Chuck Forsberg

User Manual for ZCOMM

Universal Line Printer Edition

ZCOMM Communications Software

Featuring
TurboLearn(TM) Script Writer,
Cybernetic Data Recovery(TM), Error Containment(TM),
and
OverThruster(TM)

User Supported Communications Software Tools

User Manual for
ZCOMM
Universal Line Printer Edition

Omen Technology Incorporated

The High Reliability Software

Box 4681 Portland Oregon 97208
VOICE: 503-621-3406 :VOICE
TeleGodzilla Modem: 621-3746 Speed 1200,2400,19200
Compuserve:70007,2304 GEnie:CAF BIX:cforsberg
UUCP: ...!tektronix!reed!omen!caf

1. INTRODUCTION

Get a Handle on the Information Explosion with
ZCOMM(TM) User Supported Communications Software

ZCOMM helps collect, control, and transmit information with a minimum of time, hassle, and expense. Concise commands and unobtrusive displays facilitate telecommunications instead of distracting.

1.1 Data Capture

ZCOMM's Full-Time Capture Buffer(TM) saves scrolled data other programs lose. You can scroll, page, and string search to cut and paste captured information.

Omen's Error Containment(TM) technology minimizes errors caused by line hits and their effects on automatic scripts.

ZCOMM captures text with many choices of parity bit and control character editing. ZCOMM can capture binary data without protocols. ZCOMM does not limit the length of captured files.

1.2 File Transfer Protocols

Years of communications experience distilled in ZCOMM provide rapid file transfers with unmatched reliability. Unsolicited customer testimonials chronicle accurate file transfers under conditions that crash the other programs, thanks to Omen Technology's Cybernetic Data Recovery(TM) compatible logic enhancements and thorough protocol stress testing.

ZCOMM's protocols are more cost effective than the minimal, unreliable XMODEM support available with other programs. They are easier to find and more useful than undocumented proprietary protocols.

1.3 ZMODEM: The Sate of the Art in File Transfers

"ZMODEM is the overall winner"
-BYTE Magazine, Feb 1989

How often has your modem disconnected when you were within the last few bytes of a long, expensive file transfer? With ZCOMM's ZMODEM file transfers, you can resume the transfer from where you were cut off, without wasted time or phone charges! And, if the transfer aborted because you ran out of disk space, ZMODEM can recover from that too!

ZMODEM transfers files and commands with a uniquely user friendly interface. Unlike traditional protocols, only one command or menu choice is needed to transfer files or download commands.

"Pro-YAM's Autodownload feature for ZMODEM (and KERMIT) has got me completely addicted."

A 32 bit Cyclic Redundancy Check, five orders of magnitude more sensitive than CRC-16 and billions of times more sensitive than XMODEM checksum protects your data.

ZMODEM provides high throughput with full integrity even with timesharing systems, high speed buffered modems, and packet switched networks. Unlike other "high speed protocols", ZMODEM's high speed does not compromise reliability.

ZMODEM compression provides spectacular throughput increases on suitable files.

Other ZMODEM features include text file translation, selective transfer of modified files, and remote file maintenance. Security authentication* disables Trojan Horse attacks. ZMODEM supports global operations by preserving the exact file contents and modification date, unaffected by crossing time zones.

"Here's the simple fact. Zmodem is the state-of-the-art protocol for microcomputers. It's the protocol of choice. Forget the old dogs. It's fast and bullet-proof."
-John C. Dvorak, INSIDE TRACK, PC Magazine June 1989

ZMODEM's convenience, speed and reliability have made it the protocol of choice with bulletin boards, BIX, GEnie, Portal Unison, and other information utilities. While competitors hype the performance of their undocumented proprietary protocols, experienced BBS operators know ZMODEM is the only high performance protocol that survives on the streets.

Source code for complementary Unix and VMS programs is provided.

1.4 XMODEM: The Lingua Franca of Traditional Programs

ZCOMM supports the ubiquitous Ward Christensen "XMODEM" protocol with Cybernetic Data Recovery(TM) and automatic file name generation. Omen Technology's exclusive Cybernetic Data Recovery(TM) transfers files under conditions that crash other programs.

+ XMODEM CRC-16 Even today, few commercial programs support 16 bit CRC, the standard of XMODEM file transfer technology since 1981. CRC-16 error detection is orders of magnitude more accurate than checksum. Cybernetic Data Recovery(TM) catches and corrects transmission errors that confound other programs.

+ True YMODEM(TM) batch file transfers preserve the exact file name, file length and creation date.

+ XMODEM-1k and YMODEM-1k 1024 byte packets increase XMODEM/YMODEM throughput.

1.5 Kermit: A Cure for Brain Damage

Kermit transfers ASCII and binary files with IBM, CDC, Cray, DEC, ICL, Harris, Honeywell, Pr1me, Tandem, Univac and other mainframes that do not support XMODEM.

While not as fast as ZMODEM, Kermit is usually more reliable than XMODEM/YMODEM.

ZCOMM's 16 bit Kermit CRC is thousands of times more sensitive to errors than other programs' 6 bit checksum.

+ Convenient Kermit AutoDownload adjusts to the sending program's Kermit dialect, saving keystrokes and frustration. (Dialect incompatibilities often confound users of other programs.)

+ Sliding Windows Kermit, alias SuperKermit, is the only high speed protocol available on The Source(TM).

+ Long Packet Kermit speeds file transfers with big IBM, CDC, and Cray mainframe systems.

+ Advanced Kermit Server Access functions support low cost networking.

1.6 Swiss Army Knife for Protocols

+ Extended Quick-B streaming protocol slashes CompuServe download costs up to 60 per cent or more.

+ OverThruster(TM) Speeds XMODEM and YMODEM downloads

+ ZCOMM supports bulletin boards and traditional communications programs with MODEM7 batch, Telink/FIDO, and Clink/SEAlink file transfer protocols.

+ WXMODEM (Windowed XMODEM) speeds People-Link(TM) timesharing service downloads.

1.7 X.PC: Your Own Packet Gateway

The X.PC network interface protocol flavor supports low level flow control, error correction, multiple virtual calls and concurrent data capture on one modem line.

1.8 Controlling Information

ZCOMM's Full-Time Capture Buffer(TM) lets you flip back and forth or search, scanning two hundred messages from bulletin boards in a couple of minutes. (It has to be seen to be believed.) To compose a reply, call your favorite editor (the one you've already learned!) as a subroutine without losing your place.

ZCOMM's high speed screen driver makes life pleasant:

+ Easy on the eyes: ZCOMM supports No Flicker displays, up to 450 per cent faster than DOS

+ VT220, VT102, VT100, Wyse, TTY 5425, ANSI, Z19, VT52, TI 940, IBM 3101, Televideo 9xx, and ADM3a emulation.

+ Supports 132 columns and advanced displays (114x60, etc.)

+ VT100 character graphics and keyboard mapping support "visual" programs. Unlike Microsoft Access, Crosstalk, and most "VT100" emulators, ZCOMM correctly displays EDT, AllIn1, SCO setcolor, and DEC Store on an XT even at 19200 baud.

+ Hardcopy Terminal Emulation previews printer output by converting overprint sequences to bold or underlined characters.

+ Visual (silent) bell preserves domestic tranquillity

+ Settable number of lines and columns, border color, default colors, autowrap, keyboard mapping enable.

Full pathnames, directories, and wildcards support file transfers and utility commands. Output may be redirected to printers or appended to files. Files may be listed, paged, copied, renamed, searched, edited, and deleted. Accuracy and identity of files transmitted by any means are verified by word count and two types of checksum/CRC's. Matching C Source code is available for many of these functions.

ZCOMM can search files for lines matching a string, insensitive to case.

1.9 Transmitting Information

+ Dual stack Command Recall saves your keyboarded host commands in a history file for search, recall, editing, and reentry.
+ Convenient Split Screen option allows responsive local editing of input lines before transmission.
+ A rich palette of editing and timing modes permit file and message upload, even to fussy microcomputer Bulletin Boards.

+ Remote access for file transfers and DOS program execution with baud

rate detection and three passworded security levels.
+ Outcall Queue intersperses scheduled outgoing calls with incoming messages on one modem line.

1.10 Other Features

Interrupt driven modem input allows High speed operation with file transfer and conversational terminal operation at 19200 bps and above. One of 7 modem "ports" may be selected at any time.

A real-time status line displays column, row, time, elapsed time, transmission speed, and other important information.

Soft keys provide convenient execution of common commands.

ZCOMM is written in C for performance, portability and maintainability. ZCOMM loads quickly from a moderately sized executable file with no cumbersome overlays.

Almost two decades of telecommunications knowledge are distilled in ZCOMM.

2. ZCOMM REGISTRATION

ZCOMM is a user supported program developed and supported by Chuck Forsberg. ZCOMM is not and never has been public domain.

ZCOMM may not be modified, patched, hacked, disassembled, decompiled, or otherwise reverse engineered, or sold, without prior written permission by Omen Technology Inc. This prohibition applies to any theft of the intellectual property and trade secrets contained in ZCOMM by decompilation, disassembly, or any other form of reverse engineering including but not limited to profiling, tracing, data analysis, or monitoring the operation of ZCOMM.

The only legitimate way to disable the opening advertisement in ZCOMM is to insert an authorized SNP obtained from Omen Technology into ZCOMM with the putsnp program. Any other suppression or modification of the opening screen is illegal, unethical, and prohibited.

Distribution of programs and/or instructions on how to modify, patch, disassemble, decompile, or otherwise reverse engineer ZCOMM without prior written permission by Omen Technology Inc is a theft of services and a violation of federal copyright law, and will be referred to the FBI for investigation and prosecution under federal conspiricy statutes. Applicable RICO law provides for treble damages and recovery of attorney's fees.

Distribution of ZCOMM in any medium without this documentation file constitutes an unauthorized modification.

Students may use unregistered copies of ZCOMM in the discharge of assigned coursework for the duration of the course without obligation to register. Otherwise, individuals may use ZCOMM with only a moral obligation to register their copy with Omen Technology once they find it useful. You may distribute the unmodified ZCOMM*.ARC archive files[1] to as many as you wish, or post them on bulletin boards, etc. Businesses must register their copies of ZCOMM.

Registration buys you:

+ A clear conscience.

+ Your own unique ZCOMM Serial Number Password (ZSNP). Your ZSNP may be applied to copies of ZCOMM to be run on a single machine.

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1. The archives may be converted to other storage or archive formats,

including "zipping", provided no files are modified or removed.

+ Serialized of ZCOMM deactivates the registration request display and the pause afterwards.

+ Serialization activates the egrep, egrepm, expand, split, and ss commands and the outcall queue. Features denoted with ** are available in serialized copies of ZCOMM.

+ Serialization more than doubles the circular buffer size.

+ A software disk with the current version of ZCOMM, the putsnp program to serialize your copy of ZCOMM with your ZSNP, and the tree structured "flash-up" help processor and help file included in ZCOMMHLP.ARC.

+ The complete Professional-YAM User Manual, more than 200 Typeset pages, with many chapters not included here, ready for insertion into a PC size binder.

+ The Pro-YAM Crib Sheet.

+ A ZCOMM registration is worth $40.00 when upgrading to Professional-YAM. This upgrade includes the Pro-YAM software disks and license. You will already have the manual from your ZCOMM registration package.

REGISTRATION FEES:

+ Basic registration (ZSNP, disk, manual pages): $40.00

+ Custom Binder (OPTIONAL): $10.00

+ ONE of the following:

+ Domestic Shipping (UPS surface): $5.00

+ Domestic Surface Shipping: Free with prepaid orders

+ International Air Mail (most countries): $15.00[2]

+ Domestic UPS Second Day AIR: $5.00 additional

Don't bother scrounging for an envelope, use the INSTANT MAILER included in this archive!

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2. $25.00 to Australia etc. if binder included due to higher cost.

3. ZCOMM's Big Brother

ZCOMM is the Little Brother of Professional-YAM. As powerful as ZCOMM is, more powerful than other user supported software, it pales beside Omen Technology's commercial Professional-YAM software.

Pro-YAM's TurboDial(TM) script language provides state of the art real time pattern recognition, "regular expiression" string parsing, script development aids, script encryption, queue management, extensive logging facilities, and finely tuned security control unmatched in the industry.

Fortune 500 corporations use these exclusive features to support large PC based telecommunications projects involving attended and unattended operation.

Specialized utility commands allow Pro-YAM and a PC or DG/One portable to replace data line monitors in many applications. Pro-YAM supports Echoplex uploads and high speed data dumps in addition to the uniquely accurate and robust XMODEM, YMODEM, ZMODEM, and Kermit protocol transfers shared with ZCOMM. Pro-YAM has many powerful utility commands that earn it the sobriquet Integrated Communications Tools.

Pro-YAM is available with the Tymnet X.PC link level protocol for multiple, concurrent data transfers.

Omen Technology also markets highly compatible Unix and Xenix flavors of Pro-YAM.

Omen Technology's Demand Upgrade(TM) technology and small company responsiveness meet the support needs of a growing base of demanding customers.

Professional-YAM is a superset of ZCOMM; applications and scripts developed on ZCOMM will operate with Pro-YAM.

This ZCOMM manual omits descriptions of many Pro-YAM features not included in ZCOMM. The special symbol * denotes Pro-YAM features not included in ZCOMM.

Pro-YAM features not included in ZCOMM include X.PC, encryption, CryptoScript(TM) capability, Password Guardian(TM), logs, the ap, apd, fget, fput, kbdmon, link, on, portx, purgek, quit, restime, restrict, timestamp, trs, and usq commands, and certain vertical application and security related features. (Newer versions of ZCOMM include the logging facility.)

In some places you will see references to a fake Chapter 99. Pro-YAM manual chapters not included in this document are designated by

Chapter 99.

ZCOMM registration can be upgraded to Pro-YAM as described in the previous chapter.

4. DESIGN PHILOSOPHY

ZCOMM is a Communications Tool. Once learned, ZCOMM's command interface is more powerful, faster, and less cumbersome than a menu interface. Indeed, menus comprehensive enough to describe all the nuances of ZCOMM's capabilities would take up more memory than most microcomputers can afford. In addition, remote operation of ZCOMM would be excruciatingly slow due to transmission delays displaying the appropriate menu pages.

ZCOMM's look and feel has been influenced by the MODEM series of programs, the Unix(TM) Operating System, the Berkeley Editor (vi), CP/M(TM), PC-DOS, and ANSI standards.

Function keys F1 and F2 have been assigned with a logical grouping. Wherever meaningful, F1 exits from a function, and F2 enters the logical "next" function. From the command prompt, F2 enters the term function, and from there another F2 enters the review function. Once in the review function (assuming it was called from the term function), F1 exits back to the term function, from where another F1 exits to the command prompt.

Another ethic guiding ZCOMM's design is respect for the user's information. The user's data is, after all, precisely what a modem program is all about. Status information is limited to one CRT line to allow maximum screen size for data. Fancy display modes such as reverse video are used sparingly to avoid distracting from the user's work.

If you seek a video arcade modem game, ZCOMM will disappoint you.

4.1 Circular Buffer

The circular buffer remotely resembles the linear "capture buffer" used by other modem programs. Many ZCOMM commands involve the circular buffer, including the t, f, wait, ki, kill, w, review, and close commands.

The term function uses the circular buffer as a first in, first out (FIFO) buffer for data arriving from the remote. The circular organization of this buffer makes the most recent data always available for review and arbitrary writing to disk files.

When the circular buffer has been filled and the XOFF character sent to the remote, ZCOMM writes the contents of the circular buffer to the capture file if a capture file has been opened. ZCOMM then checks whether any characters remain to be written to the printer. When both of these checks are satisfied, ZCOMM then sends an XON character to the remote to resume the transmission of data.

Keyboarding ALT-W or enabling j writes the contents of the circular

buffer to the capture file without waiting for the circular buffer to fill up first.

The large storage capacity of the circular buffer may be used to review the most recent data captured from the remote. The review command allows one to page back and forth through the data captured from the remote. Forwards and backwards string searches make it easy to locate important text. The review command also allows segments of the data in the circular buffer to be selectively saved on disk (cut and pasted). Scripts can search and mark text captured from the remote with the full power of regular expression pattern matching.

5. ROSETTA STONE

Alphanumeric An alphanumeric character is either a letter or a decimal digit 0 to 9.

Baud A baud is a signaling unit conveying one or more bits of information. Baudrate is commonly (and usually incorrectly) interchanged with bits per second.

BPS is an abbreviation for "bits per second", a measure of transmission speed. ASCII Asynchronous transmission generally uses 10 bits to transmit each character, so the speed in characters per second is one tenth the speed measured in bits per second.

Capture The term function captures data from the remote into the circular buffer. This data may be paged back and forth with the review function, or written to a disk file.

Character Escape is a sequence of characters initiated by a backslash character used to represent a control character or programmable string using printable characters. Character escapes are described in Chapter 23.

CPMEOF A control character (hex 1A) added to the end of text files by traditional microcomputer programs. This practice was popular with the Digital Research CP/M 8 bit operating system.

Crash Recovery(TM) refers to the ZMODEM File Transfer Protocol's ability to resume file transfers that have been interrupted by a line disconnect from the point where the transfer was interrupted.

Cyclical Redundancy Check (CRC) is a datum (16 or 32 bits) generated by a cyclic code. The CRC-16 extension to the Ward Christensen XMODEM protocol provides a high level of data integrity. CRC-16 guarantees detection of all single and double bit errors, all errors with an odd number of error bits, all burst errors of length 16 or less, 99.9969% of all 17-bit error bursts, and 99.9984 per cent of all possible longer error bursts. The actual performance is even better because the errors that sneak by CRC-16 are often detected by the other error checks simultaneously applied by ZCOMM's Cybernetic Data Recovery(TM). ZMODEM's 32 bit CRC provides five orders of magnitude more accurate error detection than XMODEM's CRC-16 a billion times more accurate than 8 bit checksum used by standard XMODEM..

