

ZTerm

Version 0.9

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by

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Latest version and support available from:
GENie Mac RT, Category 5, Topic 8
CompuServe: Mac Communication Forum
America Online: Mac Comm & Network Forum

ZTerm is a shareware telecommunications program for the Macintosh. It features ZModem, YModem, XModem and CIS B-Plus/Quick-B file transfers, VT100 & ANSI-BBS emulation, including colors, and an efficient scroll back buffer (size is limited by available memory). It uses a Phone List file to hold many Dialing setups. Each setup contains the phone number, port settings and many other settings. Each dial setup appears in the Dial menu to allow easy connection to all of the services you connect to. MultiFinder friendly. It supports 9 and 12 point text and a resizable terminal window. THE FINE PRINT: It requires 512k, the 128k ROM or later and System 4.1 or later. The shareware fee is \$30 US (registration only) or \$40 US (registration with disk).

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1. Introduction

Terminal Emulation

The purpose of a terminal emulator is to connect your computer to another computer, either through a modem or a direct connection. There are other cases where the connection might be going through something other than a modem, such as a PBX system in the work environment. Terminal emulation software running on your Mac makes it act like a video display terminal, which basically displays incoming information on the screen and sends characters you type to the other computer. In addition, most terminal emulators support file transfers, so you can send or receive files from the other computer with error recovery.

The most common uses of a terminal emulator are: 1) to connect to a bulletin board system (BBS) or online service to read messages and download files; 2) to connect to a mainframe or Unix system to do “real” work; 3) to connect to another Mac or PC to exchange files with a friend.

Shareware

Shareware is a means of distributing software that lets you evaluate the software before committing your money. It also eliminates the middlemen, so you can get quality software and good prices. Shareware is distributed on bulletin board systems, online systems like CompuServe and America Online, by user groups, and from user to user. When you get a shareware program, you have the opportunity to try it out for some period of time to see if it does what you need. After trying it, you must either send the registration fee to the author or stop using the program. In addition, once you register, you normally don’t have to pay for updates. (This really depends on the shareware author; many don’t request additional fees for updates once you are registered.)

Registration

After using ZTerm for 30 days, you must either register or delete any copies that you have. Registration has the following benefits: support of the development of quality Mac software, use of ZTerm without a guilty conscience, details of future plans and telephone support. Registration only is \$30 (US); Registration with Disk of current release is \$40 (US). Purchase Orders must order the registration with disk (most companies like to receive something before paying the bill). All payments must be made in US funds. If you don’t have the registration form (ZTerm Registration), just send your check and your name, address to:

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International Users:

Registration must be made in US funds. An International Money Order, a check drawn on a US bank, or US currency are all acceptable. At this time, I cannot accept payment by VISA, etc. Also, I have received a few checks with ‘Not Negotiable’ written on them. Please don’t do this. To U.S. banks this means “Do not honor this check.” You can put Not Transferable on them.

Support

GENie: ZTERM

Compuserve: 72155,1560

America Online: 'Dave ZTerm'

Internet: davea@tso.uc.edu

AppleLink: ALVERSON.SW

Support is currently available by leaving me a message on GENie, in the Mac RT Bulletin Board, Category 5, Topic 8. On CompuServe, leave a message in the MacComm forum, section 3 (Term Programs) to 72155,1560. On America Online, leave a message in the ZTerm folder in the Communications & Networking forum. On usenet, I try to read the comp.sys.mac.comm group when I can. Registered users will get my phone number for support.

The latest version of ZTerm will always be available in the Mac RT on GENie, in CompuServe's MacComm forum and the Communications forum on America Online.

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2. Getting Started

System Requirements

ZTerm was designed to run on a machine with at least 1 megabyte of memory, using the MacPlus or later ROMs and running System 4.1 or later. It may run on earlier systems/ROMs, but I don't have the equipment to test this. I have made every attempt to make it usable by the largest number of users.

Installation

In most cases, the only file you will need for installation is the ZTerm application itself. You can also use the ZPhoneList file that is distributed. (It's just a sample.) If it does not find the ZPhoneList file in the same directory as the application, it will create a new one.

If you are using a Mac 512 or MacPlus with System 7, you will need to install the ZTerm Keyboard file into your System in order to be able to use the Option key as a Control key. This should only be used with the US System software, because it is a modified version of the US keyboard resource. If you are using a non-US system, you can set ZTerm to use the Command key as a Control key (in the Terminal Preferences dialog).

Now you are ready to run ZTerm and set it up.

Setting Preferences

The top half of the Settings menu are settings for each service. All the options in these dialogs are stored separately for each service. The lower half of this menu is for preferences, which are global. This means when you set the Receive Folder, it will be the same for all services.

Select the General Preferences item. The TEXT file creator determines how TEXT files created by ZTerm (by capture, Save Selection, etc) are marked. Use the pop up menu to select the text editor or word processor that you want to use to read text files. Click on OK, then select Terminal Preferences. Change the font size if desired. The custom terminal fonts in ZTerm are in 9 or 12 point. Any other size will not look very good. If you have a 9 inch screen, you will probably want to use the 9 point font to be able to get a 24 by 80 terminal window. If you have a larger monitor, you may want to use 12 point, which is easier on the eyes.

Now select Modem Preferences. First, select the port that your modem or connection is attached to. The Initialization string is sent to your modem when you start ZTerm. In many cases, you can leave this empty and ZTerm will work fine. But if you use other communications software, it might leave your modem in a different configuration. For example, some software might set your modem to send "numeric result codes" instead of "verbal result codes." When most Hayes compatible modems connect, the verbal result code is CONNECT 2400 (or some other speed). The numeric result would be 10 (or 1 or 5). ZTerm wants to see the verbal responses, so setting the modem to verbal result codes is a good thing to put in the initialization string. The default initialization string for ZTerm is "ATE1V1^M". The AT is used to get the modems attention for a command. E1 means to turn on the echoing of commands. V1 tells it to use verbal result codes. The ^M means Control-M, which is the same as a RETURN. This tells modem that you are finished typing, and to process the command. The init string that I use is ATE1V1S11=70^M. The S11=70 means to set register 11 to a value of 70. Register 11 sets the duration and spacing of touchtones in milliseconds. On my modem, the default is 95, so setting it to 70 makes it

dial a little faster. See the section on modem commands for more information.

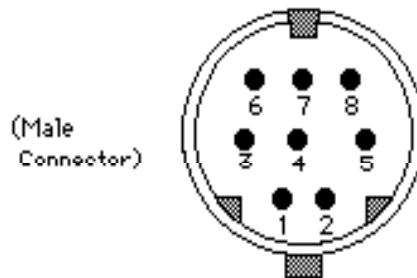
The DeInitialize string is like the Initialization string, but it is sent when you quit ZTerm. You can usually leave this blank, but you may want to use it to disable something that you turned on in the init string. For example, if your init string turns on the auto answer feature of the modem, you may want to turn it off when you exit ZTerm.

The Dial Substitution strings can be used for things that could be common to several services. I have set •1 to “*70,” which will disable call waiting. Then I can put •1 in front of the phone number for a service, and it will dial the *70 first. The comma after the zero causes a pause in the dialing, usually one second. You could use one of the dial substitutions for your long distance numbers. You might normally set it to “1”, so it will use your normal long distance carrier, but if you wanted to try another, you could change the string to something like 10288, which will dial long distance using AT&T.

In the Color Preferences, you may want to check the Use Color option if you call PC based bulletin boards and you have a color monitor. Finally, use the Receive Folder selection to set the folder that you want downloaded file to go to.

Adding a New Service

Now let's add a dial entry for a service that you use a lot, like a local bulletin board. First, select Directory from the Dial menu. Now click on the New button. This will bring up the connection dialog, with the service name and phone number blank. Enter the name for the service. This will appear in the dialing directory and the Dial menu, so you don't want a super long name. Enter the phone number for the service. Select the highest data rate that you know your modem and the service can handle. Choose 8 data bits and no parity, unless



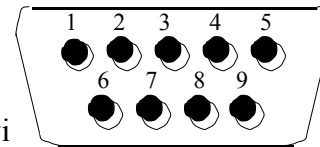
you know that another format is required.

The most common alternative is 7 data bits with either even or odd parity. This is more common on mainframes; almost all bulletin boards that run on personal computers will accept 8 data bits, no parity. Select 1 stop bit.

If you know the service does not echo what you type, check the Local Echo option. Most BBSs do echo what you type, so in most cases you leave this unchecked. You can usually leave XOn/XOff checked because most services support it. If you have a high speed modem and a hardware handshake cable, check that option. See the section on High Speed modems for more things you may need to set up. Click on OK and your new entry will now appear in the Dial directory and the Dial menu.