Download is the transfer of data from the remote system down to your computer.

DTR is an abbreviation for Data Terminal Ready. Data Terminal Ready is a signal sent by the computer to the modem to condition it to

accept commands or answer an incoming call. When DTR is "dropped"
(switched off), the modem should disconnect from the line.

Execute When a string parameter is executed, it is normally sent to the remote (modem). If it begins with "@", the remainder is executed as a ZCOMM command.

Filespec Some ZCOMM commands instruct a remote Kermit server program
to send, receive, print, type, or delete one or more files. The syntax of this specification is defined by the remote Kermit server program, not ZCOMM. If filespec contains spaces, filespec must be enclosed by double quotes.

Flow Control restrains the speed of transmission to prevent loss of data when a fast sender must communicate with a slower receiver. Hardware signals, control characters, and protocol handshakes can be used to provide restraint, singly or in combinations.

SEE ALSO: handshake command, zmodem w parameter, Flow Control Chapter 13

Functions are operations supported by ZCOMM, such as a dir, type, s, r, or t (term) command. A command may set or reset mode[s], change a parameter, or perform a function.

Host Operation allows remote access of files and programs.

Iff If and only if.

Integrity in a data transfer protocol refers to the ability of the protocol to guarantee a correct data transfer provided both sender and receiver report a successful transfer. Integrity is a different measure of a file transfer protocol than robustness, which is a measure of a protocol's ability to complete the requested transfers in the presence of errors, independent of the probability of undetected errors in the file transfer.

Kermit ia an error correcting batch file transfer protocol developed at Columbia University and elsewhere. The Kermit protocol supports text and binary file transfers with many mainframe computers whose hardware and operating software preclude implementation of high performance protocols. Kermit implementations exist for many mainframes that cannot support the XMODEM protocol.

Line Hit A burst of noise on a telephone line may generate modem data errors. A single noise burst may garble dozens of characters. ZCOMM's Error Containment(TM) technology may be used to reduce the

number of characters garbled by each line hit.

Modes Many modes are available to modify the way the term function receives, displays, transmits, and stores data.

N.B. Nota Bene, Latin for "note well" or "take notice".

Options Options apply to the Kermit, s, sx, sb, s7, st, r, rx, r7, rb, and rc protocol file transfer commands.

q.v. Quod Vide is Latin for "which see", an invitation to consult information on the subject mentioned.

Pathname is a complete file name, including disk and directories.

EXAMPLE: c:/ZCOMM/PHODIR.t

Pathspec ... A pathspec consists of zero or more pathnames.

Unambiguous and ambiguous (with wildcard characters) pathnames may be specified in any combination. The wildcard filename characters * and ? are allowed as described in the IBM DOS manual chapter "Global Filename Characters". In DOS, only the filename portion of the pathname may contain wildcards.

EXAMPLE: src/cmd/*.c is legal; src/*/foo.c is not.

On 32 bit Unix systems, ZCOMM expands "*" and "?" the way the shell does. All the shell wildcards may be used including multiple wildcards, wildcards in directories, and ranges. ~user expands to the login directory of user, and ~ expands to your home directory. In addition, `command` takes the output of command as a series of pathnames.

EXAMPLE: dir */[a-i]* displays all files starting with "a" to "i" in all subdirectories immediately below the current directory.

An empty pathspec represents all files in the current directory on the current disk. A disk identifier without any file names represents all files on that disk's current directory. A directory pathname expands to all files in the specified directory.

Sequences of the form %svar are replaced by the value (possibly empty) of the string parameter svar. If svar is not a string parameter, no substitution is made.

A pathspec may contain any combination of the above, separated by spaces or tabs.

If pathspec includes a disk specifier (such as a: or b:), ZCOMM checks the disk specifier against the list of permissible disk specifiers in the string parameter disks.

The various filename expansions are especially useful in the context of commands such as wc, sum, crc, find, sb, and sz. For example, wc applies to all files in the current directory, and wc dir applies to all files in dir.

ZCOMM pathnames may use / or \ to delimit directories.

Regular Expressions control pattern matching and grouping of text by the ss and egrep commands. "Magic" characters specify the pattern matching and grouping processes.

Remote refers to the machine or terminal with which ZCOMM is communicating. This could be a direct RS-232 connection to a local terminal, micro, mini, or mainframe, or a timesharing system accessed through a modem and a global packet switched network.

Restraint See "Flow Control" above.

Restricted For security reasons, ZCOMM is restricted to prevent unauthorized dial-in users from accessing private data or crashing the system. Certain commands are illegal when ZCOMM is restricted, and only specified disk drives and directories may be accessed.

Review Function Characters output from the remote may be paged and searched online with the review function. This data may also be cut and pasted to disk files.

Robustness in a file transfer protocol refers to the protocol's ability to complete transfers in the presence of errors induced by line noise or other sources. Robustness is a different measure of a file transfer protocol than integrity, a measure of the probability of correct data transfer given a successful completion of the transfer process.

Script A script is a set of commands that control dialogues with the user or a remote system.

Script Level refers to the degree of nesting of scripts. Level 0 is called by the user directly, and each higher level is executed by a gosub or other command from the previous level.

Shell Escape is a DOS command or program called as a subroutine from ZCOMM via a DOS Gateway. The phrase "shell escape" comes from the

Unix(TM) Operating System, whose command interpreter is called "the shell".

Soft Keys Strings or commands may be assigned to the Soft Keys with set commands, including those in the telephone directory "setup" entry executed each time ZCOMM starts. ZCOMM recognizes the forty function key codes produced by the function keys F1 to F12. FS1 to FS12 are obtained with a Shift key, FC1 to FC12 are obtained with the Ctrl key, and FA1 to FA12 are obtained with the Alt key. The cursor keys and extra function keys on 101 key Extended Keyboards are also recognized.

Strings or commands may be assigned to BS, ESC, Ins, Del, Home, End, Up, Down, Left, Right, PgUp, and PgDn, overriding their normal functions in the term function.

String Some commands take a string argument. If a string argument contains spaces, tabs, and a semicolon, it must be enclosed by double quotes (shift single quote on the IBM PC keyboard). Control characters may be included in strings with character escapes similar to those used by the C Programming Language.

Term Function ZCOMM's Term Function provides the conversational "connection" between the user and the remote. The term function captures data from the remote into ZCOMM's circular buffer from whence it may be displayed, printed, stored in a disk file, or searched, cut and pasted by the review function.

TWX Teletypewriter Exchange (Teletype Corp. TM). A simple protocol used to transmit files or paper tapes between dial-up teleprinters.

Upload is a transfer of data from your computer up to the remote system.

Wild Card Many commands allow wild card file names in their pathspec (q.v.).

Writing When a receive file is open as a result of a create or t filename command, data in the circular buffer is written out to the receive file when the circular buffer fills up or when a w or ALT-W command is given.

XMODEM The Ward Christensen file transfer protocol uses 128 byte packets, one byte control messages, and a one byte arithmetic checksum.

XMODEM/CRC A synonym for the enhanced Ward Christensen XMODEM protocol
using a Cyclic Redundancy Check (CRC-16). Newer programs support CRC-16 for better data integrity, but reliability is still compromised by one byte control messages.

XMODEM-1k XMODEM protocol with 1024 byte data packets, CRC-16,

and one
byte control messages, sometimes incorrectly called ymodem.

YMODEM YMODEM is a batch file transfer protocol with pathname, date, file length and other file data in block 0, CRC-16 default, and optional 1024 byte packets. Many programs claiming to support YMODEM actually use XMODEM with 1024 byte blocks; use ZCOMM's sx -k and rx commands with these XMODEM mutants.

XOFF, XON ASCII control characters control the flow of data. XOFF (Ctrl-S) stops and XON (Ctrl-Q) resumes the flow of data. Chapter 29 provides an ASCII code chart with the names for the control characters.

ZCOMM is a shareware (User Supported) subset of Professional-YAM.

ZMODEM An advanced public domain file transfer protocol with simplified human interface, crash recovery, high speed streaming, sensitive 32 bit CRC, command download, security features, and important file management functions.

{arg1 | arg2} One of the arguments separated by | is required.

[] Optional argument.

* The special symbol * denotes features not included in ZCOMM. ** Denotes features not included in userialized (unregistered) copies of ZCOMM.

6. INSTALLING ZCOMM

If you have registered your copy of ZCOMM, make yourself a working copy of the ZCOMM distribution disk using the DOS diskcopy command to make exact copies. Keep the distribution disk in a safe place away from nasty data killers such as disk drives, displays, computers, magnets, motors, and coffee cups. The only time the distribution diskette should be out and about is when you are cloning your working copies.

6.1 Installation from Registration Disk

The putsnp program inserts your ZCOMM Serial-Number-Password (ZSNP) into your working copiy of ZCOMM. Installing a legal serial number suppresses the pause after the opening message, enlarges the circular buffer, and enables new commands. The putsnp program prompts for your Serial/Number/Password (SNP) of the form X123456789. Putsnp checks for keyboarding mistakes and then verifies that you understand and agree to the licensing conditions. When you understand and agree to the licensing conditions, respond with yes (not just y).

Then putsnp prompts for the name of a file to insert the serial number into. This should be a ZCOMM.EXE file that you have transferred to a scratch disk, or to an appropriate directory on your hard disk. Do not write on the distribution diskette unless a nuclear attack is in progress.

After inserting the serial number in the given file, putsnp asks if you wish to change the default value for the phone directory pathname (string parameter phones). This is normally /PHODIR.t. If you wish to keep the phones file elsewhere, answer "yes".[1] Putsnp then searches for the location in your copy of ZCOMM that contains this information. When found, you may enter a new pathname,[2] up to 64 characters.

Afterwards, you should copy the help processor files YHP.EXE and ZMANH.HLP from the disk.

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1. The default value may also be overidden with the PHONES DOS environment variable.

2. Such as c:/zcomm/PHODIR.t.

6.2 Installation from ZCOMM*.ARC

If you are using the software provided in ZCOMM*.ARC, be sure to save the original files for backup, and pass them on to your friends to fill their communications needs. There are currently three ZCOMM archive files:

+ ZCOMMEXE.ARC contains the executable program and demonstration files.

+ ZCOMMDOC.ARC contains this documentation.

+ ZCOMMHLP.ARC contains ZCOMM's tree structured help file and random access flash-up help processor.

6.3 Installation Continued

The second order of business is to read this manual. There is just no way you can get your money's worth out of ZCOMM without reading, or at least carefully scanning, this manual. After all, didn't you get ZCOMM because you needed something more powerful than that cumbersome, unreliable, brain-damaged menu driven crock you've been using? (Perhaps you shouldn't answer that question just yet ...)

You can then edit PHODIR.t to suit your own needs by inserting directory entries for the systems you wish to call and changing the phone numbers, account numbers, and passwords on the "standard" entries for popular timesharing services that you have accounts with. Be sure to check the setup entry and make any changes you feel appropriate. Once you have the "feel" of ZCOMM, you will want to remove the automatic menu invocation at the end of the setup directory entry.

Chapter 9 gives a line by line tutorial for setting up your telephone directory assuming you are using a standard modem.

If you are using a computer that runs at non standard clock rates (e.g., 8 mHz 8088 instead of 4.77 mHz) or with an enhanced CPU chip (NEC V20), you will need to set special values for the a and b numeric parameters as described in Chapter 21.

**** WARNING **** Although ZCOMM is well behaved as communications programs go, some memory resident programs, special keyboard modifiers, print spoolers, or special display drivers, may cause problems. The POLYTRON memory-resident desktop organizer

DeskPlus as well as POLYBoost work with ZCOMM.

**** WARNING **** Since ZCOMM uses interrupts to read data from the

serial ports, each serial port must be strapped for its proper interrupt vector. Some communications programs assign both IRQ3 and IRQ4 while operating, so they will operate even if the serial ports are not strapped properly. Since ZCOMM only assigns the interrupt vector of the port in use, incorrect IRQ level strapping will crash ZCOMM. Check the serial port addresses and vectors with the information given ith the port command in Chapter 15 if you encounter trouble starting ZCOMM.

7. TAMING THE MODEM

7.1 Hardware Interface

DOS ZCOMM accesses serial ports at the standard COM1 and COM2 address, as well as COM3-COM18 as described under the port command. The portx command may be used to access 8250 family serial ports at non standard port addresses.

When a port is selected, a quick hardware check is made to verify the existience and minimal functionality of the port. If this test fails, the message Port N Defective is displayed. An incorrect port switch or strap (jumper) configuration is the usual cause of this message.

This check does not guarantee the port is connected to the proper IRQ line. If the port is not configured to use the proper IRQ line, the computer may lock up when the port is used.

Some 8250 UART devices (used by serial interface adapters and internal modems) do not respond correctly when the software turns the transmitter interrupts on and off. High performance communications programs such as ZCOMM require properly functioning UART chips, such as the National Semiconductor 16450 or 16550A.

7.2 MODEM environment variable

The mm224 dialing routine uses the MODEM environment variable to indicate the type of modem it is driving. Except for ZCOMM, the value inherited from the environment may be overridden with a set command. Currently supported values for MODEM are:

AX9624 MicroCom AX/9624c with MNP Class 6. This modem includes a pseudo full duplex 9600 bps speed.

HV96 Hayes V series Smartmodem 9600

MM224 MultiModem 224 without MNP. This works with many other 2400 bps modems with little or no modification.

MM224E MultiModem 224E with MNP.

SM1200 Hayes SmartModem 1200

TB Telebit TrialBlazer

These values must be entered in upper case (all capital letters).

EXAMPLE: C>set modem=MM224E (PCDOS)

EXAMPLE: $ MODEM=MM224E; export MODEM (Unix)

When setting up for a particular modem type, be sure to configure the modem's switches and Non Volatile RAM (NVRAM) for use with ZCOMM. If nonstandard NVRAM settings interfere with ZCOMM's initialization scrip for that modem, you must manually restore the NVRAM contents to the factory default. The supplied scripts expect to see the factory default VERBAL RESULT CODES (not result digits).

7.3 Carnival of the MODEMS

Modem manufacturers are constantly refining their products, adding new features and making subtle subtle changes in existing features. The mm224 dialing script supports a number of modems under control of the MODEM environment variable.

To obtain the full performance your modem provides, you can edit initialization strings in the dialing scripts to take advantage of new modem features as they are developed. If MODEM is not set, changing the X3 string sent by the dialing script to X1,X3 or X4 enables extra features on some modems. Some modems do not emulate the Hayes Xn commands exactly, requiring a change to the Xn value emitted by the dialing script for proper operation. The line in mm224 to modify is:

```
if !%MODEM put "ATX3\r";  wait -f2 :: Change this for your modem
```

If your modem is not listed in one of the following subchapters, please read all the subchapters and use the suggestions that apply to modems similar to yours.

7.4 Tone Dialing

If your telephone line supports Tone Dialing, set mprefix to ATDT with a command in the setup telephone directory entry. If your telephone line only supports rotary (pulse) dialing, set mprefix to ATDP. This procedure is detailed in Chapter 8.

7.5 MNP, X.PC, AFT

Some modems are available with one or more error correcting link level protocols such as MNP. Sometimes enabling MNP in a modem impairs logging into timesharing systems, packet switched networks, or bulletin boards. In addition, non streaming protocols such as XMODEM, YMODEM, Kermit and Compuserve B give faster transfers without the delays introduced by MNP and other link level protocols. Accordingly, ZCOMM's dialing scripts are designed to place calls with MNP disabled

by default.

There is no modifier to enable the Hayes AFT link protocol because we have not experienced problems with leaving it on all the time.

The mm224 dialing script allows an optional link level modifier[1] to be appended to each telephone number.

The currently supported modifiers are:

/300 Force a connection at 300 bps. Dropping down to 300 bps may be necessary to get a reliable connection in Oregon.

/1200 Force a connection at 1200 bps.

/nop Suppress the detection of call progress reporting. This may be used to prevent the modem from misinterpreting an unusual ringing sound as a busy signal.

/fast Force a high speed connection (refuse a slow speed connection).

EXAMPLE: 123-4567/fast

man Some modems incorrectly abandon a call attempt when they "hear" sounds they aren't programmed to understand. For example, some TrailBlazer modems abort the call with a spurious "NO CARRIER" message when they hear the sound of the telephone "ringing". If that doesn't dump the call, the TrailBlazer may dump the call when the answering modem emits an echo suppressor disabling tone before entering the standard Bell 103 answer tone. Under these circumstances the only solution is to listen to the sounds youself and tell the modem exactly when to start listening.

With the man modifier, the modem remains in command mode after dialing the phone number and ZCOMM enters the term function to display messages from the modem. When you hear the called modem's answer tone, hit F1 to exit the term function. The mm224 dialing script then sends an "ATO" to the modem to attempt a normal data connection.

Some practice may be necessary before you get the right timing. If you hit F1 too late the answering modem may give up before the modems can handshake and enter data mode.

---

1. Some modifiers are specific to certain types of modems.

mnp Require MNP link level connection. Do not connect if MNP fails.

EXAMPLE: 123-4567/mnp

/mnp_s Require MNP link level connection, use software flow control.[2] Do not connect if MNP fails.

/a_mnp Request MNP link level connection.

/a_mnp_s Request MNP link level connection, use software flow control.

/xmodem Enable "XMODEM spoofing" on Trailblazer modems.

/kermit Enable "Kermit spoofing" on Trailblazer modems.

/v22 Use V.22 modulation (effective for 1200 bps calls).

Most modems do not support all these modifiers.

7.6 High Speed Modems

The new generation of high speed dial-up modems presents special oppurtunities and challenges to users and system integrators.