Now highlight your new service in the directory and click on the Terminal button, which brings up the Terminal settings dialog. The 'No Extended Chars' option should be checked unless you know the service uses extended characters. Extended characters are usually generated with the Option key and include the foreign characters and special symbols. If the service uses "ANSI graphics" you will want this option unchecked, and click on the PC ANSI-BBS emulation button. If the service is a Unix or DEC system, you will probably want to click on VT-100 emulation. If you use the VT100 keypad with this service, you

should check that option. On many DEC systems, you will want to check the “Send



RUBOUT for Backspace/Delete” option. Click on OK. Now with the highlight still on the service you just added, click on the Set button. The settings you just made for this service will be loaded and the window title will change to the name of the service to show you what settings are loaded.

The Text Pacing options are used when you are pasting to the modem, or sending a text file. See “Uploading a composed message” in the Terminal Functions section for more information on these settings. For now you can leave them as is.

Now select the Transfer Options command. The first two items set the default send and receive protocols for this service. A file transfer protocol is the set of rules two computers use to transfer a file from one to the other. You can start a file receive with the default protocol using Command-R and file send (default send protocol) with Command-S. The Command key is the one with the Clover-leaf (or Apple symbol) on it. It is usually used to select menu items with keyboard equivalents, like Command-Q to quit.

If you know what protocols the service supports, you can select these now. If you don’t, you can always set them later. Note that the B-Plus or Quick-B protocols used by Compuserve are not listed. This is because a B-Plus transfer on Compuserve is started by the Compuserve host by sending a special sequence. There is no menu in ZTerm to start a B-Plus transfer. If the service you are setting up is Compuserve, make sure you check the “CIS B+ / Quick-B Protocol” option. For X/YModem Error Checking, the “Try CRC, fallback to Checksum” option is usually the best. For the Sent Filenames option, the safest choice is “Remove funny characters.” If the service is a BBS running on an MS-DOS computer, you will want to select “MS-DOS (8.3) limits.” Click on OK.

If the service supports ZModem transfers, you may want to set the ZModem Options now. If the service is a Unix or Opus host, you can click one of those buttons, otherwise don’t worry about that part. Set the SubPacket Length to Auto and leave the remaining items blank or unchecked. Click on OK and you now have made all the settings for the service you just added.

Calling the New Service

So why not try calling this new service. There are two ways to dial a service. You can select it from the Dial menu, or you can highlight it in the Dialing Directory window and click on the Dial button. ZTerm will bring up the Dialing status window, which will show the name of the service and the number it is dialing. If the number is busy, it will usually show either BUSY or NO CARRIER in the Response field. The Attempts field shows how many times it dialed but failed to connect. It will keep trying until it connects successfully or you Cancel it with the Cancel button or hitting the ESC key. When it does connect, the dial status window will go away and it will print the connect message in the terminal window. Now that you are connected, you can log in and read messages or whatever you use the service for.

Downloading a File

When you want to download a file, you first must know what protocol is supported by the service and ZTerm. On most BBS’s, you can get a list of the supported protocols when you select the download command. XModem is supported by nearly all BBS software, so we

will describe XModem downloads first. You need to know the name that the BBS uses for the file; there will be one or more commands you can give the BBS to list the files available for download. Also, the files are usually separated into different areas to make searching easier. You also need to know the command to start a download. Many BBS's use 'D' for download. Next it will usually ask you what protocol to use. For this example, select XModem (or XModem-1k if available). It will also ask you what file you want to download.

Some systems may ask you additional questions (for example, if you want to be automatically logged off when the transfer is complete). When all is ready, the BBS will usually print a message telling you that it is ready to start the download. Now you must tell ZTerm to start receiving the file. Pull down the File menu and select XModem from the Receive files sub-menu. (If the default receive protocol is set to XModem, you can just select the Receive XModem command.) ZTerm will display the file transfer status window and the transfer should start in 5 to 10 seconds. If nothing has started after 30 seconds, something has probably gone wrong. In this case, you should hit the Cancel button and try to start the download again.

If the BBS supports the ZModem protocol, you should use it instead of XModem because the procedure is much simpler and faster. Tell the BBS you want to download, tell it to use ZModem and give it the name of the file. The BBS will send a sequence that will cause ZTerm to automatically start receiving the file using the ZModem protocol. ZTerm will display the transfer status window and the transfer will begin.

Note that XModem and YModem require you to start the file transfer on the other computer first, by issuing the download command, then starting a file receive in ZTerm. ZModem and the CompuServe B-Plus and QuickB protocols only require you to tell the other computer to start sending the file, and ZTerm will detect this and start receiving the file automatically.

Reviewing the Session

If you connect to a service that you have to pay for per minute, then you want to keep your time on the phone to a minimum. This would include the pay services (CompuServe and GENie, etc) as well as any BBS that you call long distance. If you are reading messages on this type of service, the best thing to do is to have messages you are interested in displayed, but don't take your time to read them while you are online. Then, after you log out, you can scroll back in the buffer and read the messages at your own speed.

If you have the Extended keyboard, you can use Home, End, Page Up and Page Down to move around in the scroll buffer. However, if the VT100 Keypad option is turned on in Terminal Settings, you will need to hold down the Shift (or Option) key when you use these keys. If you don't press Shift (and the VT100 keypad option is checked), it will send a sequence of characters to the modem.

Printing a Message

While you are reviewing the messages in the buffer, you see something that you would like to print out. Select the text, either by click and drag, or by a click at the start and a Shift-click at the end, then choose Print Selection from the File menu. This will give you the normal print dialog; click on OK or Print and off it goes. If the selection includes PC graphics, you will have to make sure that you have the right font set in Print Options. I normally keep the print font set to Times or Palatino. But to print PC graphics you will need to set the print font to Terminal Font.

3. Terminal Functions

Scroll Back Buffer

To me, one of the most important features in terminal program is its scroll back buffer. This allows you to look back at words that zipped by on your screen a few minutes ago. It should be simple, unobtrusive and fast. ZTerm will save lines that are pushed off the screen by a line feed or a clear screen. It will not put more than two blank lines in a row in the buffer. This means if it receives a clear screen code and there are only two lines of information, you will NOT get 22 blank lines in the scroll back buffer (what a waste). The buffer is stored in memory and when the buffer fills up, ZTerm will try to allocate more memory for the buffer. If it cannot get more memory, ZTerm will remove lines from the top of the buffer (the oldest lines). The scroll back buffer does not store any character attributes like bold or colors – it only stores the text.

You can scroll around in the buffer while data is coming in, while a file transfer is in progress and when ZTerm is dialing. If you have the Extended keyboard, you can use Home, End, Page Up and Page Down to move around in the scroll buffer. However, if the VT100 Keypad option is turned on in Terminal Settings, you will need to hold down the Shift (or Option) key when you use these keys.

The Find command in the Edit menu allows you to search the scroll back buffer for a sequence of characters. Any changes to the search string will reset the search position to the top of the buffer (the oldest line). Clicking in the terminal window will set the search position to the line you clicked on. After you have found an occurrence, if you click the Find button again (or use the Find Again command) it will find the next occurrence. If it beeps, the string could not be found.

When you select text in the scroll back buffer, you can Cut, Copy or Clear it, and you can save it to a text file (Save Selection), or append it to an existing text file. Cut and Clear will not remove text from the last 24 lines because it is not in the scroll back buffer yet. If the clipboard has text on it, Paste will start sending the text as if you were typing it, using the options selected in Text Pacing. Command-Period will cancel a Paste command.

Append Selection to a File

Many people will store messages that they see in a file on their Mac, in case they want to refer to it later. For example, I store lots of messages that I see about ZTerm. For each of the services that I frequent, I have a folder and in it I have a file for every month that holds the messages I saved that month. When you use the Append to... command, it will add the selected text to the end of the file you pick. It will also change the “last append file” to that file. The name of this file will appear in the next menu. When you see another message you want to save, you can append it to this file by using this second append command (or use Command-Shift-N).

Uploading a Composed Message

Many times when you want to post a message or a reply on a bulletin board, you might want to compose the message when you are offline. This is especially true if you are going to post the message on a service that charges per minute. So you type your message using your word processor or text editor and save it in TEXT format. Some editors always use TEXT format (like miniWriter, TeachText, McSink or QUED). Most word processors have their own file format that includes lots of formatting information in addition to the text. But most will let you save a file in a TEXT only format. Some give this option in the Save

As dialog (like Word 4, with full menus on). Others have a separate menu command; MS Works has the Export command, which saves the file in a TEXT format.

When you select the Send Text command and choose a text file to send, ZTerm will send the text in the file like you are typing it. When you are typing or sending a message to a service or BBS, some want you to hit return when you get near the right margin. Others will automatically wrap text to the next line, just like most word processors do. When you are composing a message for a service without auto-wrap, you will need to break the lines yourself by entering a return at the end of each line.