These modems transmit data at speeds from 110 to 38400 or more bits per second. This range of speeds poses special problems communicating between the computer and the modem. Lower speed modems examine the traditional "AT" command prefix bit by bit to lock onto the computer's transmission speed instantly. Many modems which recognize commands at widely varying speeds can not use this technique. A number of alternate techniques have been developed, each with its own advantages and problems.

+ Lock the interface to the highest tranmsission rate. This aviods the programming required to synchronize the modem's and computer's speeds. Flow control must be used when the interface speed is locked to prevent the computer from sending data more rapidly than the modem can buffer and transmit it. This local flow control is usually accomplished with hardware signals. When such an arrangement is used to communicate over networks that must assert their own flow control (with XON and XOFF), data flow regulation

2. Software flow control in the modem is not compatible with XMODEM, YMODEM, Sealink, Clink, or WXMODEM.

must respond to both hardware (RTS) and software (XOFF) signals. The handshake both command should be used whenever the modem's interface speed is locked and transmission over networks or to timesharing systems is desired.

When the interface speed is locked at a higher speed than the actual data transmission, an excessive amount of data may be stored in the modem's memory awaiting transmission. This is inefficient when a streaming file transfer protocol is used because the data backed up in the buffer must be drained before error recovery can commence. The ZMODEM b and w muneric parameters should be used to manage the modem's data storage.

Locking the interface speed to 9600 or 19200 bps while communicating at 1200 and 2400 bps should be avoided unless all links in the transmission path have low error rates.

Most modems do not recognize XOFF characters from the remote computer, so characters stored in the modem's buffer will be transmitted for a period of time after an XOFF is received. This causes loss of data with some computer services.

+ Autobaud to adjust the modem and computer speed. With this method, the modem is optioned to enter a search mode whenever it becomes idle. The dialing script calls the waketb phone directory subroutine to train the modem to the computer's transmission speed. The waketb subroutine may be optimized for the particular modem used.

After dialing or answering a call, the modem handshakes with the remote modem and reports the connect speed with a message such as "CONNECT 1200" or "CONNECT FAST". The dialing script recognizes the string, and sets the computer to the correct speed. If the connection is made at high speed, the dialing script may need to enable hardware flow control with a handshake command.

7.7 TELEBIT TrailBlazer

The Telebit TrailBlazer modem uses 68000 and TMS320 processors to transmit serial data at rates up to 14000 bps over standard phone lines. The modems also operate at speeds of 2400, 1200, 300 and slower. The TrailBlazer is one of the most complex modems to fully exploit, a worthy challenge for a TurboDialTm script. Use the mm224 dialing routine discussed above for this modem. The mm224 dial routine has special provisions to exploit this modem's features. Set the MODEM environment variable to TB (caps are important) to support the TrailBlazer's MNP, speed and flow control features.

Before making calls, use the inittb phone entry to initialize the modem's non volatile memory with proper settings for ZCOMM.

EXAMPLE: call inittb

ZMODEM provides optimum file transfer speeds with these modems. ZMODEM avoids interference with the modem's flow control.

7.8 MultiTech MultiModem 224E

Special features of this modem are accessed with the mm224 dial script. Set the MODEM environment variable to MM224E (caps are important) to support the MM224E's MNP, speed and flow control features.

Set dip switch 1 on the bottom of the modem to up (DTR Normal), the reverse of the factory setting. For high speed operation, CTS flow control should be enabled with internal switches and jumpers.

Before making calls, use the initmm phone entry[3] to initialize the modem's non volatile memory with proper settings for ZCOMM.

EXAMPLE: call initmm

This disables automatic error correction under mnp. If you wish to enable this setting, merely type, from the terminal mode, 'at &e0 &w', and the 'ok' which will ensue tells you that the command was accepted and stored in non-volatile memory.

7.9 MultiTech MultiModem 224

The autobaud feature of this and most other 2400 bps modems is accessed with the mm224 dial script. This dialing script is the default choice in the distribution phones.t file. Set the MODEM environment variable to MM224 (caps are important) to support the MM224.

7.10 U.S. Robotics Courier 2400e

Unlike most medium and high speed modems, the Courier 2400e does not recognize the computer's transmission speed when given "AT" commands.

This modem is accessed with the mm224 dial script. This dialing script is the default choice in the distribution phones.t file. Set the MODEM environment variable to C2400E (caps are important) to

3. Information courtesy Earle Robinson

support the C2400E.

This modem should be initialized with the initc24e entry in the telephone directory. Switch settings are off, off, on, off, on, off, off, on, on, off.

7.11 Hayes Smartmodem V9600

This modem should be initialized with the inithv96 entry in the telephone directory. The AFT link level is enabled by default because it does not appear to interfere with connections to modems not supporting AFT.

7.12 Hayes Smartmodem 2400

The Hayes Smartmodem 2400 presents the same considerations as the Smartmodem 1200 described below. Unlike the 1200, the 2400 uses a non volatile memory to store configuration parameters instead of the switches used in earlier models. The sequence AT&C1 &D2 &R1 &S1 &T5 &W should be sent to the modem to set normal operation for DCD, DTR, CTS, and DSR. The T5 command disables remote loopback request, a source of failed file transfers on noisy lines. Finally, the &W command writes this information to the non volatile memory. Please consult your Hayes manual for more information on these commands.

7.13 Hayes Smartmodem 1200

The Smartmodem 1200 and similar 1200 bps modems are compatible with the mm224 telephone directory entry. Some modems may require a change in the X1 command to a higher Xn digit for proper autobaud operation.

The Smartmodem 1200(TM) should be configured as follows by setting S1-S8, located under the front panel. These switches may be accessed by gently prying the ears of the front bezel, allowing the bezel to pop off the front of the unit.

S1 Up Support DTR Lead
S2 Up Verbal result codes (Verbose) [4]
S3 Down Result codes are sent
S4 Up Echoes characters in command state
S5 Down Modem does not answer calls initially
S6 Up Carrier Detect line reads status

4. If other options are necessary (to support other software) a custom dial routine may be used as described in Chapter 99.

S7 ???? See Hayes manual
S8 Down Enables Smartmodem 1200 command recognition

The modem cable should connect the following RS-232 circuits: AA BA BB
AB CF CD which use pins 1,2,3,7,8, and 20 on the Hayes modem. Some programs require pins 5 and 6 connected to the modem.

NOTE: Some Hayes modems require mprefix to be in upper case only. "Hayes Compatible" modems not manufactured by Hayes generally work with the same mprefix, but some of the other modem control strings that appear in the distributed PHODIR.t file may not work properly with a particular brand of modem.

7.14 Microcom AX9624c

Microcom AX modems have a configuration switch to select Hayes style "AT" commands. The AX/9624c front dip switch should be set 1, 4, 6, 7 UP, 2, 3, 5, 8 DOWN, and A/S OUT (asynchronous). The rear switches are all UP. Of all these switches, it is vital that front switch 2 be DOWN (AT commands) and rear switch 6 be UP; the initax9624 script should override the others.

Set the MODEM environment variable to AX9624 (caps are important) to support the Microcom AX9624's MNP and flow control features. Before making calls, use the initax9624 phone entry to initialize the modem's non volatile memory with proper settings for ZCOMM.

EXAMPLE: call initax9624

7.15 Microcom SX Series

Older Microcom SX series modems have a unique command set incompatible with Hayes modems. Careful attention must be paid to flow control issues to obtain reliable operation. When using XMODEM or other protocols, the modem must be set to pass all 8 bits and all 256 code combinations of those 8 bits. The dialsx script sets the modem to "transparent software flow control" as described in Chapter 13. Change the line

```
set mcommand "gosub dial"
```

to

```
set mcommand "gosub dialsx"
```

in the setup telephone directory entry.

7.16 Prometheus ProModem 1200

The following switch setting works with ZCOMM: 1-4,6,9 on; 5,7,8,10 off.[5] A custom "dial" script can be written to operate this modem in its native mode.

7.17 Racal-Vadic Maxwell 2400V

The Maxwell 2400V has long delays designed to allow switching between data and voice operation on the same phone line. Unfortunately, they slow normal data operations. The 2400VP reportedly does not have this feature.

Use the default mm224 dialing routine discussed above for this modem.

7.18 Standard 103/212

The supplied "dial" script will present the number to the user and wait for a success/fail response if the mprefix string parameter is set empty. Alternatively, one could change the script to loop waiting for carrier detect while the keyboard is inactive. The Data Set Ready (DSR) signal may be connected to the modem's speed detect output (high for 1200 bps, low for 300) allowing the dr test condition to sample the DSR line to determine the speed of the incoming call.

7.19 Data Race BMX

These modems have a switch selected interface speed, an AT style command set, and switch options for software or hardware flow control. Recommended settings are: AT commands, Dialup, 8 bit data (down), disable XON (7 and 8 down), Echo on. ZCOMM's handshake on command should be used.

7.20 Strange Modems

Most intelligent modems can be commanded to autodial with a suitable mprefix and msuffix string. Those modems that won't work with a particular mprefix can be programmed with a custom "dial" script. If the modem can be configured to reset to a known condition when DTR is

---

5. Prometheus mode does not work with ZCOMM's built-in dialing software because the "DIAL COMPLETED" message makes ZCOMM

think
it's seen "CONNECT" (ZCOMM looks for a "T").

turned off, programming is usually straightforward.

Otherwise, the script must determine what speed the modem is set to, and then, at its present speed, command the modem to change to the desired speed. The essential requirement is to write a script that controls the modem and responds to its state. The information on scripts in Chapter 99 should prove useful.

7.21 Manual Dialing with Smart Modems

Some hotels and exotic locales sport telephone systems with unusual dialing requirements. It may be necessary to dial the call with the telephone, talk to an operator, and then activate the modem. With Hayes compatible modems, an ATD command may be given to the modem to connect it to the line and attempt a data handshake.

7.22 Direct Connection

ZCOMM works well communicating with locally connected microcomputers, minicomputers, or mainframes with direct RS-232 connections. For such applications, only transmit and receive data data signals need be connected to the computer. The Carrier Detect line[6] should be driven ON (+5 volts) to prevent noise on this signal by strapping it to Data Terminal Ready [7] if no other signal is available.

For best high speed operation, replace 8250 or 16450 UART chips with the NS16550AN chip. ZCOMM enables the hardware buffering on this chip to avoid data loss caused by TSR programs, special device drivers, extended memory disks or caches, and DOS clock interrupts.

---

6. Pin 8 on 25 pin RS-232 connector, pin 1 on PC-AT 9 pin connector.

7. Pin 20 on RS-232 connector, pin 4 on PC-AT 9 pin connector.

8. YOUR TELEPHONE DIRECTORY

ZCOMM's telephone directory is a big flexibility advantage over traditional communications programs which require one or more separate files for each system called, or limit directory information to little more than a telephone number.

The telephone directory is a plain ASCII text file which can be edited with standard text editors (brief, teco, EMACS, edlin, etc.). Normally, ZCOMM expects to find the telephone directory in the file /PHODIR.t on the current disk. The pathname may be changed with the PHONES environment variable. Forward slashes should be used to indicate directories.

EXAMPLE: C>set PHONES=c:/yam/lib/PHODIR.t

EXAMPLE: $ PHONES=/u/flashg/bin/phones.t; export PHONES (for Unix)

The putsnp program may also be used to change ZCOMM's default Telephone Directory pathname.

The call command is normally used to make a connection with another computer. When you give a call name command, ZCOMM prepares for a modem call and then searches the telephone directory file for a line starting with name.

It is not necessary to type the entire name as it appears in the file. ZCOMM will find the first entry that name is a prefix of.

EXAMPLE: call cis would access either the cis300 or cis1200 telephone directory entry, whichever was first.

When using two entries with similar names (such as "cis300" and "cis1200"), place the favorite entry first. This way you can just type call cis to get the desired entry.

If the search is successful, the call command copies the complete directory entry name to the remote string parameter, where it can be used for log entries and automatic password generation. ZCOMM executes the commands on the rest of the line (if any), and on succeeding lines beginning with a space or tab, until the next Telephone Directory entry or a return command is seen.

There is no arbitrary limit to the size of the telephone directory. Popular entries may be placed near the front to minimize searching time. When desired, Scripts can be placed in separate files referenced with a source command from the Telephone Directory entry.

8.1 Customizing Your Telephone Directory

8.1.1 TAKE A SHORTCUT WITH PHOMAST.T This starter script was written by Michael Ash of San Antonio, Texas. It is easy to configure and use by following the detailed instructions included in the file itself.

8.1.2 CUSTOMIZING PHONES.T Compared to phomast.t, phones.t is the "industrial strength" prototype directory. While not as easy to configure as phomast.t, it is powerful enough to tame a TrailBlazer and other complex modems.

When ZCOMM begins execution, it searches the telephone directory for the setup entry. (A directory entry has the entry name starting at the left margin.)

The setup telephone directory in the distributed phodir.t file invokes a demonstration menu. Once you have exercized the various demonstration possibilities, search for the xsetup telephone directory and change it to setup be removing the "x". This will blank out the oroginal setup entry which appears later in the file.

```
setup     port 1
```

The first line of the "setup" entry selects port 1.

```
    : if !c speed 1200 putw "ATZ\r"
```

This line is commented out with a colon (:). If the colon is removed, the speed is changed to 1200 and ZCOMM sends an initialization command to the modem if no carrier detect signal is present. If a carrier detect signal is present (modem still connected to the remote computer), the speed is not changed, and no initialization command is sent to the modem.

```
    pd1; pz480
```

enables incoming time/date information provided by the ZMODEM and True YMODEM protocols. Time/date stamping of transmitted files provides many advantages over traditional protocols, including the ability to selectively transmit files if the source file is newer than receiver's copy. The number in the pz480 command should represent the local time zone expressed as minutes behind GMT.[1]

This line should be commented out with a leading colon (or removed) if

1. Pacific Standard Time is 480 minutes behind Greenwich Mean Time

you use a backup program that depends on the dates of files to determine which to save.

```
set mprefix "ATDP"
```

sets the string parameter mprefix to ATDP, setting the Hayes modem to use rotary (pulse) dialing. If your phone uses tone dialing, comment that line out (place a leading colon to make ZCOMM pass over it) and uncomment the line containig "ATDT".

```
set l "1"; set m "1"
```

The l and m string parameters support the dynamic selection of one or more ALDS alternate long distance carriers. The default values for these parameters is the digit 1.

When making entries in your telephone directory, use %l- for numbers with different area codes, and %m- for numbers with the same area code as yours.

If you use a long distance credit card or sometimes dial out from hotel or PBX lines, be sure to modify the att, ddd, hotel9, and hotel8 telephone directory entries in phones.t to suit your needs.

The set command sets the string parameter l (lower case L) to 1 (number), providing for normal long distance access. If you have an alternative long distance service, set this parameter to the required access string for that service.[2] The "set m 1" command sets the string parameter m to 1, providing for normal long distance access for numbers in your same area code. If you have an alternative long distance service, set this parameter to the required access string for that service, plus your area code if required. (Some alternate long distance services require the area code for all calls, even those in your own area code.)

```
set answerback "YOUR NAME CITY\r\n\21"
```

Change the answerback setting to reflect your name.[3] Be sure to keep the \21 at the end of the string.[4]

The next lines configure soft keys F3 to FS4. Their functions are

---

2. Use the "setsavenet" entry in PHODIR.t as a prototype.

3. Some timesharing systems may require a specific answerback string.

4. See Chapter 23 for a description character escapes.

described at the end of Chapter 15.

: display bell=visual

Causes bell characters to be displayed as a flashing musical note instead of sounding. If you want a silent bell, uncomment this line.

set quitcmd "\003\336off\r"

This string is sent to the remote before disconnecting when an ALT-Q is typed during a protocol file transfer.

: set calllog c:/calllog
: set rxlog c:/tmp/rxlog
: set txlog c:/tmp/txlog

The above lines set the pathnames for logs of calls, files received, and files transmitted.

set f10 "@help"
if fyamhelp.t set helpfile "yamhelp.t"
if f/umanh.hlp set helpfile "@yhp /umanh.hlp"
if fumanh.hlp set helpfile "@yhp umanh.hlp"

The above lines locate the help file and program F10 to summon the help processor if available. These lines may be changed if you keep these files in other directories.

: if dc ps4 pn2 pr97

If a color display is used on DOS, uncommenting this line selects red status line (ps4), green normal text (pn2), and a blue/yellow for reverse video (pr97). These colors may be more suitable than the default black and white. Another possibility is "pn3" which selects blue-green for normal text. You may wish to experiment with these values to find ones best suited for your particular combination of display equipment and visual preferences. Changing the colors from time to time may prolong display tube life. The colors Telephone Directory entry* displays the colors generated by the possible numeric parameter values:

EXAMPLE: gosub colors

Some programs, including the "DEC Store" demonstration, will not display exactly as intended with some combinations of the above display parameters.

You may wish to keep your phone numbers etc. in one file and relegate information specific to each computer to a separate file. The setup entry in phones.t checks for the existience of a phones.ts file and executes it of found.

```
set s0 ""
setc pho "%PHONES\&s";  if f%pho source %pho
if %s0 return
```

The supplied phones.ts file is used on Omen's 386 Xenix system, and may be used as an example. On DOS, if you use VT100 emulation with keyboard mapping most of the time, you can add the contents of the keyboard mapping file std.mk, xen.mk, or 101.mk to your phones.ts file.

While editing your telephone directory, you might wish to add some entries for your favorite systems in the same format used by the "amrad", "amsat", or "denver" directory entries.

When the PHODIR.t file is ready, type "ZCOMM<ENTER>" to run ZCOMM. ZCOMM will print several lines of greeting and then silently execute the commands in the setup directory entry.

If ZCOMM can't open PHODIR.t, exit ZCOMM with "x<ENTER>" and copy PHODIR.t to the correct directory, or set the DOS PHONES environment variable to the actual pathname (see Chapter 14). Also check that the DOS CONFIG.SYS files contains FILES=20 to allow ZCOMM a sufficient number of open files for proper script operation. If using DOS 3.2 or later, you will need to have a STACKS line in your CONFIG.SYS file, as described in Chapter 26.

9. HANDS ON TUTORIAL

As a first order of business, run the demonstration program by typing ZCOMMDEMO at the DOS prompt. The demo asks certain questions about your system, and then allows you to exercise a few of ZCOMM's features from a menu. It's a good way to get a first "feel" for ZCOMM before getting down to business with the industrial strength software you will be using.

Remember to turn off the CAPS LOCK key when running ZCOMM.

ASSUMPTIONS: In addition to the minimum hardware requirements for ZCOMM, this tutorial assumes the use of a Hayes Smartmodem 1200 (or equivalent) connected to the COM1 port in accordance with the instructions in Chapter 7. The tutorial assumes that ZCOMM.EXE, YHP.EXE, UMANH.HLP, and PHODIR.t are copied to the root directory of your working disk, and that ZCOMM.EXE has been serialized with the putsnp program. If your system configuration is different, you will have to read the manual carefully to learn how to adjust for your configuration.

After typing ZCOMM from the DOS prompt to load ZCOMM, type F10 to activate the flash-up help processor. Browse through it to familiarize yourself with the information available via the F10 (help) key.

To make a call without using a directory entry, type speed 1200 (or whatever) and then the phone number:

speed 1200 123-4567

The modem then dials the number. When you are connected, ZCOMM will return to its command prompt. Keyboard F2 to begin talking with the remote. Give some commands to the remote until several screens' worth of text have scrolled by.

Now press the PgUp function key. The screen will now display text that had scrolled off before. Use the PgUp, Home, PgDn, and End function keys to move around in the review buffer.

Look for a moderately interesting nugget of wisdom, and use the up arrow and down arrow function keys on the numeric keypad to place the interesting part at the top of the screen.

Hit "t" to set the top marker. This causes all the text to display in high intensity. Now move down using the down arrow key to place the first line of unwanted text at the top of the screen.

Hit the "b" key to set the bottom pointer. This will change the displayed text back to normal intensity.

Now hit "w" and ZCOMM will prompt for a filename to write to. Type the filename followed by <ENTER>, and ZCOMM will write the selected data. When the write operation is finished, the screen will redisplay the text.

When you have the feel of it, type F1 to return to the term function and conversational connection to the remote computer.

The demonstration disk circular buffer search/cut/paste menu choice demonstrates many of the review subcommands.

Next, log off the remote computer. When it drops the line, ZCOMM displays No Carrier Detect in reverse video to announce that the connection has been lost. At this time you are still in the term function.

Hit F1 to return to ZCOMM's command prompt. Then type "off<ENTER>" to disconnect the modem and exit back to the operating system.

Now is a good time to read the rest of the manual to discover the power of ZCOMM. Chapter 9 presents some unusual sessions demonstrating more of ZCOMM's capabilities.

9.1 Sample Sessions

Direct connection to COM2 at 19kb

```
unix  port 2 speed 19200 source 101.mk; t
 |        |        |     |
 |        |        | Map keyboard, Invoke term function
 |        |        ___ Set 19200 bits per second
 |        _______________ Select port COM2
 _____________________________ System name
```

Typical bulletin board

```
rcpm   port 1 speed 1200 123-4567 t -8g
 |        |     |        |    |
 |        |     |        |    _ Term function, graphics
 |        |     |        _______ Number to call
 |        |     ____________________ 1200 baud
 |        _______________________________ Select COM1
 _____________________________________ System name
```

A Not so Typical Session

The example below assumes a Hayes modem connected to a radio receiver tuned to the W1AW ASCII bulletins. Refer to a recent issue of QST Magazine for a W1AW schedule. to select the best signal. Usually,

the error rate is lowest when receiving a strong signal near the Maximum Useable Frequency (MUF). Set the radio for Upper Sideband

(USB) reception. Tune it so the resulting audio frequencies make the RD (Received Data) light turn on about 50 percent of the time. Reset the modem by powering it down before attempting regular calls.

```
w1aw speed 110 putw "ATS10=255 C0 H2 D\r" t -v
       |               |              |
       |               |       -v prints control chars
       |               |       as ^C so they won't
       |               |       erase the screen, etc.
       |   Ignore Carrier Detect, Carrier Off, Special Off
       |   Hook (Don't close relay), Originate, Online
       |_______ W1AW ASCII transmissions are at 110 bps
```

```
A>ZCOMM call unix   Connect to a local system named unix
jabber jabber ...   Login to system, change directory
<ALT-2>Command:     Get a ZCOMM command prompt
sz prg?.? prghlp.mm Upload some files
jabber jabber ...
sz *.c *.h          Download some source files
Receiving ...       ZMODEM AutoDownload accepts them
kermit -ix          Start the Unix Kermit server
<F1>>>>c:           Get ZCOMM's command prompt
remote dir          Get a directory listing
Directory...        Directory listing on screen
get f2              Get (fetch) a file
f2 Open ...         File arrives
send myfile         Send myfile to server
finish              Finish server access
t                   Enter term function
kermit send f1      Start a Kermit file transfer
f1 Open...          File is received AUTOMAGICALLY!
jabber jabber ...   Log off local system
<F1>>>>c:           Get ZCOMM's command prompt
port 1              Select modem on COM1
call rcpm           Dial a system called "rcpm"
jabber jabber ...   Keyboarding with remote
<Home>              Review function at top of text
/to superhacker     Search for beginning of message to you
t                   Set top pointer
/to j. fred muggs   Search for beginning of next message
b                   Set bottom pointer
w                   Write selected text to a disk file
<F1>                Return to term function
E<ENTER>            Tell the rcpm to enter a message
<ALT-2>Command:     Get a ZCOMM command prompt
open -pt letter     Open "letter" and send to bbs, using
                    prompt and throttle modes to slow
                    transmission so the remote system won't
                    drop characters.
dir                 Find out what files are on the RCPM
xmodem s foo.bqr    Command RCPM to download a file
```

<ALT-2>Command: Get a ZCOMM command prompt
rc foo.bqr Download a file with XMODEM/CRC
PgUp PgUp ... Flip back to the first part of
directory previously listed
<ENTER> Back to term function
xmodem s dr.who Download a critical file
<ALT-2>Command: Get a ZCOMM command prompt
rc \misc\dr.who Download the file
jabber jabber ... More keyboarding, logoff
<F1>>>>c: Get ZCOMM's command prompt
Connect the modem to the radio's audio and tune in W1AW
create rtty.tmp Create a disk file for the bulletins
call w1aw
bleep twort sneep Static on the radio - pure line hits until
W1AW is received while sending ASCII
<F2>k Review/k command clears the buffer
QST DE W1AW ...
END ... AR
<ALT-C> Close the capture file
<F1>>>>c:off Return to DOS

10. ACCESSING COMPUTER SYSTEMS

10.1 Dialing

Once you modem is interfaced per Chapter 7, you can connect to a remote system with the call command referencing an entry in your telephone directory.

EXAMPLE: call kgbvax

If a telephone directory entry has not been set up, TurboLearn(TM) may be invoked to dial a phone number and then learn your login procedure by keyboarding the F4 key. You may choose to add the resulting script to your telephone directory, or retain it as a separate file acessible with the source command. Please refer to the learn command in Chapter 15.

If you just want to call a number without ZCOMM learning anything, just type the telephone number from the command prompt already.[1]

EXAMPLE: 123-4567

When the modem connects, ZCOMM returns to the command prompt. You can then keyboard the F2 key to connect your keyboard to the remote system. If you wish to use "bulletin board graphics", keyboard t -8g instead.

10.2 Telenet/PC-Pursuit

For best results, identify with D1 when Telenet asks for your terminal type. This selection prevents the network from adding padding characters, which are just a waste of time with ZCOMM.

To use XMODEM, YMODEM, Telink, and other traditional protocols on PC Pursuit, type

SET 1:0,4:2,5:0,7:8,12:0

after connecting to the PC-Pursuit target city. This command prevents Telenet from "eating" control characters or breaking the connection when files containing certain patterns are transmitted. This command disables Telenet's "<ENTER>@<ENTER>" escape.

For ZMODEM or Sliding Windows Kermit a better alternatitive is:

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1. You may wish to add the /mnp modifier described in Chapter 7.

SET 4:2,5:1,12:1

Please refer to Chapter 13 for network flow control considerations.

10.3 Tymnet

If using Tymnet, type Ctrl-R Ctrl-X just before the host computer name to enable flow control with XOFF and XON. "Half Duplex" may be activated with Ctrl-H. Check with your network's documentation for further details or updates to this information.

11. FILE NAMES Good and Bad

The pathnames of downloaded files must be legal PC-DOS file names as described in The File Specification in chapter 2 of the PC-DOS manual. When choosing file names, remember that PC-DOS does not distinguish between uppercase and lowercase characters in pathnames.

The Compuserve-B, ZMODEM, YMODEM, and Kermit protocols use pathnames generated by the sending program. File names transmitted from other systems may not be legal for DOS, or they may reference directories that cannot be created.[1]

When ZCOMM receives a pathname from the sending program, ZCOMM first checks for the existence of a file with the same name. If no such file is found, ZCOMM attempts to open the named file for writing. If the file cannot be created because directories specified in the pathname do not exist, ZCOMM attempts to create the directories. A pathname that cannot be opened for reading or writing is considered illegal.

EXAMPLE: foo..bar is illegal for DOS because it contains two dots.

An Illegal pathname is translated to name.NNN where name is the filename portion of the given file name restricted to 8 characters, and NNN is an assigned three digit number starting with 001 and incremented after each file download. If a file with this new name already exists, the number is incremented up to 999, until a unique file name is found. The open fails if a unique number cannot be found.

EXAMPLE: A downloaded file with the name newprog.patch.1 might actually be downloaded as newprog.001.

This check for illegal file names is made whenever ZCOMM attempts to create an output file.

EXAMPLE: t foo.bar.baz given from the command prompt would invoke file name translation.

1. A circtory cannot be created if a regular file with the same pathname is present.

11.1 Pathname Translations

Files affected by the dirrx and dircx string variables have their directory paths and/or device specifier stripped if the string variable ends in a "/". Otherwise a file specification with an absolute path overrides the string variable. The pathname of the incoming file is checked before any of these transformations, allowing a host system to place all files received with a protocol in a private directory.

EXAMPLE: C>set DIRRX=C:/download
places files received with a protocol in the download directory on drive C unless the file specification included an absolute path or device letter.

dirrx	File Stored Location
(empty)	any (same)
C:/a f	C:/a/f
C:/a /f	/f
C:/a A:f	A:f
C:/a/	f C:/a/f
C:/a/	/f C:/a/f
C:/a/	A:f C:/a/f

Parameter	Affected commands
dirrx	r{bcotwx7}, fget, get, bdump, usq, ZMODEM/Kermit AutoDownload
dirsx	s{bctx7}, send, B protocol sends[2]
dircx	create, t, message, private, >, bro/a review/w, ap[d] (2nd argument)
dirfx	f, open

To show the possible pathname translations, consider the pathmame: A:/spy/kgb/sabotage/666 sent between two copies of ZCOMM with the ZMODEM protocol.

The sending program command: sz A:/spy/kgb/sabotage/666 sends the file name 666.

The command sz -f A:/spy/kgb/sabotage/666 sends the complete pathname /spy/kgb/sabotage/666.

The command sz ONAME=hogwash A:/spy/kgb/sabotage/666 sends the

---

2. If the dirsx parameter is set, ambiguous or wild card file names

cannot be used.

pathname hogwash.

sz PREFIX=C:/fbi/security/intelligence A:/spy/kgb/sabotage/666
sends the pathname C:/fbi/security/intelligence/666. Note that a disk identifier (C:) is being sent.

On reception with ZMODEM AutoDownload or the rz command, the last example (C:/fbi/security/intelligence/666) would normally be stored under that exact pathname, creating the directories C:/fbi, C:/fbi/security, and C:/fbi/security/intelligence if needed.

If the dirrx string variable had contained C:/downloads the incoming drive specifier would still have overidden the dirrx specification.

If the dirrx string variable had contained C:/ollie/to_do/ the file would have ended up as C:/ollie/to_do/666 to the consternation of all.

The command rz foobar could have been used to rename this file to foobar in the current directory.

The oncloserx and onclosetx string parameters may be used to specify commands to execute after each file received or sent with file transfer protocols. Their use is described in Chapter 11.

12. PROTOCOL FILE TRANSFERS

With many different ways to transfer files with ZCOMM, your choice of file transfer methods could make the difference between efficient, error free data and slow or error prone transfers. This chapter gives an overview of the different ways to transfer files with emphasis on their relative merits.

A file transfer protocol should have high integrity (assurance of accurate data) and high robustness (low probability of aborting a transfer). When the file transfer is attended, robustness is not so critical because the transfer can be restarted.

The following subchapters discuss these file transfer methods in more detail.

12.1 ZMODEM

ZMODEM was developed for the public domain under contract by Telenet, a major packet switched network. ZMODEM has been submitted to the ANSI X12C committee.

ZMODEM provides a greatly simplified user interface. The file name is entered once, and transfer options may be given to the sending program, even those that apply to the receiver. ZMODEM AutoDownload(TM) allows menu and mouse driven programs to download files and commands with no extra keyboarding required.

ZMODEM transfers one or more files with a single command. The size and transfer time for each file is displayed, and the total number of files, size, and transmission time is displayed when more than one file remains to be sent on a command.

Keyboarding ALT-F allows the receiver to bypass an individual file without having to restart the batch.

ZMODEM transfers both files and commands. Command download allows one of the computers to take positive control of the session. A security challenge (activated by ZMODEM AutoDownload(TM)) guards against Trojan Horse messages.*

ZMODEM file transfers preserve the file date[1] and the exact file contents, unlike traditional protocols that append garbage to files.

Streaming transmission provides full throughput over satellite links

1. Controlled by the d and z numeric parameters

and packet switched networks. One of three ZMODEM streaming control methods may be used with systems that allow the sender to monitor the received data for error correction packets without interrupting transmission. ZMODEM's "block length" is the entire file! Individually acknowledged packets support other systems.

ZMODEM allows programs to adjust the protocol parameters for optimum
efficiency as the file is being sent.

Some programs support ZMODEM compression for even faster file transfers under appropriate conditions with the Z file transfer option (q.v.).

ZMODEM is immune to conditions that prevent reliable, accurate file transfers with traditional protocols:

+ ZMODEM data transfers are protected by the Federal Standard 32 bit CRC to assure reliable transfers. This 32 bit CRC gives an undetected error rate five orders of magnitude better than XMODEM's 16 bit CRC, and more than a billion times better than checksum XMODEM. ZMODEM uses 16 bit CRC for file transfers with programs that do not support 32 bit CRC.

+ Most important, all ZMODEM protocol transactions are protected by CRC. Competing protocols advertising 16 or 32 bit CRC sometimes fail under stress because critical control messages are not protected by CRC.

Omen Technology Inc's Intelligent Crash Recovery(TM) and advanced file management. If you've ever been disconnected when a huge file transfer was almost finished, you'll appreciate resuming/recovering the file transfer with the ZMODEM r option.

You can use the ZMODEM n option to transfer only those files that have changed since the last time they were transferred. With the p option, you can unconditionally protect files that already exist on the destination system. To update only the files you already have while skipping the rest, use the Yn options.

To send a file with ZMODEM, the command sz file1 can be given from either the main command prompt, or from the term function via a secondary command prompt obtained with ALT-2. Multiple files and wild cards may be used.

EXAMPLE: sz file1 file2 *.lst

12.1.1 ZMODEM AutoDownload If Z mode has been enabled (the default),
ZCOMM's term function will detect a ZMODEM transmission and receive

the file(s) automatically, after a security check. File transfer options for ZMODEM automatic downloads may be specified with the

adlopts string parameter.

The rz command may be also given from a command prompt.

Please refer to the sz and zcommand commands described in Chapter 15 for examples and information.

Rz and sz programs for Unix and VAX/VMS are available in rzsz.zoo.

12.1.2 Tuning ZMODEM Parameters Chapter 21.2 describes a number of ZMODEM numeric parameters which may be adjusted for extraordinary situations, or to fine tune the last 0.1 per cent of possible performance.

The ZMODEM subpacket length (zmodem L parameter) and the ZMODEM frame length (zmodem l parameter) deserve special mention. People tend to confuse these with the familiar 128 and 1024 byte block length used in XMODEM transfers.

When a ZMODEM frame length of 0 is specified (the default), a single frame will span the entire file if there are no errors. This is the main source of ZMODEM's reputation for fast transfers.

Setting the ZMODEM frame length to a number between 64 and 16384 restricts the frame length to that value. At the end of each frame, the sender stops sending and waits for an acknowledgement from the receiver. When set, the ZMODEM frame length corresponds in function to the 128 or 1024 byte block length of XMODEM based protocols.

Each ZMODEM frame consists of one or more subpackets of 32 to 1024 bytes. Since the subpackets within a frame are sent without pause, a short subpacket length does not exact the terrible throughput penalty associated with short XMODEM and Kermit blocks. In the absence of transmission errors, a 256 byte subpacket length has about two per cent more overhead than a 1024 byte subpacket length. However, the longer subpacket length does increase error recovery time.

ZCOMM dynamically adjusts the ZMODEM subpacket length on the basis of transmission speed and observed error rate. If you know what the error rate on a particular call will be before starting a ZMODEM file transfer, setting the zmodem L numeric parameter will provide a small but noticeable improvement in performance, with 1024 best for clean lines and smaller numbers better for noisy lines.