Text Pacing

When you are sending a composed message with the Send Text command, ZTerm can send the text a lot faster than most people could type. Some services can't handle received the text at such a high rate and could lose characters. In these cases, you need to use Text Pacing, which is a means to slow down the rate that the text is sent.

The first option in Text Pacing Options is Wait for char echo. This is the slowest and most conservative option. When ZTerm sends a character from your text file, it will wait until that character is echoed back before it sends the next one. This will only work with services that echo what you type. Most do; GENie is one that does not. If you don't use wait for echo, you can use the remaining options to slow things down. When the line prompt character is filled in, ZTerm will wait until that character is received (after a line has been sent), before it starts sending the next line. The last two options let you set a delay after each character and after each line. The values are in sixtieths (1/60) of a second, so a value of 30 would be one half second. If you use a delay between characters, it normally would be small, say between 1 and 5. Typical values for the delay between lines would be between 10 and 60, but could go even higher.

If you leave all these options blank or off, ZTerm will send the text as fast as it can. Many BBS's run on personal computers will be able to handle this if the computer is handling only one line and is not doing any other processing.

Person to Person Modem Connection

There are times when you may want to connect to a friend's Mac (or PC), usually to transfer some files. The easiest way is for one side to enable auto answer and have the other person call. For example, I could enable the auto answer feature in my modem and tell my friend to dial me through his modem. The modem command "ATS0=1" will enable auto answer on most Hayes compatible modems. This command tells the modem to set register zero to a value of 1. The zero register selects how many rings before the modem will answer the phone and try to establish a connection. You can even add an entry to your dialing directory called "Auto Answer On" and set the phone number to "ATS0=1".

For a person to person connection, you usually want to turn on Local Echo so you can see what you are typing. When I connect like this, I always exchange a hello, etc, to make sure that the connection is OK. Then if I am sending a file to him, I use ZModem so that he will not have to do anything to start the transfer (because ZModem has the autodownload feature).

Keyboard Buffer

The keyboard buffer is most useful for online conferences (for example, on GENie or CompuServe). Selecting this command will bring up a keyboard buffer window and you can type into this window and perform any editing. When you hit RETURN, the contents

of the buffer are sent out. If you have ever tried sending a message during a conference without a keyboard buffer, you know how confusing it can get. If other users send messages while you are typing your message, the characters of your message can get mixed in with the other messages and get spread over several lines. With the Keyboard Buffer, you type your entire sentence locally (and edit it if needed) and its all sent out when you hit return.

Dialing Directory

ZTerm uses the ZPhoneList file to hold setups for the various services or BBS's that you like to call. Each setup will appear in the Dial menu and in the Dialing Directory window. Each Dial setup will save all of the settings from the Settings menu above the dividing line. The ZPhoneList file also contains some global settings that apply to all setups. You can have multiple phone list files. If you open ZTerm, it will look for ZPhoneList in the same folder and if its not there it will create it. However, you can double click on a phone list file and ZTerm will use it. You can create different phone files by renaming or duplicating one that ZTerm has created.

The Dialing Directory window is where you do all your maintenance of the phone list. You add a new service with the New button. Delete will let you remove the highlighted service. You can edit the connection settings by highlighting the service and using the Connection button (or double click on the service). You can rename an entry by changing the name in the Connection settings window. The Manual button lets you enter a number to dial without adding it as a new service. The Set button will load the settings of the highlighted service without dialing it.

Queue Dialing

If there are several busy BBS's that you would like to connect to, you can mark them for Queue dialing and ZTerm will call each one, round robin, until you connect to one (or Cancel the dialing). Setups can be marked or unmarked in the Dialing directory, by using the Mark and Unmark buttons, or clicking in the leftmost column of an entry. They can also be marked by selecting the service in the Dial menu with the Shift key held down. ZTerm will automatically mark an entry when a dial attempt fails, and will unmark an entry when a connection is made.

ANSI Graphics

The emulation that I call "PC ANSI-BBS" is called many things by many people. Two things make up this emulation: a font that is used by PC's, which include a lot of line and box drawing characters; and handling the escape sequences that most PC BBS's use. These sequences are pretty much the VT100 sequences (based on the ANSI X3.64 specification), with additional sequences to change foreground and background colors. If any of the services you call are BBS's run on a PC, you should set the emulation for that BBS to PC ANSI-BBS in the Terminal Settings.

Call Waiting

Call Waiting is an option available from many telephone companies that can cause problems with modem communication. With this option, when you are using the phone and someone tries to call you, you will hear a short beep. This is fine when you are talking, but when it's your modem using the phone, the beep can get the modem real confused. You will probably get some garbage characters received or the modem could hang up. Most modem users with call waiting disable this feature when making a modem call. If you have TouchTone service, you dial *70 then dial the number. For rotary service, you would dial 1170 then the number. These codes are the most common, but your telephone company

may use other codes to disable call waiting.

So in the connection settings, you would put “*70,xxx-xxxx” for the phone number. The comma adds a short delay for the phone company to handle the disable function. Another way would be to set one of the dial substitution strings, say •1, to “*70,” in the Modem Preferences. Then you can put •1 in front of each phone number, like “•1 xxx-xxxx”. If you ever wanted to have call waiting enabled during a call, you could go to Modem Preferences and change •1 to no characters.

4. File Transfers

X Y Z Modem

XModem, YModem and ZModem are names of file transfer protocols, which are a set of rules that two computers can use to send a file from one computer to the other. A protocol will usually provide error detection and correction, by re-sending the portion that was received in error. XModem is the first public domain protocol developed for use with microcomputers and is one of the most widely supported. It was developed by Ward Christensen back in 1977.

YModem is a variation of XModem that sends an additional block of information before the file is sent. This block zero contains the file name, size and modification time and date. Because the file name is sent with the file data, files could be sent in batches, which is why this protocol is sometimes referred to as YModem-Batch. YModem was developed by Chuck Forsberg in his YAM (Yet Another Modem) program.

YModem-G is a variation of YModem that is useful for direct connections to another computer or when using error correcting modems. The receiver does not send any ACKs, so the sender just pumps out the file as fast as it can. If an error is detected, the transfer is stopped. There is no error recovery.

The ZModem protocol was developed for the public domain under a Telenet contract. Its goal was to “alleviate the throughput problems network customers were experiencing with XMODEM and Kermit file transfers.” It was developed by Chuck Forsberg/Omen Technology. It overcomes many weaknesses of older protocols and adds several useful capabilities. For additional information on the ZModem protocol, look for the file YZMODEM.ARC available on many BBS's, including TeleGodzilla: 503-621-3746.

Omen Technology continues to enhance the ZModem protocol, adding proprietary new features. The extended protocol is referred to as ZModem-90. ZTerm does not implement any of these new features because they are not in the public domain, and would require a hefty licensing fee to use them.

ZModem

The ZModem file transfer protocol is arguably one of the best general purpose file transfer protocols for personal computers. Some of its features include:

- various options to let it operate efficiently in a wide range of communication environments. The most common mode is full streaming, where there is no wait between blocks—the receiver only talks when he has an error.
- the sequence that starts a file transmission can be detected by the receiving communication software, which can then trigger its receive routines. This is sometimes referred to as AutoDownload.
- **Crash Recovery** - A file transfer that is interrupted by modem disconnection (or other reasons) can be restarted and it will pick up where it left off. Note: if the Mac crashes or loses power during a transfer, you may not be able to restart the transfer because the partial file was not closed by ZTerm.
- All ZModem transfers are batch transfers: multiple files can be sent per transfer, each file is sent with its file name, file size and date of last modification.
- 32 or 16 bit CRC's will error check all blocks: data blocks and control messages.

For receiving files using the ZModem protocol, just start the sender and ZTerm will detect that it should start receiving files with ZModem. On the Opus BBS for example, to download the file “newfiles.txt” just type “dz newfiles.txt” and ZTerm will receive it.

For sending files using ZModem, ZTerm can send a command sequence to put the receiver in a receive ZModem mode. In the Settings menu, ZModem Options will bring up a dialog that includes the command to send to put the other end into ZModem receive. For Opus, this should be set to “uz” followed by a return. When you select Send ZModem, you will first select what files to send. When you start the transfer, ZTerm will send the sequence from the ZModem Options and then the transfer will start.

Binary File Type Detection

ZTerm will detect certain types of binary files, and set the appropriate creator and type for the kind of file. It detects the type by either looking for a specific sequence of bytes at the start of the file (a signature) or by matching the end of the file name (e.g. the extension of an MS-DOS file). See the appendix on ZTerm resources for additional information.