When sending files over noisy phone lines not involving networks, the speed of error recovery may be increased by decreasing the values of the ZMODEM t and p numeric parameters.

Fascinating information about ZMODEM and other protocols is provided in ymodem.doc and zmodem.doc, part of yzmodem.zoo (yzmodem.arc).

12.1.3 Manual ABORT If for some reason a ZMODEM transfer fails,[2] the program on the remote machine may be manually terminated by repeatedly typing Ctrl-X characters at it until the program exits.

12.2 XMODEM Family Protocols

12.2.1 TRUE YMODEM(TM) Developed in 1981, YMODEM is finding its way into many communications programs. With Omen's Enhanced Data Recovery(TM), YMODEM gives excellent efficiency, integrity, and good robustness in many applications.

True YMODEM transfers one or more files in a batch, without alteration or added garbage characters. True YMODEM also preserves the file date across multiple time zones. ZCOMM and the Unix(TM) rb and sb programs preserve the file modification date.[3]

12.2.2 YMODEM-1k The sb k option (1024 byte blocks) may be used to enhance throughput, especially when using timesharing systems, satellite links, or packet networks that can support the longer blocks.

EXAMPLE: sb -k *.c *.h sends all .c and .h files in the current directory with 1024 byte blocks.[4]

YMODEM and YMODEM-1k transfers can be received with the rb or F3 commands.

YMODEM file transfers with Unix and VMS systems are discussed later in this chapter.

A few obsolete programs claiming to support YMODEM actually use XMODEM with 1024 byte blocks; use ZCOMM's sx -k and rc commands when necessary to exchange data with these non standardized products.

12.2.3 YMODEM with OverThruster YMODEM and YMODEM-1k file downloading from networks and timesharing systems is slowed by response times. This slowing may be significant even when 1k blocks are used. With some systems, one can speed up YMODEM downloads by

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2. For example, Disk Full or NUKE

3. Controlled by the d and z numeric parameters

4. ZCOMM switches to 128 byte blocks at the end of a file when the length warrants.

using the o option with the rb command to receive the file. Because OverThruster(TM) defeats error recovery, a line hit will usually abort a download. OverThruster(TM) may be used with X.PC or MNP error correcting link level protocols.

EXAMPLE: rb -o

SEE ALSO: O numeric parameter

12.2.4 XMODEM-1k The XMODEM-1k protocol transfers one file per command with 1024 byte blocks and a nominal 16 bit CRC. The file name must be entered for both the sender and the receiver. Programs lacking ZCOMM's Cybernetic Data Recovery(TM) logic are less likely to transfer data accurately under marginal conditions. XMODEM's use of every possible 8 bit code limit its effectiveness in many applications.

The end of the file may be padded by up to 127 or 1023[5] garbage characters.

To send a file with XMODEM-1k: sx -k file1

To receive a file with XMODEM-1k: rc file1

12.2.5 XMODEM-CRC (with fallback) The XMODEM-CRC protocol transfers one file per command. The XMODEM-CRC protocol requires the receiving program to initiate an XMODEM-CRC transfer.

The file name must be entered for both the sender and the receiver. Even with CRC-16, programs lacking ZCOMM's Cybernetic Data Recovery(TM) are less likely to transfer data under marginal conditions. XMODEM-CRC's short data blocks and use of every possible 8 bit code limit its effectiveness in many applications.

The end of the file may be padded by up to 127 garbage characters.

To send a file with XMODEM (or XMODEM-CRC): sx file1

To receive a file with XMODEM-CRC: rc file1

12.2.6 Classic XMODEM The original MODEM protocol, developed by Ward Christensen, is supported by a large and growing number of programs operating on a variety of micros and minis. The base level XMODEM protocol gives good results when used over low error rate direct

5. Some programs (including ZCOMM) limit this padding to 127 bytes.

telephone connections. XMODEM's short data blocks and use of every possible 8 bit code preclude its application in many environments.

File transfers with this protocol add up to 127 garbage characters to transferred files. The XMODEM protocol can transfer one file per command. The file name must be entered at both the sender and the receiver.

To send a file with XMODEM: sx file1

To receive a file with Classic XMODEM: rx file1

12.2.7 Relaxed XMODEM ZCOMM's XMODEM and YMODEM support has been optimized for maximum reliability with a wide variety of systems under a wide variety of conditions.

The default XMODEM and YMODEM timeout limits approach typical "relaxed" timings and rarely need to be lengthened except under the most sluggish of conditions. The zmodem t, T, and p numeric parameters (q.v.) control timeouts for XMODEM, YMODEM, and ZMODEM. The default values allow 10 seconds for a packet to appear and a maximum 5 second pause within a packet before starting error recovery.

EXAMPLE: zmodem pt200 pp150 :: Set more relaxed X/Y/ZMODEM timing

Omen Technology does not recommend tightening these timings for XMODEM and YMODEM transfers on noisy lines.

12.2.8 XMODEM with OverThruster XMODEM file downloading from networks and timesharing systems is slowed by short blocks and long response times. With some systems, one can speed up downloads by using the ro command to receive the file. Because OverThruster(TM) defeats error recovery, a line hit will usually abort a download. With nearly error free connections, one can save enough time from the increased throughput to make up for the failed transfers. OverThruster(TM) may be used with X.PC or MNP error correcting link level protocols.

EXAMPLE: ro file1

EXAMPLE: rb -o

SEE ALSO: O numeric parameter

12.2.9 YMODEM-g: Traditional Overdrive The proliferation of error

correcting modems has sparked a proliferation of YMODEM-g programs, more and more of which actually meet minimal YMODEM protocol specifications.

YMODEM-g transmits 0 or more files per batch with an ACK-less variant of YMODEM-1k. The sender does not wait for individual data blocks to be acknowledged, allowing high speed transfers with error correcting modems.

YMODEM-g assumes an error free communications channel. A single transmission error or character lost because of DOS or TSR interrupt latency ruins the entire transfer, and YMODEM-g does not support Crash Recovery(TM).

ZCOMM supports True YMODEM-g with the sb and rb -g commands.

EXAMPLE: sb *.old Sends files in the current directory with YMODEM or YMODEM-g protocol. The receiver controls whether YMODEM or YMODEM-g is used for the transfer.

EXAMPLE: rb -g Receives with YMODEM-g protocol.

12.2.10 XMODEM Mutants Misrepresented as YMODEM Despite continuing education efforts, a few lazy software providers insist on identifying their mutant XMODEM protocols as "ymodem". They choose to ignore the definition of YMODEM that Ward Christensen wrote when he coined the term YMODEM in his April 1985 message:

(a) a record 0 containing filename date time and size
(b) a 1K block size option
(c) CRC-16.

In case of questions, please refer to ymodem.doc, part of yzmodem.zoo (yzmodem.arc) for for the official YMODEM protocol.

12.2.11 Qmodem-G/Streaming XMODEM The Qmodem program and certain bulletin boards provide an ACKless XMODEM mutant protocol selected with the Qmodem G protocol menu choice.

The sx and rx -g commands support this mutant XMODEM.

EXAMPLE: rx -g qmodem.fil

12.2.12 WXMODEM (People-Link) ZCOMM supports WXMODEM protocol downloads with the rw command. On the People-Link timesharing service, WXMODEM downloads are faster than XMODEM downloads. Throughput, reliability, accuracy, and amenities are not as good as ZMODEM or SuperKermit, but neither of these protocols are currently

available on that system. WXMODEM adds up to 127 garbage bytes to transferred files. Omen Technology does not recommend WXMODEM for use over noisy phone lines.

EXAMPLE: rw file1

12.2.13 MODEM7 Batch The MODEM7 batch protocol passes CP/M file names from the sending program to the receiver one character at a time. The compatibility, throughput, and reliability problems of this kluge prompted the development of YMODEM. Nonetheless, when it becomes necessary to transfer files with a program lacking more advanced protocols, MODEM7 batch is better than nothing.

File names transmitted with the MODEM7 batch protocol must obey the restrictions of both 8 bit CP/M and DOS. The f option cannot be used with MODEM7 batch. Data transfer within MODEM7 batch uses XMODEM protocol, and all of XMODEM's weaknesses discussed above apply to MODEM7 batch. MODEM7 batch does not preserve the modification date or exact file contents.

EXAMPLE: s7 file1.ext *.baz sends files with MODEM7 batch.

EXAMPLE: r7 receives one or more files with MODEM7 batch.

12.2.14 Telink/FIDO The Telink protocol expands upon the MODEM7 batch kluge with a specially formatted block containing the length of the file and the local DOS time and date. All of the MODEM7 batch compatibility and reliability problems apply to Telink.[6] The zmodem Z numeric parameter or the z file transfer option may be used to correct the time/date stamping of files transferred between different time zones.

EXAMPLE: zmodem pZ120; st file1.ext *.baz Sends the specified files with a 2 hour time zone adjustment.

EXAMPLE: rt -z60 Receives one or more files with a 60 minute time zone adjustment.

12.2.15 SEAlink When transferring files with the CLINK 1.13 compatible programs, ZCOMM's rb and sb commands recognize SEAlink's modified Telink protocol. The rb command allows a transmitting SEAlink program to use sliding windows. Telink time zone and file

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6. ZCOMM's rt and st commands were verified with Minitel 3.0 by Tom Jenning's Fido Software; other Programs may not produce the same

results.

name considerations apply to SEAlink. In addition, because SEAlink uses all 256 of the possible 8 bit codes for both data transfer and protocol management, some modems and networks that operate with XMODEM will not accommodate SEAlink. As with the MODEM7 and Clink protocols mentioned above, the SEAlink protocol is included for convenience in situations where the YMODEM and ZMODEM protocols are not implemented.[7]

EXAMPLE: zmodem pZ120; sb file1.ext *.baz Sends the specified files to a SEAlink program with a 2 hour time zone adjustment.

EXAMPLE: rb -z60 Receives one or more files from a SEAlink program with a 60 minute time zone adjustment.

12.3 Kermit

Kermit operates with a wide range of computer systems, including those whose restrictive terminal interfaces prevent XMODEM transfers. Kermit uses an encoding technique called quoting to represent control characters and (if necessary) parity bits with standard printable characters. It is one of the few asynchronous error correcting protocols that work properly with half duplex IBM front ends. Because of the overhead from character quoting, Kermit is less efficient (slower) than ZMODEM.

Kermit can transfer one or more files per command, preserving the exact file length. The popular timesharing service The Source supports the Kermit file transfer protocol in ASCII and binary modes.

Kermit was developed at Columbia University. The protocol and supporting mainframe programs are described in documents available from Columbia University and elsewhere.

EXAMPLE: kermit sb file1 file2

EXAMPLE: kermit rb

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7. ZCOMM's SEAlink was verified with CLINK 1.13 by Systems Enhancement Associates. Other Programs may not produce the same results because of ambiguities in the SEAlink documentation and undocumented protocol variants.

12.3.1 Incompatible Kermit Dialects When sending files with the Kermit Protocol, ZCOMM uses all 8 bits for the transfer unless a 7 bit parity mode (e.g., ena -7e) is used, the kermit 7 numeric parameter is non zero, or the other program requests 8th bit qouting. If ZCOMM is using a 7 bit parity mode (such as ena -7m), ZCOMM requests 8th bit quoting unless the kermit 8 numeric parameter is non zero.

-=-

Both programs must use the same parity
for Kermit file transfers to succeed.

-=-

Kermit does not provide an automatic means of forcing both the sender and receiver to use the same dialect. Files cannot be transferred if the two programs disagree on parity handling, Such failures are quite commonplace. A common symptom is a transfer that starts up normally but always fails at the same block. Setting appropriate parity corrects these Kermit failures.

ZCOMM's Kermit AutoDownload(TM) (enabled with the K mode) allows the
term function to sense the beginning of a Kermit file download, make the proper determination on whether to use 8 bit serial data, and execute the file download without user intervention.

12.3.2 Kermit Performance Enhancements Super-Kermit (Kermit with Sliding Windows) transmits multiple packets before waiting for a response, increasing throughput with timesharing systems and networks.
ZCOMM uses sliding windows and CRC error detection if the other machine's Kermit supports them.

ZCOMM also supports long packets for increased throughput with suitable systems, including many that do not support sliding windows. ZCOMM allows Kermit long packets up to 1000 characters on DOS, up to 2048 on 32 bit Unix systems.

The maximum send packet length is set by the kermit l numeric parameter. ZCOMM will ask for sliding windows if this is set to 94 or less.

EXAMPLE: k pl94

The maximum receive packet length is set by the kermit L numeric parameter. ZCOMM will ask for sliding windows if this is set to 94 or less.

EXAMPLE: k pL94

With the default values for the kermit l and kermit L parameters, ZCOMM will choose long packets over sliding windows when a choice is

possible.

ZCOMM supports 12 bit Kermit checksums and 16 bit Kermit CRC for professional error detection performance. ZCOMM uses the most reliable Kermit error correction available. Shorter checksums may be forced by changing the kermit b numeric parameter.

12.3.3 ZCOMM Kermit Capabilities At a Glance

Local operation.....Yes
Remote operation.....Yes
Transfers text files.....Yes
Transfers binary files.....Yes
Wildcard send.....Yes
Filename collision avoidance.....Yes
Can time out.....Yes
8th-bit prefixing.....Yes
8 bit serial data.....Yes
Sliding Windows.....Yes
Long Packets.....Yes
Repeat count prefixing.....Yes
Alternate block checks.....Yes
Terminal emulation.....Multiple
Communication settings.....Yes
Transmit BREAK.....Yes
IBM mainframe communication.....Yes
Transaction logging.....Yes
Act as server.....no
Talk to server.....Yes
Advanced commands for servers....Yes
Handle file attributes.....no
Programmable reset string.....Yes

12.3.4 Accessing Kermit Servers The commands to start up a Kermit server vary from system to system. Unix C-Kermit can be started in server mode with kermit -ix given to Unix or VMS. When the Kermit server is active, the ZCOMM get, send, and remote ... commands may be
used. The ZCOMM finish command causes the remote Kermit server to exit to its operating system.

12.3.5 Kermit Caveats Some versions of Kermit translate files as they are sent, by default! Typical modifications include CR/LF to NL transformations and CPMEOF stripping. Before transferring binary files, such editing must be disabled with SET FILE TYPE BINARY or similar commands given to the other program. The demonstration in Chapter 9 includes several Kermit server access and file transfer commands.

If the Kermit protocol doesn't work with IBM mainframe communications, incorrect ASCII/EBCDIC translate tables may be the problem.

Some mainframe "front ends" require special characters or a break

signal to recover from transmission errors ("line hits"). The kermreset string parameter (q.v.) may be programmed with the required sequence.

SEE ALSO: kermreset string parameter

When downloading files from some versions of Kermit, best results may sometimes be obtained by starting ZCOMM's kermit receive before typing the carriage return that starts the sender on the remote. If the other program includes an adjustable initial delay, you can save time by setting it to zero.

SEE ALSO: kermit d numeric parameter

SEE ALSO: K mode (Kermit AutoDownload(TM))

12.4 Uploading Files to Remote Unix Systems

On Unix(TM) systems, files may be uploaded most conveniently and efficiently with the ZMODEM protocol supported by the Unix rz program. The rz program supports a subset of ZCOMM's ZMODEM features; see the rz program's manual page for more information.

If rz is not installed on the Unix system, unpack the rzsz.zoo file[8] on your MSDOS system with: looz -e rzsz.zoo given from the DOS prompt.[9] Next, the command source zupl.t calls the zupl.t script to upload the bootstrap file minirb.c, compile it, and use it to upload the remainder of the source files.

After the rest of the files have been uploaded, compile rz.c and sz.c using the directions given in the README file and in the C source files.

The manual "pages" rz.1 and sz.1 may be formatted with nroff commands such as

```
nroff -Tlp -man rz.1 sz.1
```

Versions of sq, type, usq, and zoo are available for Unix. The Unix version of USQ has a -n flag to strip carriage returns. In addition, the undos program may be used to remove carriage returns from Unix files.

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8. This file is part of the DSZ and Professional-YAM distributions.

9. The rzsz.zoo or rzsz.arc file is also available on TeleGodzilla and other bulletin boards.

12.5 Downloading Files from Remote Unix Systems

To download files from Unix(TM) systems, simply use the Unix sz program to send the desired files to ZCOMM. To Unix keyboard: sz file ... ZCOMM's ZMODEM AutoDownload(TM) takes care of the rest for you, saving unnecessary keystrokes.

If one or more of the files already exists on the destination disk, use sz -y file ... instead, to replace the old copies on your computer.

Another useful option sends only the files that exist on both computers (Y), and furthermore sends only those that are newer (n): sz -Yn file ...

When files are long and transmission slow, you can save time by squeezing them first with sq. Source for a Unix compatible version of sq is available in xsq.cq. The zoo program, available for DOS and Unix, may also be used to compress file(s) before transmission.

Omen Technology products support ZMODEM compression with the Z option.

All Omen Technology products support compression by Run Length Encoding (RLE). Unix flavors of Professional-YAM also support LZW compression.

Unix source files normally do not contain carriage returns used by CP/M and DOS. Some CP/M or DOS programs, such as C compilers, do not require carriage returns in the source files. Others, such as the Microsoft Macro Assembler, become quite confused by such files, although such files fully meet the requirements of the ASCII standard.

Carriage Returns may be added before downloading with the todos or tocpm programs. Carriage returns may be added during the transfer with the sz a option. Carriage Returns may be added after the transfer by some program editors, including uEMACS. (Other editors, such as DOS edlin may crash trying to edit such files.) Short files (less than 64kb) may be converted using ZCOMM's read and create commands to pass the data through ZCOMM's capture buffer.