Text Detection and Conversion

When ZTerm is receiving a file, it inspects the first 128 bytes to determine if it should be treated as a text file. If all of these bytes are Macintosh printable characters or typical text control characters (return, line feed, tab, etc), then it is considered a text file. The file type will be set to TEXT and ZTerm will perform End of Line conversion. If the text has CR/LF at each line end, ZTerm will filter out the LF. ZTerm currently does not filter any other control characters.

Resume an Interrupted Download

If a download is interrupted by disconnection, Cancel, or whatever (but not a power failure - the file won't be closed properly) it can restart where it left off using ZModem. A partial file will have the original file name with a bullet (•) at the end. If you try to download a file and a file with the same name plus a bullet at the end is already in the current receive folder, ZTerm will resume the download where it left off.

MacBinary II

ZTerm supports the original MacBinary format for the complete transfer of Macintosh files and their additional file information. The MacBinary II standard (dated July 1987) is also supported. The file transfer status dialog will display either ‘MacBinary’ or ‘MacBinary II’ when that format is being used.

Performance Log

Each time you transfer a file with ZTerm, it will place an entry in its performance log file. The file is named “ZTerm Xfer Log” and it is stored in the same directory as ZTerm. It is a standard TEXT file with TABs between each field, so it can be imported to many spreadsheets, databases, etc. Since this file could grow large, you may want to periodically rename it. At the end of the year, I rename mine to have the year at the end of the name. The transfer log can be disabled in General Preferences.

Transfer Efficiency Calculations

I don't know if there is an accepted procedure for transfer efficiency calculation, so I will just explain how I am currently calculating efficiency. All ZTerm timings use the Macintosh TickCount, which has a resolution of 1/60th of a second.

For receiving files using ZModem or YModem, the clock starts when “block zero” (the block with the file name and other information) is received. This block zero is not the same as the MacBinary header. For XModem file receives, the clock starts just before the initial NAK (or whatever) is sent. The clock stops when all file data is received, written and the file is closed.

For sending files using ZModem or YModem, the clock starts after block zero is sent. For XModem, it starts when ZTerm starts waiting for the initial NAK. The clock stops on ZModem file sends when the ZRINIT response is received for the ZEOF message. For YModem and XModem, it stops when the ACK response is received for the EOT message.

The CPS figure (characters per second) is the total file bytes (does not include block zero) divided by seconds. The efficiency figure is CPS times 10 bits per data byte divided by BPS (bits per second, sometimes called baud rate).

Hardware Handshake

If you have a high speed modem or one with compression and error control (like MNP, V.42 and V.42bis), you may want to use hardware handshaking to get the most efficient file transfers. This requires a correctly wired cable and additional modem configuration. See the section on High Speed Modems.

Compressed Files

The files available for download on BBS's and online services are almost always in a compressed format. There are several “archive” programs that will compress one or more files into an “archive file.” In addition to reducing the time to transfer the file, it provides a means to make a package of several related files, so that anyone who downloads a package will get any necessary files. For example, the ZTerm archive file that I upload contains the program, this documentation file, and several other useful files. Packaging them together in one archive file will make sure that a downloader will get all the files.

Here are the file extensions for the common archive formats. A file extension (which is more common with non-Mac operating systems) appears at the end of the file name and provides some indication of the type of file.

.cpt	Compactor format -- use Compact Pro or Extractor
.hqx	BinHex format -- use BinHex 4.0, BinHex DA, any of the StuffIt programs, Compact Pro, or mcvert (for Unix).
.sit	StuffIt format -- use any of the StuffIt programs.
.sea	Self Extracting Archive. Double-clicking on this should give you the uncompressed file.
.pit	PackIt format, not used much any more -- use PackIt or any of the StuffIt programs.
.image	DiskCopy images of a floppy disk. This is the format used for the System software on many services. Use the DiskCopy application to translate these back onto disks.
.Z	Unix 'compress' files. Uncompress with the Unix command 'uncompress' or on the Mac with MacCompress (available from sumex).
.dd	DiskDoubler format. Use DiskDoubler or DDExpand.

MultiFinder

ZTerm will operate in the background under MultiFinder or with System 7. Once a file transfer is started, you can move ZTerm into the background.

CompuServe B-Plus and Quick-B

Compuserve has its own file transfer protocol that is very efficient. Quick-B was an interim protocol that was established while they finalized their current enhanced protocol which they call B-Plus. When CompuServe asks you what protocol to use for downloading, you should pick the B-Plus option. The QuickB option will also work just fine. There is no menu entry to start a B-Plus transfer; Compuserve will send a sequence that will start the download. Note: You must enable this option in the Transfer Options Settings.

Bonus Secret Feature #1:

If you are using an Opus BBS system, and ask for a file listing and you see a file you would like to download, just hold down the Command key and double click on the file name. ZTerm will send "dz" followed by the name that you double clicked, then a RETURN. I would like to eventually make this feature more general to work with different systems.

5. Scripting

A script is a sequence of commands. ZTerm scripts are stored in TEXT files, which you can create with a text editor or most word processors (you must save the file in a TEXT only format). A script may be run from the “Run a Script” menu command, or by a macro string or automatically run by the dialer when you connect to a service. If a macro string starts with ® (Option-R) followed by the name of a script file in the ZTerm directory, that script file will be run when you select that macro (from the Macro menu or with Command - number). For example, I could set a macro label to “Read New” and set the macro string to “®readnew.zts” and when I select Read New from the Macros menu it would run the readnew.zts script file in the ZTerm directory.

Logon Scripts

When ZTerm connects to a service, it will look for a text file with the same name as the service with a “.zts” on the end. For GENie, it will look for a file called “GENie.zts” in the ZTerm folder. If it finds a file, it will run the script.

String constants can use any form of quote: "one", 'two', “three”, ‘four’

Control characters in a string constant are specified with the ^ (carat) followed by the letter: “^M” is control-M, which is the Return character.

Built-in variables

\$Account - string in the connection dialog
\$Password - string in connection dialog
\$Service - name of current service
\$Date - in the short format
\$Time - in hours, minutes and seconds
\$Day, \$dd - day of month (\$dd has zero fill)
\$mm - month
\$year
\$yy - low two digits of year

Script Commands

Beep

Beep <duration> -- if you are using the simple beep, you can give a duration.
Beep 4 ticks

Close capture -- close the capture file.

Display <string(s)> -- display text in the terminal window
Display “Connected at ” \$time

Hangup -- hangup the modem (same as the menu command)

Open capture <capture file name> -- start capturing data to a file.
Open capture "GENie.log"

Send <string(s)>

Send “CIS^M” -- send the string (^M is a return)

Send \$account “,” \$password “^M” -- send multiple strings

Wait <durations> -- pause a specified amount of time

Wait 2 seconds

Wait 40 ticks -- a tick on the Mac is 1/60 second (40 ticks is 2/3 second)

Wait for quiet <duration> -- wait for no incoming data for the specified time.

Wait for quiet 4 seconds

Wait for prompt <string> -- check for the given string when data stops.

Wait for prompt "Username:"

Comments -- these three forms make the rest of the line a comment:

-- HyperCard style comments

MPW style comments

; another comment character.

Example Script

GEnie.zts - Simple logon script for GEnie

wait 2 seconds

send hhh with short delay between them

send "h"

wait 10 ticks

send "h"

wait 10 ticks

send "h"

wait for GEnie to prompt for your user ID

wait prompt "U#"

send the account and password (from connection settings) with comma between them

and a return (^M) at the end.

send \$account "," \$password "^M"

send beep to wake up - you are logged in now

beep 5

display "Connected at " \$time

6. Modem Commands

A modem is controlled by sending it commands. There are commands to configure a modem and commands to attempt a connection (the dial command). ZTerm handles the dial command, but you may have to learn about some commands if you need to do any special configuration of your modem. This section will explain some of the most common commands used by “Hayes compatible” modems. Advanced modems will have additional commands which are not described here and in many cases will be unique to that brand of modem. You will need to consult your modem manual for all of its commands and settings. Some modems have a command that will print a summary of its commands. On US Robotics modems, the commands AT\$, AT&\$, ATD\$ and ATSS\$ will give a help summary on a portion of the modem commands.

There are three places in ZTerm where you can enter a modem command. In the Modem Preferences there are the initialization and deinitialization strings. These two are to do any modem configuration needed when ZTerm starts and quits. And in the Connection settings for each service there is the PreDial init string. This is to make any modem configuration changes needed just for this service. In addition, you can manually type a modem command in the terminal window. This is a good way to try out modem commands or to do one-time changes.

All modem commands start with AT, which is sometimes referred to as modem attention. You could put several modem commands together on one line. In this case, the AT would only be used once, at the beginning of the line. A command is processed by the modem when it receives a RETURN.

Here are some of the more common modem commands:

ATA - answer an incoming call and attempt to connect.

ATDT 5551212 - dial the number using touch tones.