Text files may also be downloaded using the capture buffer if sz has not been installed on the Unix machine.

If a file or set of files are to be transported between two Unix systems, it may be helpful to place them in a tar or cpio archive (and possibly squeeze the archive) before transmission. This procedure will preserve the Unix file modes and modification times, and bypass pathname restrictions imposed by DOS.

12.6 VMS File Transfers

The abovementioned rz and sz sources also compile on the DEC VMS C compiler. Instructions for compiling, linking, and installing the programs are contained in the rz.c and sz.c source files.

Most of the comments made above about Unix file transfers apply to VMS as well.

The command source vupl.t calls the vupl.t script to upload the files needed to compile the programs on VMS. The script attempts to invoke a Kermit server and use Kermit to upload the files. If no Kermit server is found, the script uses the DCL create command to upload the files by emulating a paper tape reader.

Make certain to "install" the VMS sz command to the DCL interpreter.

12.7 CompuServe File Transfers

ZCOMM supports CompuServe Quick-B and the faster Extended Quick-B (B+) file transfer protocols.

As this is being written, these protocols are being revised. Please check the newest.me file for possible changes.

B+ Protocol is used by the CompuServe Timesharing Service through the CompuServe, Tymnet, and Telenet networks. B+ Protocol file transfers are initiated by the CompuServe computer. The B+ Protocol file transfer protocol is well supported by this timesharing service. Under typical conditions, the B+ Protocol saves 35 per cent or more in file transmission time and connect charges compared to XMODEM protocol transfers.

The c or C mode must be set with ena -c or ena -C to allow the B+ protocol to seize control and transfer files.

The adlopts string parameter allows the y and v file transfer options to be specified for CIS-B transfers.

The w numeric parameter controls the block length used by the CompuServe B+ Protocol. A longer length increases throughput, but may overload some networks, resulting in excessive retransmissions or failed transfers. With the new Extended Quick-B protocol, the maximum block length is 1024 data bytes. A value of 0 (the default) allows the Compuserve computer to control the block length, up to 1024 with Extended Quick-B.

A negative value controls the upload block length but still allows Compuserve to control the download block length (1024 with Extended Quick B).

Uploads to Compuserve using longer block lengths are especially sensitive to poor flow control, especially when error correcting modems (MNP, etc.) are used. If B protocol uploads fail or require excessive retransmissions, correct the flow control arrangements, disable the modem's error correction, or try a smaller upload block size.

The data contents of successfully transferred file(s) are not affected by this parameter.

Some networks may garble data when Quick-B's streaming causes ZCOMM to respond to incoming data concurrently with incoming data. The o numeric parameter can be set to 0 to disable streaming (send-ahead).

It is essential to use the same interface speed to the modem as the modem's transmission rate when uploading files with B+ protocol. If the modem buffers any characters, ZCOMM's response to CompuServe's flow control will be too slow to prevent loss of data.

The CompuServe B+ Protocol controls all file transfer operations (except permission to overwrite files) from the timesharing system.

Waiting for long files to download can be boring. You can start the transfer and walk away from the computer, but CompuServe will stay connected for 15 minute$ after the transfer is finished if you don't come back when the download finishes. This expense can be avoided by typing ALT-Q once the protocol transfer has started. ALT-Q tells ZCOMM to disconnect as soon as the protocol transfer is completed, stopping the connect charges. An alternative method is to control the transfers with a script, using either ejryam or the less sophisticated cissig and dow.t scripts included with the software distribution.

When "browsing" through CompuServe's software "downloading section" libraries, the kcisdl.t script file and ZCOMM allow you to download a file with a single keystroke: F3. Installation instructions are provided in that file.

12.8 BIX File Transfers

BIX (Byte Information Exchange) supports ZMODEM, and Kermit file transfers.

The Tymnet phone number in the bix telephone directory entry should be changed for your calling area. Other scripts are provided to handle BIX mail and conferences.

When setting up a new BIX account, give the command call bix,new to

force a login to the BIX new account program.

Be sure to select ZMODEM downloads and Kermit (sliding windows)

uploads with the "OPTIONS" menu choice. BIX's transfer time predictions are about 40 per cent too pessimistic for ZMODEM transfers.

A number of BIX scripts are included in SCRIPTS.ZOO.

12.9 User Exit Processing

The onclosetx and oncloserx string parameters provide a facility to perform user defined file related functions ("user exits") immediately after each file is closed, while the protocol is still active. Wild card filename expansionss are not allowed in this context.

The oncloserx string parameter may be used to perform user commands or call a script once for each file received with a file transfer protocol.

EXAMPLE: set oncloserx @crc %rname; obey "!%mv %rname /tmp"
When each file is received, the crc command calculates and displays a CRC for the file.

Then the !% command calls the mv program to move the file just received to the /tmp directory. The "%" in the "!%" command causes the rest of the command string to be processed for string substitutions.

The onclosetx string parameter may be used to perform user commands or call a script once for each file sent with a file transfer protocol. Wild card file name expansions may not be used in onclosetx.

EXAMPLE: The following causes each successfully sent file to be moved to the /done directory.

```
    set onclosetx
@if !d? obey "!%mv %rname /done"
```

SEE ALSO: rname, tname, drive, pwd string parameters, ?, d? test conditions

User exits will cause protocol timeouts if their execution takes too long. Since both Zcomm and the remote machine are still executing file transfer protocols when user exits are called, user exits should not involve the serial port.

13. MESSAGE TRANSFERS

13.1 Downloading Messages

ZCOMM is flexible capturing output from other systems. The trick is to make the remote send the information without too much embellishment.

When downloading files without a file transfer protocol, set the timesharing system to send tabs as tab characters without expanding them to spaces. Turn off fill characters. These extra characters waste time and money and ZCOMM doesn't need them. ZCOMM's s and S modes can be used to strip control characters and escape sequences from the capture download.

EXAMPLE: t -s file

If the remote system responds to XOFF and XON, E mode may be enabled to allow Error Containment(TM) to reduce the number of characters garbled by "line hits".

EXAMPLE: t -E7e file1 uses Error Containment to download file1 from a system using 7 bits even parity. Error Containment works best when even or odd parity is available.

SEE ALSO: E, j, S, s modes

13.1.1 XON/XOFF Files of arbitrary length may be transferred if the remote supports flow control with the ASCII XOFF and XON control characters. Output from most timesharing services may be captured to a file using this method.

To download a file with XON/XOFF flow control: t file1

13.1.2 DC2/DC4 (^R/^T) Some bulletin boards support file downloads by issuing a DC2 to open a capture buffer, sending the file, and terminating the capture with DC4. ZCOMM does not support this "protocol" directly. The review t and b commands can be used to strip excess characters from the circular buffer before writing the file to disk.

This "protocol" can be implemented with Turbodial(TM) script commands:

EXAMPLE: pat 1c "\022" "@kill; create capture.fil"
pat 2c "\024" "close"

13.1.3 Data Dump Sometimes no flow control is available. The fget * command allows ZCOMM to accept a continuous stream of data at a maximum data rate determined by the hardware and software environment.

With a hard disk, excellent results have been obtained with a 4.77 mHz PC accepting graphics dumps at 9600 bps.

EXAMPLE: fget file1

At slower speeds or with a fast computer, the term function j mode* may be used for nonstop file capture.

EXAMPLE: t -j file1

The fget command does not provide a progress display. While this allows the fastest possible data capture (38400 bps on a suitable computer), sometimes there is no handy way to monitor the flow of data.

The term function I (super-image) mode may be used to capture a binary file, provided CRT emulation is disabled with a display dumb command or by enabling v mode.

EXAMPLE: display dumb; t -Ij file1

The fax directory entry in PHONES2.T gives another example of how ZCOMM's data capture modes may be used to capture binary data.

13.2 Uploading Messages

It is often possible to upload files using the f command with one or more modes (such as w or p, possibly in combination with t).

Message uploads are more reliable if you keyboard enab flow before connecting through Telenet. If using Tymnet, type ^R^X just before the host computer name to enable flow control with XOFF and XON. Check with your network's documentation for further details or updates to this information.

It often helps to use "half duplex" (h mode) with the computer echo disabled when uploading files to the computer. This saves the computer from wasting precious time echoing characters.

Another tactic is to avoid uncorrected message transfers during peak hours. Telephone usage peaks during midday with a resulting increase in noise induced line hits. Timesharing computers and communications networks are more likely to drop characters due to buffer overloading during high traffic periods as well.

13.2.1 Paced Some systems accept characters only at a certain rate, a slow speed for each character and possibly a pause at the end of each line. Depending on the particular system, data transfer may have to pause briefly at the end of the line,[1] or wait for a particular character to signify readiness to accept the next line. There may be an additional delay after that[2] before the remote is able to accept more data.

EXAMPLE: f -p file1 uploads file1 with a wait for the linefeed echo at the end of each transmitted line.

EXAMPLE: pg63; f -p file1 Sets the prompt character to decimal 63 ("?") and sends the file with a wait for "?" after each transmitted line.

As with the fpute command, the remote system must be commanded to open
and close the file.

13.2.2 Throttle Another method of slowing message uploads is the throttle, activated by t mode. Throttle artificially slows Zcomm's character transmission to allow more time for the receiving system to digest each character. The speed of transmission with t mode is controlled by the t numeric parameter.

EXAMPLE: f -t secret.msg

Really slow systems may require both throttle and pacing to send data efficiently without loss.

EXAMPLE: f -tp turkey.slo

13.2.3 Uploading to IBM Mainframes Text files can be uploaded to IBM mainframes using the P (upper case) mode. When the P mode is activated, ZCOMM will wait for an XON (^Q) after sending each line. In this special mode, ZCOMM will not time out waiting for the XON, no matter how long it takes for the IBM front end to send it. If, for some reason, the front end fails to send the XON, (or if it is garbled in transmission), Ctrl-Q may be keyboarded.

EXAMPLE: f -P file1

---

1. Controlled by the p numeric parameter

2. Controlled by the q numeric parameter

SEE ALSO: P mode, Kermit protocol

13.2.4 Uploading Messages to Bulletin Boards The greatest file transfer challenge is to upload a file to a bulletin board message system running on a tiny microcomputer. Bulletin board message systems have a rich variety of operating sequences and timing dependencies matched only by the proliferation of incompatible dialects of Basic and Pascal.

Message upload from files to bulletin boards reduces connect time and $welling of the Phone Bill. Unattended message transfer saves the user's time, especially if the board is difficult to access.

The t, p and w modes and the g, p, t, and q numeric parameters allow disk files to be uploaded to such systems.

The basic program cbbsck.bas may be used (perhaps with modifications) to check that a message file does not violate the restrictions of the message system being uploaded to. A C version is also available.

EXAMPLE: f -pt file1

13.2.5 Uploading to CompuServe SIGS A file may be uploaded to a CompuServe SIG (Special Interest Group) editor with p mode and the g numeric parameter set to colon. When the file has been transferred, hit ENTER to send a blank line to terminate message entry.

EXAMPLE: set eolstr "\r."; pp1000; pg58; f -p FILE Is useful for uploading a prepared message to Compuserve's bulletin boards. This setting for eolstr inserts a carriage return and period after each line to prevent the CompuServe software from reformatting the message.

EXAMPLE: pp1000, pg58, and f -p FILE transmits FILE waiting for the prompt character ":" before sending each line after the first.

An alternative is to set the SIG "FIL" option, which calls the EDIT editor. The cisupl script file referenced by phones2.t uses the SIG "FIL" editor option.

Compuserve nodes often drop characters when files are uploaded at full speed in full duplex. This can be avoided by using h mode (local echo) and turning off Compuserve's echo.

13.3 Fpute: Echoplex Uploads

Text files can often be uploaded reasonably efficiently using the fpute command.* Fpute waits for an echo to each character sent to the remote. Fpute provides modest throughput without loss of data for systems with terminal ports designed for keyboard data entry. The maximum speed with fpute is limited to about 1/3 the normal character rate by echo delays. There is no error correction with fpute, but character by character handshaking prevents lost data caused by buffer overflow. If possible, TABS should be set to echo as TAB characters and not as spaces. Before the fpute command is given, the remote system must be instructed to enter data from the "terminal" to a file. After the file has been sent, the remote system must be instructed to close the file.

EXAMPLE: fpute file1

14. FLOW CONTROL

All of us must sometimes tell people to "slow down" lest they overload us with information faster than we can write it down. "Wait!" is a Flow Control Signal for the English language.

When buffered modems, timesharing systems, networks, or computers of differing speeds are involved, a machine readable "Wait!" signal is required.

Flow control is sometimes necessary to display long messages without skipping over the good parts. If you see pieces of text missing from messages but don't see the usual funny characters caused by line noise, ypu have a flow control problem.

File transfers that use long blocks or streaming protocols may not work well unless slower parts of the system regulate the speed of transmission to prevent loss of data. With ZMODEM, SuperKermit, and other streaming protocols, inexplicable retransmissions of data blocks, often at regular intervals, indicate flow control failure.

If you wish to keep things simple, the sending computer should not operate at a higher interface speed than the slowest link in the network. Otherwise precautions must be taken to prevent data loss with interactive operations and unnecessary retransmissions with streaming file transfer protcols.

ZCOMM, ZCOMM, and DSZ default to software flow control with XON and XOFF characters.[1] When used with modems that require hardware flow control, the handshake command (q.v.) should be used to specify which hardware lines are to be used for flow control.

Non transparent software flow control is incompatible with XMODEM and YMODEM transfers. XMODEM and YMODEM require complete transparency to all 256 8 bit codes. An XMODEM transfer that always fails at the same block results from non transparent flow control. When XMODEM-1k and YMODEM-1k are used, the network must assert flow control, or handle bursts of 1040 characters without data loss. When X.25 or hardware CTS is unavailable, flow control that does not "eat" any characters may be used with XMODEM and YMODEM. When buffers fill up, an XOFF should be emitted. An XON should be sent when the buffer has emptied. Otherwise, the network should neither generate nor eat XON or XOFF characters.

---

1. The PCDOS flavor enables "handshake both" when selecting a port with an active Clear To Send (CTS) signal that was previously

initialized to a speed greater than 2400 bps

On Telenet, this is obtained by setting CCIT X3 5:1 and 12:1 in the PADs (Packet Assembler Dissassembler) at both ends of the network. Packets should be forwarded when the packet is a full 128 bytes, or after a moderate delay (3:0,4:10). Set parameter 5 to 1 at both ends AFTER one is connected to the remote modem. (Sorry, these commands must be given each time you connect to a modem in the far city!)

<ENTER>@<ENTER>
set 5:1<ENTER>
rst? 5:1<ENTER>
cont<ENTER>

ZMODEM and Kermit protect all 4 XOFF and XON characters, commonly used network control characters and trigger strings. ZMODEM and Kermit are compatible with many networks that do not support XMODEM family protocols, including some that claim network compatibility. For PADs that do not accept "rst?", use:

<ENTER>@<ENTER>
set 4:2,5:1,12:1<ENTER>
cont<ENTER>

For best Telenet download throughput, parameter 64 (advance ACK) should be set to 7. The parameter 0 is a dummy argument that distinguishes Telenet parameters from CCIT parameters.

<ENTER>@<ENTER>
set 0:0,64:7<ENTER>
cont<ENTER>

Sometimes Telenet flow control stops data transmission when the network buffers are not yet full. If you often see "STOPPED" flashing in the status line (DOS versions), or if you see the modem send data light pause in a ZMODEM or SuperKermit file send, poor flow control may be the culprit. Such slowdowns are typical when a network is overloaded. If this condition persists, the network should take steps to reduce the congestion. Turning OFF network flow control and activating ZMODEM's or SuperKermit's protocol flow control may increase throughput under these conditions.

Instead of or in addition to XON/XOFF flow control, the sending program's ZMODEM w numeric parameter can restrict the window size to a value that does not overload the network. A zmodem pw2048 command restricts the window size (maximum number of bytes in transit) to 2048. This causes the sz command to trigger the receiver's acknowledgement every 512 bytes (one fourth the value of the ZMODEM w numeric parameter). The sender monitors these responses and suspends transmission when necessary to restrict the window to the specified size. Until a network dependent lower limit is reached, lower window sizes improve the speed of error recovery at the expense of slight increases in protocol overhead. When the window size becomes less than the number of characters sent within the network's transit time, throughput falls off rapidly. Frequent protocol acknowledgements slow

down high speed psuedo full duplex modems (US Robotics HST, Telebit TrailBlazer) and should be avoided.

Some modems and networks can be configured to flush (discard the

contents of) their buffers when a break signal is received. If this is possible, error recovery with ZMODEM transfers may be speeded up by setting the ZMODEM b parameter to 1, which sends a break whenever the ZMODEM sending program gets a retransmission request.

Network and Flow Control (FC) Compatibility

Network	Interactive	XMODEM	WXMODEM	S-KERMIT	ZMODEM
No Network	YES	YES	YES	YES	YES
8 bit, no FC	NO	YES	YES	YES(1)	YES(1)
Transparent FC	YES	YES	YES	YES	YES
Non Transparent	YES	NO	NO	YES	YES
7 bit	YES	NO	NO	YES	NO

(1) Window size must be restricted to avoid buffer overrun if the network cannot transfer data at full speed.

14.1 Got ZRPOS Errors

Got ZRPOS indicates the receiving program has detected a transmission error and has requested retransmission. In other words, ZMODEM is doing its job of detecting and correcting missing and garbled data. If this happens more often than observed line errors would indicate is reasonable, there may be a flow control problem in one of four areas:

+ Between the sending program and its modem. If using an interface speed higher than the transmission speed, or modem to modem error correction (MNP, LAPB, PEP, etc.), check that the modem and the sending program are configured for the same flow control methods. Omen Technology's software is faster than most other programs, and may expose flow control problems not seen with slower software.

+ Between the sending modem and the network. Correcting this requires "handshake both" to allow the sending program to honor both hardware (CTS) flow control from the modem and software flow control (XON/XOFF) from the network.

+ Between parts of the network.

+ Between the receiving modem and the receiving program. This can happen at high transmission speeds when the receiver has specified a large I/O buffer size with the B numeric parameter.

  Excessive interrupt latency from extended memory ramdisks or disk caches, and poorly written hard disk drivers also wreak havoc on streaming protocols but do not affect start-stop protocols

(XMODEM, etc.). Problems with extended memory disk caches may cause errors at regular intervals; check the receiver's error messages.

To work around these problems, give the "handshake slow" command to the receiver.

15. RUNNING ZCOMM

Before running ZCOMM, the keyboard Caps Lock should be turned off. ZCOMM commands and most arguments must be entered in lower case.

15.1 Running ZCOMM from DOS

ZCOMM is called from DOS as ZCOMM [A] [DPORT=n] [command ...]

The following special commands may be given from the command line only.

A PcAnywhere host mode must be disabled to allow another program to access the serial port in order to prevent port contention and lockup. The A command may be given to disable pcAnywhere host mode for the duration of the program. The A command is only recognized when it is the first command on the command line.

EXAMPLE: ZCOMM A DPORT=2 remote

COMSPEC ZCOMM uses the DOS COMSPEC environment variable to load COMMAND.COM or similar program to parse and execute DOS gateways (shell escapes).

DPORT=n is an optional override to the default comm port. If another program is using the default comm port, ZCOMM may be told to use another port to prevent interference.

SEE ALSO: DPORT environment variable

Command may be any desired combination of ZCOMM commands. Command line arguments to ZCOMM must be in lower case excpet as noted.

EXAMPLE: C>ZCOMM call cissig invokes ZCOMM and executes the commands in the "cissig" telephone directory entry.

EXAMPLE: C>ZCOMM DPORT=2 call othersys
Selects COM2 before initializing the serial port

15.1.1 DOS Environment Variables

ZCOMM searches the DOS Environment for the following variables:

CBSIZE overrides the default allocation for the circular buffer.** If memory is limited, the DOS command SET CBSIZE=3000 will leave more memory for DOS Gateway or other programs. On medium model

DOS flavors, CBSIZE may be set as high as 65500.

DIRRX, DIRSX, DIRCX, DIRFX Contain optional receive (DIRRX), send (DIRSX), capture (DIRCX), and file (DIRFX) directory presets. When ZCOMM starts, these environment variables preset the dirrx, dirsx, dircx, and dirfx string variables respectively.

DIRSIZE controls the number of directory items that may be sorted with each wildcard. It should be set to 23 * times the desired number of entries (default = 200). If more directory entries are encountered, they are processed without sorting.

EXAMPLE: C>set DIRSIZE=8000

DPORT overrides the default modem port (COM1) initially accessed by ZCOMM.

EXAMPLE: C>set DPORT=2

HOTPORT Suppresses the "Warning: Old dport=" message (q.v.) seen when Zcomm is called from certain operating systems or programs.

EXAMPLE: C>set HOTPORT=1

SEE ALSO: port, portx commands

MODEM Describes the type of modem used by the mm224 script. See Chapter 7 for details.

EXAMPLE: C>set MODEM=MM224E

PATH must include the directories containing ZCOMM and the help processor YHP.

PHONES overrides the default pathname used to fetch ZCOMM's telephone directory. Forward slashes should be used to indicate directories.

EXAMPLE: C>set PHONES=c:/PHODIR.t

YAMQUIET Inhibits the display and locks the keyboard, preventing ZCOMM from writing on the screen. * This is useful when calling ZCOMM from another program.

EXAMPLE: C>set YAMQUIET=257 Performs the equivalent of an initial kbdlock 257 command.

SEE ALSO: kbdlock command

ZONE sets the z numeric parameter to the number of minutes the current local time lags GMT time.

EXAMPLE: C>set ZONE=420

SEE ALSO: z numeric parameter

Before running the X.PC* version of Pro-YAM, you must run the Tymnet X.PC driver to make it resident by calling the driver from DOS. The driver announces itself and returns control to DOS. The Tymnet X.PC driver uses approximately 40kb memory.

EXAMPLE: xpcmain

15.1.2 Help Program Environment Variables The flash-up help processor program YHP examines the environmnet for the NORMATTR, REVATTR, and UNDLATTR variables. These set help screen parameters for normal, reverse video, and underline attributes corresponding to the n,r, and u numeric paramters.

EXAMPLE: C>set NORMATTR=3

15.2 Running ZCOMM from Unix

15.2.1 Dial-Out ZCOMM is called from Unix as [DPORT=S] yam [command ...]
DPORT=S is an optional override to the initial default serial line.

If another program is using the line, ZCOMM complains that the port is busy and will refuse to open it.

Command may be any desired combination of ZCOMM commands.

EXAMPLE: yam call cissig invokes ZCOMM and executes the commands in the "cissig" telephone directory entry.

EXAMPLE: DPORT=tty77 ZCOMM call othersys
Selects /dev/tty77 before executing the othersys telephone directory entry.

If ZCOMM is run in the background, it will exit if it reached the main command prompt.

EXAMPLE: yam call cissig&

As a form of shorthand, ZCOMM may be invoked as call if that is the command to be executed.

EXAMPLE: call cissig

15.2.2 X Windows When run under the X Windows xterm(1) interface program (indicated by the TERM environment variable), ZCOMM displays status information in xterm's status line. ZCOMM understands xterm's keyboard mappings for function and ALT keys.

EXAMPLE: xterm -e yam&

ZCOMM can also be called from an xterm login window the same way ZCOMM
is called from the shell.

15.2.3 UNIX/XENIX Environment Variables Unix/Xenix ZCOMM flavors search the Environment for the following variables:

CBSIZE overrides the default allocation for the circular buffer. On 32 bit systems, the maximum CBSIZE is limited only by the operating system's process size limit.

EXAMPLE: CBSIZE=300000; export CBSIZE

DIRRX, DIRSX, DIRCX, DIRFX Perform the same function as described for the DOS flavor above. (Since Unix does not use colon (:) as a device specifier, Unix flavors do not treat colon(s) in pathnames in any special way.)

DPORT overrides the default modem port initially accessed by ZCOMM.

EXAMPLE: DPORT=tty12; export DPORT

HZ Indicates the number of kernel "clock ticks" per second. This calibrates terminal function timeouts, protocol timeouts, and the sleep command. The HZ environment variable must be set if the value used by your system is not 50 clock ticks per second.

MODEM Describes the type of modem used by the mm224 script. See Chapter 7 for details.

EXAMPLE: MODEM=MM224E; export MODEM

PAGER points to a pager program suitable for viewing files a screenfull at a time, such as pg(1), more(1) or less(1).

PATH must include the directories containing yam and the help processor yhp.

PHONES overrides the default pathname used to fetch ZCOMM's telephone directory.

EXAMPLE: PHONES=/usr/lib/local/localphone.t; export PHONES

SHELL ZCOMM uses this environment variable to select the appropriate program for its shell escapes.

TERM If the TERM environment variable contains xterm, xterms or anything else beginning with xterm, ZCOMM assumes it is operating as a subprocess to the Xwindows xterm(1) program, enabling a term function status line. The LINES and COLUMNS environment variables preset the # and $ numeric parameters respectively. This assumption may be overidden by setting the X numeric parameter.

If the TERM environment parameter contains the string 401 indicating emulation of a Tektronix 4010 series storage tube terminal, status line updates are inhibited when Tek graphics is active.

If the TERM environment parameter cegins with "wy" (as in "wy60") ZCOMM will use and recognize Wyse escape sequences.

UUCPLOCK If UUCPLOCK contains "/usr/spool/locks/LCK.." ZCOMM uses "Honey Danber" uucp port arbitration conventions.

15.2.4 Dial-In Unix flavors may be used for dial-in applications to transfer files and commands with programs logged in to terminal ports. The commands rz, sz, zcommand, and zcommandi perform the same functions as the corresponding ZCOMM commands. They may be given directly to the shell or executed from a shell script or Makefile.

EXAMPLE: sz -Yn *.c *.h

The Makefile fragment below commands a DOS ZCOMM logged into a serial port to clear its dirrx string parameter, change to its root directory, and then sends a new version of the executable to the DOS machine.

EXAMPLE: cpsz:/tmp/yam.exe @zcommand 'set dirrx ""'

```
        @zcommand "c:;cd /"          @sz -y
/tmp/yam.exe
```

More general command sequences or other protocols such as Kermit may be accessed with the xyam command.

EXAMPLE: xyam kermit sb *.c *.h

EXAMPLE: xyam z pl256 sz -Yn *.c *.h

16. SPECIAL KEYS

Ctrl-Break clears any typeahead, unlocks the keyboard, and stops whatever function[1] ZCOMM is doing in a reasonably orderly manner.[2] Ctrl-Break cancels kbdlock. It is not so abrupt as the NUKE key. The B test condition tests whether Ctrl-Break has been struck since the last purgek command.

Keyboarding ALT-N will NUKE (abort) the current command and return to ZCOMM's command prompt.[3] If one or more scripts are active, the current line number (counting from the first line in the script file) for each level of script is displayed.* NUKE will terminate any script. NUKE closes any transmit file, but not a receive capture file. (A receive capture file may be closed with the "close" command.) NUKE does not disconnect the modem by dropping DTR.[4]

Keyboarding ALT-Z appends the contents of the display screen to a DOS file. The pathname is contained in the string parameter picture which may be changed with the set command. The exact contents of the screen memory are written to the file, with each screen character followed by its attribute. A separate program, unpic is used to convert the screen dump to a normal file that may be printed or displayed.

16.1 Special Keys during Protocol Transfers

Certain keys perform special functions when keyboarded during protocol file transfers (XMODEM, Kermit, etc.).

F1 Keyboarding F1 causes a protocol timeout and forces a retry.

ALT-A Displays Kermit file transfer status.

ALT-B Cancels the current Kermit or ZMODEM batch transfer.

---

1. Not necessarily the calling function or script

2. In the term function, Ctrl-Break sends a break to the remote unless it has been redefined with a set command.

3. Use of this term, popularized in the J.F.K. administration, does not imply endorsement of preemptive nuclear attacks on innocent populations.

4. When in host operation waiting for a call, NUKE drops DTR.

ALT-C Cancels the ZMODEM or Kermit session.

ALT-F Skips the current ZMODEM or Kermit file transfer.

ALT-Q Keyboarding Alt-Q during a protocol file transfer toggles a flag that causes ZCOMM to disconnect when the transfer is completed. This is most useful when downloading a long file. As soon as the file is transferred, ZCOMM will execute the string parameter quitcmd (if set) and then disconnect the modem. If keyboarded during a Host Operation file transfer, ZCOMM will exit Host Operation at the conclusion of the transfer. The state of the quit flag is displayed each time ALT-Q is keyboarded.

ALT-S Keyboarding Alt-S displays status information on the console screen only (even if in Host Operation). The pattern number of the last successful search (-1 if no match), the active search patterns (if any), and the line numbers of the active scripts (if any) are displayed to aid script debugging.

ALT-V Keyboarding ALT-V will toggle the view option affecting the rb, rc, rz, sb, sc, sx, and sz commands, and data transfers using the Compuserve B protocol.

ASCII Keyboarding a normal ASCII character (in the range of 00 to 7F) will send that character to the modem. This may be used for protocol testing, or to terminate a modem's autodial handshake without terminating ZCOMM's call retry count.

Ctrl-X All ZMODEM and many YMODEM and XMODEM protocol programs recognize a dozen successive Ctrl-X characters as a session abort command. If the remote computer appears to be "stuck" in a YMODEM
or ZMODEM transfer, keyboard ten Ctrl-X characters to abort the protocol transfer.

During a protocol transfer, normal keys are sent to the modem when Zcomm is waiting for or receiving a packet. This may be used to reissue a file transfer command to the other computer if it becomes apparent the original command was not accepted.

Other uses for this pass thru capability include protocol testing.

16.2 Local Editing Keys

Emacs style character editing reduces the number of keystrokes needed to enter and edit commands and strings. Normally, the cursor is at the end of the line of text being keyboarded. Printing characters insert themselves at the cursor location. The <ENTER> key enters the entire line of text.

Editing keys are:

Left, Ctrl-B moves the cursor to the left

Right, Ctrl-F moves the cursor to the right

Ctrl-Left cursor WORD left

Ctrl-Right cursor WORD right

Ctrl-A cursor to beginning of line

Ctrl-E cursor to end of line

Del, Ctrl-D delete character at cursor

Backspace delete character to left of cursor

Ctrl-W delete word to left of cursor

Ctrl-K delete to end of line

Ctrl-R refresh (redisplay) the line

Ctrl-X delete entire line

Down, Ctrl-N next history line

Up, Ctrl-P previous history line

Ctrl-U Argument Count (not available in term function)

An initial Ctrl-U sets an argument count of 4. Successive Ctrl-U characters multiply the argument count by 4. A decimal number may be entered after Ctrl-U, and this number becomes the argument count.

EXAMPLE: ^U^U Left moves the cursor 16 left

EXAMPLE: ^U5X inserts 5 "X" characters

EXAMPLE: ^U5^U? inserts 20 "?" characters.

Unix/Xenix flavors do not support Emacs style editing in the term function.

17. MAIN COMMANDS

17.1 Main Commands

All commands and arguments must be entered in lower case except where stated.

You may shorten some commands by typing just the first portion that is shown in caps. For example, the "break" command may be entered as "br". Whether or not you abbreviate the command, it must be entered in lower case.

User defined Soft Keys are executed from the command prompt iff they do not conflict with the permanent definitions described below.

Except where stated, multiple commands can be written on one line separated by ; (semicolon). Commands that take a constant number of arguments do not need a semicolon to delimit the end of the command. If in doubt, use a semicolon to separate multiple commands.[1]

@ The at sign may be used to indicate a telephone number starting with the Touch-Tone(TM) A B C D * or # codes or a character escape. If the phone number contains spaces, it must be enclosed in double quotes. The leading @ is not sent to the modem.

EXAMPLE: @#*-123-4567 Dials #*-123-4567.

%l-234-567-8901 (%l:letter l) For normal long distance dialing, the string parameter l (letter l) defaults to "1" (digit 1). To use an alternative long distance service, set the l string parameter with a modem command to dial the local access number, wait for the second dial tone, and transmit the account number.

SEE ALSO: "setsavenet" telephone directory entry

A string of alternate phone numbers may be specified with the "+" construction shown below.

234-5678 A number given as a command invokes the dial script to attempt a connection with the specified number. Iff the modem is currently connected to a remote modem, and the B numeric parameter is non zero, ZCOMM pulses Data Terminal Ready, terminating the connection. ZCOMM character escapes may be used within the number

---

1. A space or two after each semicolon makes scripts easier for

humans to read.

string to represent special characters.

EXAMPLE: 234-5678

When carrier is detected, ZCOMM executes the mconnect string (if set) and proceeds to the next command

One or several alternate phone numbers may be specified by appending
the previous number with +234-5678 for as many alternate numbers as
are desired.[2] When a connection is made, undialed alternates are forgotten. Alternate phone numbers need not support the same speeds. A redial count given to the call command repeats the sequence of alternate numbers.

EXAMPLE: cis speed 2400 239-6124/mnp_s+239-6126/mnp_s+232-1032/300
This script line attempts a MNP (with software slow control) call to the first two numbers, then a 300 bps call to the third number if neither of the first two connected.

Iff no connection is made, script processing at the current level is terminated.

A number of modifiers are available depending on the type of modem and the choice of dialing script used. These are described in Chapter 7.

SEE ALSO: nolog command, calllog string parameter, mcommand string parameter

a: Change the default disk to a:. ZCOMM then prints the free storage remaining on the selected disk. The specified disk must be included in the string parameter disks.

abort Aborts any command or script in progress. Closes all script files that may be open. Abort returns to the command prompt.

SEE ALSO: quit command

accept[[l]1] stringvar prompt (letter l, digit 1) Scripts often need to prompt the user for file names and menu choices.

2. When using the mm224 dialing script.

Accept displays Prompt[3] to the user. ZCOMM then reads keyboard input into the specified string variable. Backspace and Ctrl-U perform editing functions. Characters are accepted from the user until <ENTER> is typed. If the H numeric parameter is non zero, an empty string is returned if <ENTER> is not typed within the time limit set by that parameter. Acceptl translates the user's response to lower case. Acceptl1 returns a 1 character string in lower case after the single character is keyboarded.

Prompt is processed for string substitution and character escapes. If the result begins with an ESC character, ZCOMM does not reposition the cursor before accepting the string. In writing scripts, it may be useful to save the current screen location with an escape sequence, then restore it with an escape sequence encoded in the prompt string.

EXAMPLE: accept s1 File: Displays the prompt File: and reads the keyboarded response to string parameter s1.

EXAMPLE: acceptl1 s0 "Enter Menu Choice" Reads a single character from the user, translates it to lower case, and assigns it to s0.

EXAMPLE: accept s0 "\E[20;60H\E[KFile Name: " Places the cursor at line 20 column 60, clears the rest of the CRT line, displays the prompt, and accepts input.

EXAMPLE: accept s6 " Your \E[1mFirst\E[0m name please " Uses boldface video to highlight First as it appears in the prompt.

EXAMPLE: accept s2 "File "; rc %s2 Prompts the user for a file name, then receives that file with XMODEM/CRC protocol.

EXAMPLE: accept xpassword "\E[mMaster Password: \E[8m"; lput "\E[m" Uses invisible video (ESC [8 m) to allow a password to be entered without visible echo. The ESC [m sequences reset the display to normal (visible).