ATDP 5551212 - dial the number using pulse dialing.

ATE1 - turn on the echoing of modem commands.

ATH0 - hang up (go on hook).

ATM0 - speaker always off.

ATM1 - speaker on while dialing until connection established.

ATV1 - verbal result codes (sends “CONNECT” instead of just “1”).

ATZ - reset modem to default configuration.

ATS0=1 - set modem to auto answer after one ring.

ATS0=0 - turn off auto answer.

7. High Speed Modems

High speed modems would include 9600 bps or higher modems and also 2400 bps modems with compression and error control protocols like MNP, V.42 and V.42bis.

Maximizing the Efficiency

To get the most out of a high speed modem, you may need to change the configuration some from the factory settings. Because the compression and error correction features can make the expected throughput somewhat variable, it is best to set the data rate between your Mac and the modem to a higher speed. This is often called “locking the port” at a higher speed. For 9600 bps modems, you would normally set the interface to either 19200 or 38400. In addition, you should use a “Hardware Handshaking” cable so the Mac and the modem can handle the variable throughput. All Macintosh models since the Mac Plus can take advantage of hardware handshaking. The Mac 128, Mac 512K and Mac 512KE cannot use hardware handshake because the serial ports have only one of the two necessary control signals available.

These are the things you need to do to set all this up:

- Set ZTerm to a fast data rate in the Connection settings (38400 for a 9600bps modem).
 - Set ZTerm to use Hardware Handshaking in the Connection settings.
 - Connect the Mac to the modem with a Hardware Handshake cable (see Appendix).
 - Set the modem to use a fixed DTE speed (&B1 for a USR HST).
 - Set the modem to ignore DTR (&D0 for a USR HST).
 - Set the modem to use CTS transmit flow control (&H1 for a USR HST).
 - Set the modem to use RTS receive flow control (&I0 &R2 for a USR HST).
- (I don't have a USR modem, but I believe these commands are correct.)

Modem Standards

V.32 is the CCITT (international) standard for modulation (the way a modem converts bits into sounds that can be carried by the voice telephone system) at 4800 and 9600 bps, full-duplex on voice-grade two-wire dial-up and leased telephone lines. It was adopted in 1984.

V.32bis, which was adopted in early 1991, is 100% backward compatible with V.32. In addition, it supports rates of 7200, 12000 and 14400 bps. It also supports a “rapid rate renegotiation” capability, which allows the modems to change speeds up or down in as little as 1/10th of a second, for example, to handle changes in line conditions (V.32 requires full retrain to change speeds, which can take 5 to 10 seconds).

V.42 is the CCITT standard for error control in modems. It defines two protocols: the primary protocol, LAPM, on which all future extensions to the standard will be based, and an Alternative protocol, defined in an annex, which provides for backward compatibility with modems that implement MNP classes 2-4. V.42 can be used with any full-duplex modem that uses async-to-sync conversion (e.g. V.22, V.22bis, V.26ter, V.32, V.32bis).

V.42bis is the CCITT standard for data compression in modems. It is based on the Lempel-Ziv-Welch technique, with extensions from IBM, British Telecom, and Hayes, and can provide up to 4-to-1 compression on certain types of data. It is currently standardized for use only in conjunction with v.42 LAPM. V.42bis doesn't imply the implementation of any particular modulation scheme; specifically, you can't assume that a V.42bis modem also supports V.32 or V.32bis.

8. Trouble Shooting

Problem: Can't talk to the modem.

Things to check: Make sure the modem cable is connected to the port selected in the Modem Preferences. If the SD light on the modem (Send Data) does not blink when you type in ZTerm, you probably have a cable problem. Try typing ATH then hit Return; if the modem responds with OK on the next line, then you are talking to the modem.

Problem: You get the message "NO DIAL TONE" when trying to dial.

Possible causes: The modem is not connected to a phone line. Someone else is using the phone.

Problem: During an XModem or YModem transfer, it keeps getting errors after 2176 or 17408 bytes.

Possible cause: something in the data path (like a terminal server) is not passing on the XON or XOFF character. For X/YModem, all characters must be passed through. See if the terminal server has a binary mode.

Problem: During a ZModem transfer, lots of errors occur after the first few blocks.

Possible cause: a flow control problem with one of the machines. Try setting a window limit to see if that helps. If you are sending, go to the ZModem Options and put 2048 in for the Window Limit. If you are receiving from a unix system (using sz), try the command "sz -w 2048 <filename>".

Problem: Modem hangs up during a download or when receiving lots of text.

Fix: If you are using hardware handshaking, you need to configure your modem to ignore the DTR line.

9. Menu Reference

The Apple Menu

The Apple menu has information about ZTerm and any desk accessories currently available.

About ZTerm... This brings up a dialog giving information about the program, the version number and registration information.

The File Menu

Start Capture... This is ASCII capture that will save all received characters to the selected file. When capture is active, the menu will read Stop Capture.

Send Text... After selecting a TEXT file, this will send the characters of the file. The transmission will be paced by options selected in the Text Pacing settings.

Close Window Closes the front window.

Receive File(s)... This menu has a sub-menu for the various protocol receive options. XModem receive will put up the normal Save dialog so you can select the file name and folder to put the received file in. The other options all get a file name from the sender and store the file in the current receive folder (currently the same as the default folder).

XModem XModem is one of the most common transfer protocols for personal computers. The Transfer Options settings let you select what type of error checking is requested (CRC or Checksum). ZTerm's XModem will accept 1024 or 128 byte blocks; the sender selects the size of blocks.

YModem YModem is based on XModem, but the sending program also sends the file name, the size and the date of the file. This protocol is often called YModem Batch because many files can be sent in a batch.

YModem-G YModem-G is a variation of YModem that is meant for error free connections like a direct connection. There is no wait at the end of a block for the receiver to Acknowledge. The receiver only signals if an error occurs, in which case the transfer is stopped.

ZModem This is normally not needed because ZTerm detects the sender starting a ZModem transfer and automatically starts a ZModem receive. This is called AutoDownload in ZModem parlance. Files are stored in the current receive volume and folder. For example, if you are connected to an Opus BBS, you can type "dz stuffit.sit" and Opus will start the transfer. ZTerm will detect this and receive the

file.

(Default Receive)	The item after “Receive Files” in the File menu is the default receive option for the current Setup. You should set the default to the normal method you use to receive files for each setup. Then you can just select this item (or Command-R) to receive a file. The default can be set in the Transfer Options dialog.
Send File(s)...	This menu has a sub-menu for the various protocol file send options.
XModem	Send a file using the XModem protocol (with 128 byte blocks). The receiving program determines whether CRC or checksum is used for error detection; ZTerm will handle either.
XModem-1K	Like XModem, above, but using 1024 byte blocks. Some communication software (including BBS's) mistakenly refer to this as YModem.
YModem-128	Send file(s) using the YModem protocol with 128 byte blocks. This is not normally used. You would usually want to use 1024 byte blocks whenever possible.
YModem-1K	Send file(s) using the YModem protocol with 1024 byte blocks.
ZModem	Send file(s) using the ZModem protocol. After the files are selected and Start is clicked, ZTerm will first send the characters set up in the ZModem Options dialog. This is usually needed to get the other computer ready to receive files using the ZModem protocol. After these characters are sent, the transfer will begin.
(Default Send)	The next item in the File menu is the default send option for the current Setup. You should set the default to the normal method you use to send files for each setup. Then you can just select this item (or Command-S) to send a file. The default can be set in the Transfer Options dialog.
Transfer Convert	This menu has a sub-menu to select the desired file transfer conversion option. You can set the default conversion for each setup by holding the Command key while you select the desired conversion option.
Smart MacBinary	On receive, MacBinary files and text file are automatically detected and converted as appropriate. All other files are received as binary. On send, TEXT files are sent as text, files received as binary by ZTerm are sent as binary and all other files are sent as MacBinary II. This is the best option if you will be sending a mix of MacBinary files and other files.
Always MacBinary	This option would be useful when connected to another Macintosh. All files are sent as MacBinary II, even text files. Receive uses the same detection of Text and MacBinary files used by Smart MacBinary.

Binary Data	On receive, all files will be received as binary files with no conversion. On send, all files will be sent as binary and only the data fork will be sent.
Text	Receive with this option is a little more lenient in its text detection than Smart MacBinary. On send, the data fork of a file is sent with appropriate text conversion.
Append to...	Will append the selected text to a file you specify. It also will remember the file, so you can append addition text to the same file using the next command.
Append to <last>	Will append the selected text to the last file that text was added to for this service.
Save Selection	If there is a block of text selected in the scroll back buffer, this will put up the standard Save dialog to save the selection to disk.
Page Setup...	Will present the standard page setup dialog, where you can select the paper orientation and other options. Note that margins and the print font can be set with Printer Preferences in the Settings menu.
Print Selection	This will print the text selection to the printer.
Quit	This will exit ZTerm. If the current setup has been changed, it will ask if the setup should be saved.

Edit Menu

Undo	For use by desk accessories. Not used by ZTerm.
Cut	Copy the selection to the clipboard and then remove it from the scroll back buffer.
Copy	Copy the selection to the clipboard.
Paste	Start sending the text that is on the clipboard. This can be stopped by pressing Command-period.
Clear	This will remove the selection from the scroll back buffer.
Copy to Modem	Copy the selection to the clipboard, then paste.
Select All	Selects all the text in the buffer and the current screen.
Keyboard Buffer	This will open the Keyboard Buffer window. You can enter a line here and when you hit RETURN, the whole line is sent out the serial channel. This is especially useful for online conferences.
Find...	This will let you search the Scroll Back buffer. The search is case insensitive; searching for MAC will find Macintosh and Mac. The

line that the match appears in will be selected (and highlighted). The search begins from the top of the buffer (the oldest line). Clicking on the Find button again will find the next occurrence. If you change the find string, it will reset the find position so that it will start again at the top of the buffer when you click Find again.

Find Again This will repeat the last search.

Clear Scroll Buffer... This command will clear all lines from the Scroll Back buffer. After you log off a service and have reviewed the buffer and printed or saved any portions that you want to preserve, you might want to clear the buffer before calling another service. If you hold down the Shift key it will also clear the current terminal screen. This item will prompt you to make sure you want to clear the buffer if the confirmation option is enabled.

Save Lines Off Top When this is checked, ZTerm will save lines to the scroll buffer when they are scrolled off by a line feed or clear screen sequence. This is normally checked, but there are a few situations where you might want to turn it off.

Dial Menu

Directory... This will display the Dialing Directory window, which lists all the current services in your phone list. You can add, delete or modify services from this window. The Manual button will ask you for a number and then will dial it (to try a number without adding it to your phone list).

Save Setup This will save the current settings to the current service.

Dial Marked This will start queued dialing of all marked entries in the Dial menu. If no entries are marked, it will mark the current service and just dial that one. Entries can be marked in the dialing directory or by holding down Shift and selecting the entry. An entry is automatically marked when a dial attempt returns a non-CONNECT response. Hold down Shift when you select this and it will mark all entries; hold down Shift-Option and it will unmark all entries.

Hang Up Will hang up the modem. An option in Modem Preferences lets you select hang up by pulsing the DTR line. Otherwise it will hang up by sending the command mode escape (+++) followed by the hangup command (ATH0). This item will prompt you to make sure you want to hang up if the confirmation option is enabled in General Preferences.

(dial entries) Selecting the name of a service will change the settings as they were saved for the service, then dial the phone number (if any) until a connection is made or the dialing is Canceled.

If you hold down Option when you select a service, it will load the settings, but won't dial the phone number. If you hold down the

Command key when you select a service, that service will become the default (and the menu item will be outlined). If you hold down Shift, the entry will be marked (or unmarked) for Queue Dialing.

Settings Menu

Connection... This will bring up the connection dialog. You can rename the service by changing the name here. This name will appear in the dialing directory and the Dial menu, so you don't want a super long name. You can change the phone number for the service. Leave it blank if its a direct connection to another computer. You can put a modem command in the PreDial init field, which will be sent before dialing the service. You can put your account and password in these fields; the values can be accessed from a script.

The data rate and other communication settings are here. Choose 8 data bits and no parity, unless you know that another format is required. The most common alternative is 7 data bits with either even or odd parity. This is more common on mainframes; almost all bulletin boards that run on personal computers will accept 8 data bits, no parity. One stop bit will work in most situations.

Check the Local Echo option if the service does not echo what you type. Most BBSs do echo what you type, so in most cases you leave this unchecked. You can usually leave XOn/XOff checked because most services support it. If you have a high speed modem and a hardware handshake cable, check that option, and see the section on high speed modems.

Terminal... The terminal settings dialog lets you select various terminal emulation options. You can select if extended characters should be displayed. Turning Auto Line Feed on will cause a line feed when a return is received. Line feeds are ignored when they directly follow a return. Leave the Auto Line Feed off if the service is a unix or DEC machine. If VT100 keypad is turned off, it will just send the character marked on the key.

You can select if the Backspace key should produce a RUBOUT (or DELETE) character code, which many DEC systems expect. Enabling Destructive Backspace will cause the previous character to be erased when the backspace code is received. You can select VT100 or PC ANSI-BBS emulation.

Text Pacing... These options are used for ASCII send and Paste. Wait for character echo will wait for the host to echo the character. There is a five second timeout. If wait for echo is not selected, it will use the Delay between Characters and Delay between Lines (which is used after a return is sent).

If a Line Prompt Char is specified, it will wait for that character to be received after sending a Return. You can set this to a prompt character that your host uses when it is ready for the next line of text.

Transfer Options... The first two items set the default send and receive protocols for this service. These make it more convenient to start a transfer with each service. Command-R will start a file receive with the default protocol and Command-S will start a file send (default send protocol). Note that the B-Plus or Quick-B protocols used by Compuserve are not listed. This is because a B-Plus transfer on Compuserve is started by the Compuserve host by sending a special sequence. There is no menu in ZTerm to start a B-Plus transfer. If the service you are setting up is Compuserve, make sure you check the "CIS B+ / Quick-B Protocol" option.

For X/YModem Error Checking, the "Try CRC, fallback to Checksum" option is usually the best. Send CK for CRC-1K should be used for systems (like Second Sight) which use this popular XModem extension to allow the receiver to request 1k blocks. Use Checksum Only could be used with systems that don't support XModem CRC error checking. For the Sent Filenames option, the safest choice is "Remove funny characters." If the service is a BBS running on an MS-DOS computer, you will want to select "MS-DOS (8.3) limits."

ZModem Options... Some of the items in this dialog are not implemented yet. "Command to start receive at other end" lets you define the character sequence that will be sent to the other system when you want to start sending file(s) to it using ZModem. For Opus it should be "uz^M". ZTerm will send this string when you start a ZModem file send.

The next part of the dialog lets you select the SubPacket length for ZModem file sends. The sending system always makes this choice. The "Auto" option will choose a size depending on the data rate. Window Limit can be used to enable ZModem's sliding window mode when sending files. This can solve problems with buffer overruns. The value should be a multiple of 512; typical values are 2048 or 1024. When this field is blank, it will not use sliding window mode.

Escape Controls can be checked if any part of your transmission path chokes on control characters. ZModem always escapes ^P, ^Q, ^S, ^X and their high bit set counterparts. Escape controls will cause it to escape all control characters.

General Preferences.. The first item selects what application to use for TEXT files. When you save a text file in ZTerm, it will be marked as created by the selected application. The creator code is listed to the right; its a 4 character sequence that identifies an application program. This will affect the icon displayed for a text file created by ZTerm and also selects the application that should be opened if you double clicked on the text file. You can also set the creator and file types used for unrecognized binary files. The normal values are ???/???

The logging of file transfers is enabled with the Log File Transfers option. You can enable a confirmation request before Quit, Hang Up

or Clear Buffer is performed.

Terminal Preferences This dialog lets you select the type size for the terminal window (9 or 12 point will work best). You can set the cursor to an underline or a block, and whether it blinks. The Hide Terminal Window in background option can be used to reduce screen clutter with MultiFinder or System 7.

The Command Key item lets you redefine how the Command key is used. Normal lets you select key equivalents for menu commands, like Command-Q for Quit. Control lets you use the Command key to generate Control characters. Meta (8th bit) and Meta (ESC prefix) are useful with the EMACS editor on Unix machines. Option for Control, which only appears if your keyboard does not have a control key, is another way to get control characters.

Capture Text by line will cause the capture function to write out the current line of text when a line feed is performed. This will strip out any escape sequences. If this is not checked, all received characters (except LF) are written to a capture file. The Ignore Bell option will tell ZTerm not to beep when a bell character is received. The duration of the break signal (and Shift Break) is set here, in 60ths of a second.

Printer Preferences... Here you select the font and size used by Print Selection. You can also turn off headers on the printout. You can also set the margins used for printing. Note that the right margin value is not used.

Modem Preferences.. The first item selects which serial port to use. You can modify the modem initialization string in this dialog. This string is sent when ZTerm starts up (except when the default setup has no phone number, i.e. a direct connection). The string is also sent if you hold down Option when selecting Reset Terminal. The DeInitialize string is like the Initialization string, but it is sent when you quit ZTerm. You can usually leave this blank, but you may want to use it to disable something that you turned on in the init string. For example, if your init string turns on the auto answer feature of the modem, you may want to turn it off when you exit ZTerm.

The Dial Substitution strings can be used for things that could be common to several services. I have set •1 to “*70,” which will disable call waiting. Then I can put •1 in front of the phone number for a service, and it will dial the *70 first. The comma after the zero causes a pause in the dialing, usually one second. You could use one of the dial substitutions for your long distance numbers. You might normally set it to “1”, so it will use your normal long distance carrier, but if you wanted to try another, you could change the string to something like 10288, which will dial long distance using AT&T.

The Dial timeout is how many seconds ZTerm will wait for a response from the modem after sending a dial command. A value of 60 is pretty reasonable. You can select Pulse dialing with the check box. The Hardware Hangup option is an alternative (faster) way to

tell a modem to hang up. The DTR line is only available on MacPlus and later machines. Your modem cable must be wired correctly for this to work, and your modem has to be set up correctly. Also, you can't use hardware handshaking and Hardware Hangup — they both use the same line. (Some have a switch to ignore the DTR line.)

Color... This dialog lets you enable the use of color and make some color settings. Swap Black & White reverses the meaning of the escape sequences that set the foreground or background color to black or white. I don't know if it helps any, but I put this in because Opus likes to show colored text on a black background, which is the norm for the PC world. This option should make it more normal for the Mac world (white background). The Text and Background Default Colors are used when no ANSI sequence sets the colors to something else. The defaults are also used when you view text in the scroll back buffer.

Receive Folder... This will let you select the folder for file transfers, where received files will be stored.

Macros Menu

Edit Macros... You can define the string that is sent for each macro key (Command-1 thru Command-0) and the label for each macro. The labels are used in the lower portion of the menu. Control characters can be entered with a ^ (caret) followed by the letter (^M for a return). If the string starts with ® (Option-R) then a file name, ZTerm will try to run that script file when you select that macro.

Macro Sets... This lets you create a new macro set, rename a set, delete a set or select the set to be used by the current service. Each set hold 10 macros, each with a label that appears in the menu.

Run a Script... This lets you manually start a script running. See the section on scripting for more information on scripts.

(macros) The labels of the current macro set are listed in the menu. Selecting one will cause that macro to be sent out.

Misc Menu

Clear Screen Need I say more?

Send Break This will send a break signal. If the Shift key is down, it will use a different duration. The durations are set in Terminal Preferences.

Help... This will display a dialog of ZTerm basics.

Support... This will display a dialog giving information on how to reach me.

Reset Terminal This function clears the screen, and resets many screen settings to a normal setting. If you hold down the Option key, it will also send the modem initialization string.

Show Controls	This is primarily a diagnostic tool to let you see control characters and escape sequences. This does not affect what is already on the screen; it only affects the display of incoming characters. The characters of an escape sequence will be displayed, but the function will not be performed (except carriage return and line feed).
Port Stats...	This shows some statistics about the maximum number of characters that have been waiting in the serial driver's input buffer.
Purge Buffer	This will purge any characters in the serial input buffer until there is two seconds of no data. It will timeout after 20 seconds of purging. If you hold down Option, it will write out a file with the contents of the serial input buffer (to help diagnose unusual problems).

Appendices

Key Sequences

This table shows the many command key equivalents you can use in ZTerm.

Cmd-A - Select All.
Cmd-B - Send a BREAK.
Cmd-Shift-B - Send a long BREAK.
Cmd-C - Copy selection to clipboard.
Cmd-D - Open dialing directory.
Cmd-Shift-D - Dial Marked services.
Cmd-E - Edit Connection.
Cmd-Shift-E - Toggle local echo.
Cmd-F - Find.
Cmd-G - Find Again.
Cmd-H - Hangup.
Cmd-K - Keyboard Buffer (for online conferences).
Cmd-L - Clear the scroll buffer.
Cmd-Shift-L - Clear the screen and scroll buffer.
Cmd-M - Copy selection to modem.
Cmd-N - Append selection to file.
Cmd-Shift-N - Append selection to last append file for this service.
Cmd-P - Print Selection.
Cmd-Q - Quit.
Cmd-R - Receive file with default receive protocol for this service.
Cmd-S - Send file(s) with the default send protocol for this service.
Cmd-T - Terminal settings.
Cmd-V - Paste to modem.
Cmd-W - Close Window.
Cmd-X - Cut the selection to the clipboard.
Cmd-Z - Undo (for desk accessories).

When the Dialing Directory window is in front:

Cmd-C - Edit connection settings.
Cmd-D - Dial highlighted service.
Cmd-M - Mark the highlighted service.
Cmd-Shift-M - Mark all services.
Cmd-N - Add a New service.
Cmd-Q - Queue dial (Dial marked services).
Cmd-S - Change to settings for the highlighted service.
Cmd-T - Terminal settings.
Cmd-U - UnMark the highlighted service.
Cmd-Shift-U - UnMark all services.
Space or Down Arrow - move highlight down.
BackSpace or Up Arrow - move highlight up.
Shift Click - toggle the mark for the service.
Command Click - Make the service the startup default.
Any letter - move highlight to matching service name.
Double Click on a service - Edit connection settings.

Keyboard Mapping

On the MacPlus and Mac 512, ZTerm remaps the keyboard using the Toolbox's Script Manager using a custom KCHR resource. This will allow you to use the Option key like a control key, and to add arrow keys to the antique original keyboard. This remapping is enabled in the Terminal Preferences: use Option for Control. If ZTerm's remapping is not desirable (if you have an international keyboard with a different layout or yours is modified for Dvorak), you can turn this off. The Script Manager is only in System 4.1 and later, so this Option for Control remapping will not work on older systems.

The mapping below is only for MacPlus and earlier, when Option for Control is enabled:

UP Option =
LEFT Option [
Right Option]
Down Option ' (These 4 make up a diamond on the old keyboards.)
ESC ` (Accent grave)

For all keyboards:

Cmd-Enter send a break
Control-Space NUL
Control-2 NUL
Control-4 ^/ (FS)
Control-5 ^] (GS)
Control-6 ^^ (RS)
Control-7 ^_ (US)

Extended keyboard:

F1	VT220 F6	esc[17~
F2	VT220 F7	esc[18~
F3	VT220 F8	esc[19~
F4	VT220 F9	esc[20~
F5	VT220 F10	esc[21~
F6	VT220 F11	esc[23~
F7	VT220 F12	esc[24~
F8	VT220 F13	esc[25~
F9	VT220 F14	esc[26~
F10	VT220 F15	esc[28~
F11	VT220 F16	esc[29~
F12	VT220 F17	esc[31~
F13	VT220 F18	esc[32~
F14	VT220 F19	esc[33~
F15	VT220 F20	esc[34~

help	VT220 Find	esc[1~
home	VT220 Ins here	esc[2~
page up	VT220 Remove	esc[3~
del	VT220 Sel	esc[4~
end	VT220 Prev	esc[5~
page down	VT220 Next	esc[6~

Error and Other Messages

During a File Transfer

CRC Err, Checksum Err - an error was encountered in the block of data and it must be resent.

Got sector header xxx - an invalid character was received instead of the start of block character.

Hdr CRC error, @ xxxx - an error occurred in the ZModem block header, xxxx is the current position in the received file.

Data CRC error, @ xxxx - an error occurred in the ZModem data block, xxxx is the current position in the received file.

No ACK on EOT - the receiver did not acknowledge the end of file message.

Timeout on sector ACK - no acknowledge was received for the block in the allotted time.

NAK on sector - the receiver got an error in the block and requests retransmission.

Got burst for sector ACK - when waiting for the sector acknowledge, several characters were received (perhaps from line noise).

No ACK, got a xxx - when waiting for acknowledge, the character xxx was received.

Got ZRPOS = xxxx - the receiver got an error and requests retransmission starting at file offset xxxx.

Modem Cables

Macintosh (Mini DIN-8) Serial Connectors (Mac Plus and later)

(This diagram is the connector on the end of a modem cable that you plug into your Mac.)

Pin	Name	Description/Notes
1	HSK _o	Output Handshake (from Zilog 8530 DTR pin)
2	HSK _i /Ext Clk	Input Handshake (CTS) or TRxC (depends on 8530 mode)
3	TxD ₋	Transmit Data line
4	Ground	
5	RxD ₋	Receive Data line
6	TxD ₊	Transmit Data line
7	GPi/DCD	General Purpose Input (not all models)
8	RxD ₊	Receive Data line; ground this line to emulate RS232

Mac DIN-8 to MODEM - Hardware Handshaking

Mac		Modem (DB-25)
1 (HSK _{out})	->	4 (RTS)
2 (HSK _{in})	<-	5 (CTS)
3 (TxD ₋)	->	2 (TxD)
4 (GND)	<->	7 (Signal Gnd)
5 (RxD ₋)	<-	3 (RxD)
6 (TxD ₊)	--	NONE
7 (GPi)<-		8 (DCD) - not currently used by ZTerm
8 (RxD ₊)	<-	7 (Gnd)

Note: This is my recommendation for the cable wiring. Pin 7 (GPi) is not currently used and I don't know if any off-the-shelf cables have pin 7 connected. Some hardware handshake cables will have pin 20 (DTR) on the modem connected to Mac pin 1 (in addition to pin 4 RTS). This is OK but you MUST remember to configure the modem to ignore the DTR line. MacConnection is selling a cable labeled 'Mac+ to MNP modem' that is like this (pin 1 to 4 & 20 of the modem).

Mac DIN-8 to MODEM - Typical Non-Hardware Handshaking

Mac		Modem (DB-25)
1 (HSK _{out})	->	20 (DTR)
2 (HSK _{in})	<-	6 (CTS) & 8 (DCD)
3 (TxD ₋)	->	2 (TxD)
4 (GND)	<->	7 (Signal Gnd)
5 (RxD ₋)	<-	3 (RxD)
6 (TxD ₊)	--	NONE
7 (GPi)<-		NONE
8 (RxD ₊)	<-	7 (Gnd)

Macintosh 512, 128 Serial Connectors (DB-9)

(This diagram is the connector on the end of a modem cable that you plug into your Mac.)

Pin	Name	Description/Notes
1	Ground	
2	+5V	See Hardware reference for power limits
3	Ground	
4	TxD+	Transmit Data line
5	TxD-	Transmit Data line
6	+12V	See Hardware reference for power limits
7	HSK	HandShaKe: CTS or TRxC, depends on Zilog 8530 mode
8	RxD+	Receive Data line; ground this line to emulate RS232
9	RxD-	Receive Data line

Mac 512, 128 (DB-9) to MODEM

Mac		Modem
1 (GND)	<->	1 (Gnd)
3 (GND)	<->	7 (Signal Gnd)
4 (TxD+)	--	NONE
5 (TxD-)	->	2 (TxD)
6 (+12v)	->	20 (DTR)
7 (HSK _{in})	<-	6 (CTS) & 8 (DCD)
8 (RxD+)	<-	7 (Signal Gnd)
9 (RxD-)	<-	3 (RxD)

Resources

ZTerm does not save any of its settings in the ZTerm file. All settings are stored in the PhoneList file. You can lock the ZTerm application for some protection against viruses.

Binary File Type Detection

When a file is received that is not in MacBinary format and is not text, ZTerm will see if it is a known type. If it is, ZTerm will set the appropriate creator and type. This is especially helpful to those transferring files from other computer systems.

There is a resource which contains file creator and types, with identifying information. If you are handy with ResEdit, you can add additional types to this resource. The resource is STR# 335. Each string in the list is one binary type detector. There are currently two types of detectors: type 0 looks for a signature (a sequence of bytes at the start of the file), and type 1 which just looks at the end of the file name (eg, the extension if its coming from ms-dos). Type 0 is the preferred kind, but some binary files do not have a signature. I may add additional types of detectors; if you have any ideas, let me know.

Each detector string begins with the detector type (0 or 1), then the 4 character creator, and the 4 character file type. Type 0 then follows with the signature bytes (any length). You should try to keep the signatures between 2 and 8 bytes. Type 1 follows with the characters to match at the end of the file name (case insensitive).

Some examples:

For GIF files: 0BozoGIFfGIF8

For ARC files: 1arc*mArc.ARC

The first example will set binary files that start with GIF8 to creator “Bozo” and type “GIFf”. The second example will set binary files whose name ends with “.ARC” to creator “arc*” and type of “mArc”. This is for ArcMac from DogStar Software.

The current detectors handle GIF, ZIP, ARC, ZOO and some Lotus, Excel and Word file types. There are a lot more binary file types that you might need to transfer to your Mac from other machines. If you know the file signature or typical extension, and the appropriate Mac creator/type, please let me know so I can put them in a later release of ZTerm.

The default binary file type is normally a creator and type of ‘????’. This is used if the file does not match any of the binary type detectors. You can change this in the General Preferences.

Sending Files as Binary

There is also a list of file types that should be uploaded as binary files. This list is in STR# 330. Each string in the list is a 4 character file type. The current list includes GIF, ZIP, ARC, ???? and zBIN files. TEXT files that have binary data in the first 128 bytes are also sent as binary.

Sounds

ZTerm can now play a sound for some events that occur while you are using it. If the sounds are available, it will play a sound when you connect to a service, when a file transfer completes or when the BELL character is received. These sounds are optional. If the sound with the right name is not available, it will just do the normal beep. It looks for

the sound by its name. The names it looks for are 'connect', 'filedone' and 'termbell'. Note: ZTerm plays the sounds using the Sound Manager, which is in System 4.1 and later. I have included three sound files for system 7 as part of the ZTerm package that you can use, or you can use some other sounds.

Trimming down ZTerm for floppy only system

For those who are running on a floppy only system and want the smallest possible program file, here are some things you can remove from the ZTerm program with ResEdit. Do not distribute any modified copies of ZTerm.

There are about 23k worth of fonts in the program. If you are always using 9 point, you could remove all the 12 point FONTS. If none of the internal fonts are found, it will use the Monaco font. All of the STR# resources in the 600's are used for balloon help; if you don't use System 7, these are not needed.

About the Author

I first started using computers when my brothers built a TVT video terminal in the mid 70's. We used it to call the university computer system. Then we got an IMSAI 8080 with dual eight inch floppy drives! I wrote a simple educational program in BASIC and had it published in Kilobaud magazine. Just when I was ready to buy a newer CP/M machine, the IBM PC came out and I got one. I programmed and played with it for a few years. Then the Mac came out and I had to get one. I started out programming in BASIC, working on a disk sector editor, a hex resource editor, a disassembler (my brother Bob did most of the disassembler part, I did the resource stuff) and making mods to MacTEP for my own use. I wrote a program called ReadLisa that could read diskettes from the LISA computer and print or copy them to a Mac disk. I uploaded this and actually received three payments for it.

I decided to write ZTerm because I spent a lot of time telecommunicating, but I didn't really like the software that was available. Also, none at that time supported ZModem, which appeared to be the best thing to be using. Thus began the never-ending journey of ZTerm.

Glossary

ANSI - American National Standards Institute.

ASCII - American Standard Code for Information Interchange, which defines the character codes for letters, numbers, punctuation and control characters. Defined in ANSI X3.4-1986.

Baud rate - a measure of the number of times per second a signal in a communications channel varies, or makes a transition between states (states being frequencies, voltage levels, or phase angles). Modems faster than 300 bps usually transmit more than one bit of information for each baud.

Bits per second - measure of the number of data bits transmitted each second in a communications channel.

Break - a signal to the remote system, usually to interrupt a process.

Bulletin Board System (BBS) - a system, often run on a personal computer, that users can call to exchange messages and files.

CCITT - International Telegraph and Telephone Consultative Committee. They define international standards for modems, among other things.

Checksum - a method of verifying the integrity of data (not as good as CRC).

CRC - Cyclical Redundancy Check, used to verify the integrity of data.

Data bits - the number of bits used to make up a character.

Flow Control - a mechanism for the receiver of data to signal the sender to suspend transmission when the receiver cannot handle more data. Typically, the receiver has buffers to hold received data and if the buffers get nearly full, it will signal the sender to stop while it catches up on processing the data in the buffer.

Hardware Handshake - a method of flow control using two control lines, usually Request to Send (RTS) and Clear to Send (CTS).

MacBinary - a file format that allows Macintosh files to be stored on non-Macintosh computers. The MacBinary format includes a 128 byte header that contains the full Macintosh file name, the file creator and type codes, and other directory information. When you download a file in MacBinary format, ZTerm will automatically convert it to the normal Macintosh format (unless Transfer Convert is set to Binary Data).

MNP - Microcom Networking Protocol, a suite of compression and error correction protocols designed by Microcom. MNP 5 is a data compression protocol. MNP 2 to 4 are error correction protocols.

Parity - a method of checking the integrity of each transmitted character.

Protocol, File Transfer - a set of rules that two computers can use to send a file from one

computer to the other. A protocol will usually provide error detection and correction, by re-sending the portion that was received in error.

Stop Bits - bit(s) used to mark the end of a character during transmission. One stop bit is the most common setting. More than one stop bit was used in days past to slow down transmission for mechanical terminals.

XModem - a file transfer protocol. This one is the most common on personal computer systems.

YModem - a file transfer protocol. YModem is similar to XModem, but uses larger blocks and sends the file name with the file so that multiple files can be sent in a batch.

ZModem - a file transfer protocol. ZModem is one of the most robust and efficient protocols available.