SEE ALSO: obey command, scripts

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3. Prompt must be enclosed in quotes if it contains spaces.

ap file1 file2* (Append) Appends the contents of file1 to file2. If file2 does not exist, it is created. Wildcards are not allowed. The ap command closes any files that have been opened by the create, f, open, t or > commands. File1 and file2 are processed for string parameter substitution.

apd file1 file2* (Append-Delete) Appends the contents of file1 to file2, then deletes file1. If file2 does not exist, it is created. If an error is detected writing file2, file1 is not deleted. Wildcards are not allowed. The apd command closes any files that have been opened by the create, f, open, t or > commands. File1 and file2 are processed for string parameter substitution.

EXAMPLE: apd %item Z%item.tmp

bdump outfile Dumps the contents of the modem interrupt input buffer to outfile. This command is useful for debugging as outfile will contain the last characters received from the remote regardless of what ZCOMM commands have been executed. The most recently received data appears at the end of outfile. This command "tells it as it is", writing all 8 bits of each character to outfile. If less than 1400 characters have been received from the remote, some of outfile will consist of nulls or garbage. The bdump command is often used as a post mortem diagnostic dump after a failed script or file transfer. This command is not available on Unix, OS/2, and X.PC flavors of ZCOMM.

bg Indicates ZCOMM is running in the background with no user at the keyboard.

SEE ALSO: fg command, df test condition

BReak Sends a 200 millisecond break signal. N.B.: Some modems do not correctly pass the break signal to the remote.

SEE ALSO: Ctrl-Break key, break string parameter, zmodem B numeric parameter

BROwse pathspec Browse through the files specified in pathspec. If pathspec is empty, all files are presented. For each matched pathname, the filename, date, and length of the file are displayed. The status line displays some of the commands which may be applied to each file. Chapter 15.4 describes the browse subcommands, which provide extensive capabilities for individually selected files.

bye Terminate the connection in progress by sending a long space and then dropping DTR (Data Terminal Ready).[4] After a pause, DTR is

reasserted to allow the modem to originate or answer another call.[5]

SEE ALSO: o, off commands

call [-N] [name][.path][,modifier] Prepare ZCOMM for a new task and invoke an entry in the Phone Directory.

The 7, A, a, b, C, c, E, e, g, H, h, i, j, n, o, P, p, q, r, S, s, t, u, v, w, X, x, Z, and z modes are reset. The d mode is set. The e, f, g, k, m, p, q, t, w, Kermit 8, zmodem C, e, l, L, p, t, T, w, and W parameters are reset to their default values. The search patterns are erased. Permanent string parameters set with the set _svar command are set to empty.

If path has been specified, it is searched for a line beginning with name. Otherwise, ZCOMM searches the telephone directory. An optional modifier (string with a leading comma), if specified, is not used in the directory search.

If the search is successful, the entire directory entry name is copied to the remote string parameter. The complete argument entered on the command line is stored in the args string parameter visible to the called script. If the script has a READ ONLY attribute, ZCOMM is unrestricted during execution of the script. ZCOMM then executes the commands on the rest of the line (if any), and on succeeding lines beginning with a space or tab. If the v numeric parameter is greater than zero, each command from the file is displayed on the screen before it is executed.

It is not necessary to type the entire name as it appears in the telephone directory, as ZCOMM will find the first entry that name is a prefix of. Iff name is empty, execution begins with the first line of path.

EXAMPLE: call cis1200
call cis1
call cis.C:/newscript

EXAMPLE: call genie,upl Invokes the genie telephone directory entry with the modifier ,upl available to the called script.

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4. The modem must be configured to use Data Terminal Ready (DTR).

5. Most dialing scripts include an initial bye command to make sure any previous call is disconnected.

The call command is not limited to making connections. For example, "call host" in the distribution PHODIR.t file conditions a Hayes compatible modem to answer incoming calls silently, set parameters, and activates ZCOMM's host operation.

Most directory entries include a telephone number to dial. If ZCOMM is used with an autodial modem, the number of retries N (default none) may be specified.

EXAMPLE: call -40 cbbs-r Attempts 40 retries before giving up.

The interval between retries is set by the i numeric parameter.

EXAMPLE: pi4 Sets the interval between retries to 4 seconds.

Words To the Wise: Abuse of the retry feature by continually calling busy numbers may incur the wrath of the Telephone Company. Especially with Message Unit Accounting, Big Brother may be watching your telecommunications habits. Some long distance services (MCI, Sprint, AT&T, etc.) charge for unsuccessful calls, especially if the phone is allowed to ring (or ring busy) for more than a few seconds.

Consult your telephone company about legal limits to the number and frequency of retries.

Since some computer services will disconnect within a short time if no login is attempted, you should start communicating as soon as the modems are connected. ZCOMM sounds the bell after making the connection if retries have been specified.

The source, gosub and call commands may be nested with up to six command/phones file descriptors open at once.[6] A label may be the target of a call command provided the trailing colon is included in name.

cat pathspec For Unix users, a synonym to the type command (q.v.).

cd [dir] Change to directory dir. If Restricted, dir is checked for a parent directory ("cd .."), and absolute paths ("cd /src") not prefixed by the home string parameter. Giving cd without an argument changes to the directory stored in the home string parameter.[7] ZCOMM then stores the current directory in the pwd

---

6. Deep nesting may require a decrease in the circular buffer memory allocation, see Chapter 14.

7. The home parameter is set to the current directory when ZCOMM is invoked, but may be changed with the set command.

string parameter and displays it unless the v numeric parameter is less than 0.

EXAMPLE: cd /tmp

N.B.: When operating restricted, the home string parameter must point to a valid directory in order to enforce the intended directory path restriction.

SEE ALSO: cdd and pwd commands, home and pwd string parameters

cd D:dir When a disk drive is specified with the cd command, the current directory on that drive is changed but ZCOMM remains logged in on the current drive and directory. If Restricted, dir is checked for a disk drive ("cd b:/foo") not contained in the disks string parameter.

EXAMPLE: cd D:/tmp

cdd D:dir Change to (log in to) disk D and then to directory dir on the specified disk. If dir is not specified, the root directory is assumed. ** This is a shorthand equivalent to a D: command followed by a chdir dir command.

SEE ALSO: cd command

chat Enter the term function to chat keyboard to keyboard. Characters typed by either keyboard are echoed to both ends, and RETURNS echo as RETURN/LINEFEED. Chat will become hostile if the other end also echoes characters. (Try it sometime on a timesharing system; it's fun.) In Host Operation, chat exits if the caller types Ctrl-Z.

close Writes the contents of the circular buffer iff a receive file is open, then closes the receive and transmit files. ZCOMM complains if no files were open.

SEE ALSO: nolog command

closerx Iff a receive file is open, writes the circular buffer then closes the receive file.

SEE ALSO: nolog command

closetx Closes the transmit file, if it is open.

SEE ALSO: nolog command

cl Clears the screen.

cls Resets display modes and clears the screen.

CONFerence Enters the term function with a 1 line window for composing commands and text. Chapter 19.5 gives details.

crc pathspec Print the CRC-32 and character count for the specified files. The crc command verifies the identity of two (or more) copies of a file. Iff the lengths and CRC-32's of two files are the same, the files are almost certainly identical. Comparing files with the crc command is faster than transmitting a second copy for character by character comparisons.

EXAMPLE: "crc", "crc *.c"

HINT: To generate a file containing the CRC's of the files in the current directory:

```
>crc.lst
crc *.*
close
```

After the files are copied, run the commands above (with a different file name), then compare the two files with DIF.EXE to detect any that have changed.

SEE ALSO: sum, wc commands
Source for a public domain Unix/DOS version of CRC is available.

create [-modes] outfile If a receive capture file is open as the result of a create or t filename command, write the circular buffer and close it. Then create outfile for use with the term function with modes. The create command is especially useful when you don't want to enter the term function immediately.

EXAMPLE: create -ys /tmp/cbbs.tmp[8]

SEE ALSO: > command

createx outfile Similar to the create command, but does not open outfile if a file with the same pathname already exists. The resulting error message may be suppressed by setting the v numeric parameter negative. Scripts may test for success with the r test condition. The createx command may be used to manage semaphores to

---

8. The y mode overwrites any existing file with the same name. The s

mode strips most control characters from the resulting disk file.

lock resources or work entries used by multiple instances of a program. The createx command is available on Unix and OS/2 flavors.

SEE ALSO: kill command

del pathspec Delete the specified files. No message is printed if one or more of the specified files could not be deleted. No confirmation is requested for mass deletes.

WARNING: As with all ZCOMM pathspec specifications, a directory name expands to all files in that directory.
N.B.: Do not attempt to delete an open file on DOS, especially the history file.

SEE ALSO: browse command

demand password Scripts must often verify a caller's identity by asking for a password. The ZCOMM password command allows a caller three chances to enter a given password. Failure results in disconnection.

Password is processed for character escapes and string substitutions. All security restrictions on string parameters are enforced.

If the result is empty, no password is demanded. Otherwise the user is prompted to enter a string matching password in the correct case. Keyboard input is not echoed.

Three attempts to enter password are allowed. If the password is not correctly entered, DTR is pulsed to force the modem to disconnect the caller, and the ? numeric parameter is set negative.

EXAMPLE: demand %password Requires the caller to enter a string matching the contents of the password string parameter.

dir pathspec Display pathnames matching pathspec alphabetized across the page. Wildcard filename expansions are alphabetical.

EXAMPLE: dir

EXAMPLE: dir y*.c *.h

dirr pathspec Displays the directory with length and creation date of each file. dirr displays the number of files matched, number of blocks, number of kb in those files, and estimated transmission time at the current transmission speed assuming the fastest protocol available (ZMODEM or YMODEM-g). XMODEM and Kermit transfers take

longer than the displayed estimates. Wildcard filename expansions are alphabetical.

dird pathspec Long Form directory, sorted by date.

dirt pathspec Long Form directory, reverse sorted by date.

dirl pathspec Long Form directory, sorted by file length.

dirs pathspec Long Form directory, reverse sorted by file length.

dirx pathspec Long Form directory, sorted by file extension.

DISable{-modes} Disable mode(s) affecting the term function. Chapter 18 describes modes affecting the term function.

EXAMPLE: dis -t Disables throttle (t mode).

display [[no]dismode] ... Without an argument, prints the display modes. Display modes preceded by NO are turned off. With one or more arguments, turn on the specified display mode(s). If an argument is preceded by no, the specified display mode is turned off.

If an emulation is specified, it must be the first argument. display command argument changing the terminal emulation (vt100, lsi-adm3a, 3101, dumb) disables nlmode and overstrike.

The display modes are:

vt100 Emulate DEC VT-100 and VT-102 display codes and most Teletype 5425 codes. VT-52 and Zenith H-19 codes are the default.

lsi-adm3a Emulate Lear Siegler ADM3a and Televideo 9xx control codes.

dasher Emulate Data General Dasher terminals.

3101 Executes IBM 3101 and TI 940 escape codes.

wyse Emulate Wyse terminals in native mode, allow switching the keyboard to keyscan mode.

dumb Only null, bs, tab, cr and lf are executed, all others display. As in real life, dumb takes precedence over vt100, vt52, and lsi-adm3a emulation.

inhibit Inhibits the display (nothing prints).

SEE ALSO: Q mode

nlmode Received newlines (linefeed) display as return/linefeed.

bell=visual Instead of sounding on the speaker, bell characters cause flashing notes to appear on the screen.

overstrike Overstruck characters are displayed in bold face or underline (reverse video on CGA) as appropriate.

autowrap The 81st character prints on a new line with possible scrollup.

rautowrap Allow a backspace from the lest margin to reverse wrap to the last character position on the previous line.

8bit Decode 8bit control characters and G1 character set.

stat=off Disables ZCOMM's status line.

warpdrive Provides higher display speed without scrolling flicker, but causes noise (snow/chromablizzard) with CGA display adapters.

mapkb Allow escape codes from the remote or a file to active alternate keyboard mapping. The keyboard mapping is defined with a series of mk commands, such as those contained in the std.mk (standard keyboard) or 101.mk (101 key extended keyboard) files. Other XXX.mk files may be provided; the first few lines of these files indicate the keyboard configuration they set up. ZCOMM comes initialized with the std.mk mapping, which requires NumLock to be on.

EXAMPLE: source std.mk Defines a VT100 keyboard mapping for standard PC and PC-AT keyboards.

The term function keyboard mapping enabled by the mapkb command may override some ZCOMM functions.

A display nlmode nobell=visual Turns on nlmode display mode and turns off the visual bell.

EXAMPLE: display vt100 Enables VT100/VT102 emulation used by many computer systems.

dump pathspec Dump the named files in a side by side hex/ASCII format, similar to the CP/M users' group DUMP program. The ending character number is also displayed. Zero length files are not displayed.

echo[c|f] string Echo a line containing a single argument string in reverse video. Tabs should not be used with the echo command. The echoc command also echoes its argument to the capture file (if

open), without reverse video. The echof command echoes its argument to the capture file only.

EXAMPLE: echoc "File not Accepted" Outputs a line to the screen and to the capture file.

EXAMPLE: echo "Dave, This conversation can serve no further purpose." Displays a line on the screen only.

SEE ALSO: lput command, r numeric parameter, character escapes

egrep[m] regular-expression pathspec ** Display lines in the specified files matching regular-expression. Regular Expressions are discussed in Chapter 23.

The egrepm command finds a line matching regular-expression in each of the specified files, and then pages through the file beginning with the matched line. At the end of each screen, ZCOMM accepts the same subcommands used with the findm command.

EXAMPLE: egrep "^Subject:" *.* Displays all lines that begin with "Subject:".

SEE ALSO: findmore command

The egrep implementation does not strip the trailing CR/LF from lines read from the disk. This affects use of the $ regular expression magic character. When using the $ magic character, the CR/LF at the end of normal lines must be represented as "..$".

egrepq regular-expression pathspec ** Silently searches the specified files for the first line matching regular-expression. Upon a successful search, the contents of this line are stored in the z0 string variable and the ? numeric parameter is incremented. The egrepq command is useful for fetching password information from a disk file.

SEE ALSO: obey command, findq command

else Execute the command(s) on the rest of the line if the last if test performed on the current script level was false.
N.B.: While else statements in programming languages are connected to a particular if statement according to syntax, the connection in ZCOMM is to the last if statement executed on the level, regardless of goto's.

ENAble {-modes} Enable mode(s) affecting the term function. Chapter

18 describes modes affecting the term function.

EXAMPLE: ena -h Enables half-duplex (local echo) Half-duplex mode causes the term function to display keyboarded characters.

estimate length [speed] Use the specified length and optional specified effective speed when displaying information for the next receive file. A length of 0 bypasses the length substitution. Once a speed (in effective bits per second) is given, it is used for all locally displayed transmission time calculations until the next speed or port command.

EXAMPLE: estimate z2 Uses the file length stored in string variable z2 in calculating the transmission time estimate for the next received file.

EXAMPLE: speed 19200; estimate 0 2400 Use an effective transmission speed of 2400 for transmission time estimates instead of the 19200 bps interface speed.

EXPand sourcefile pathspec ** For each pathname in pathspec, execute the commands in sourcefile with the string parameter item set to the current pathname. The commands in sourcefile must not themselves contain wildcards (* or ?) or directory pathnames. If no files match pathspec, sourcefile is not executed. If the script executed has a READ ONLY attribute, ZCOMM is unrestricted during execution of the script.

EXAMPLE: expand plxupl 001* Executes the script plxupl once for each file matching the wild card specification 001*.

EXAMPLE: expand a *.arc where the file a contains:

```
obey "!pkxarc -v %item >> arclist"
```

lists the contents of all .arc files to arclist.

Chapter 99 explains the use of this command in more detail.

f [-modes] file The f (think of "file") command initiates transmission of file with the term function. One or more term function modes (described in Chapter 18) may be enabled with the optional modes flag.

If q (TWX) mode is enabled, transmission pauses until the called system's answerback restarts it with an XON, or until g mode is set. Otherwise, any XOFF induced transmission pause is reset.

Once the file has been opened with the f command, a pattern match or keyboarding F1 or ALT-X will exit the term function with file

incompletely transmitted. The rest of the file may be transmitted by the t, F2, or wait commands.

EXAMPLE: f -px message Uploads message paced by the p mode, which sends a carriage return and pauses at the end of each transmitted line until the remote responds with the prompt character (default line feed). The x mode makes the term function return to the script after the file has been transmitted.

EXAMPLE: set eolstr "\r."; pp1000; pg58; f -p file Is useful for uploading a prepared message to a CompuServe bulletin boards using the "SIG" editor (not FILGE). The eolstr setting sends a carriage return and period after each line to prevent the CompuServe software from reformatting the message. Pp10000 Sets the pause timeout to a long time. Pg58 Sets the prompt character to ":". f -p file Transmits the file.

SEE ALSO: b, g, p, r, n, t, w, x, X modes, eolstr string parameter, t and wait commands

fail Terminate the current expand command, otherwise return from the current script level with failure status.

If called directly by another level of script, that level is terminated.

The fail command also causes the term function to exit, to allow a function key to be programmed with a macro that exits the term function.

If called implicitly by a number presented for dialing, fail terminates the current dialing attempt. If no retries are left, the call is abandoned.

fg Indicates ZCOMM is running in the foreground with a user at the keyboard.

SEE ALSO: bg command, df test condition

fget outfile * Gets 8 bit raw data from the modem to outfile without any protocol. No data is displayed on the screen. Keyboarding F1 terminates recording; any other keyboarded character is sent to the remote. Iff the g numeric parameter is set to to some value other than its default of 10 (line feed), the fget command terminates upon reading and storing a character matching the g numeric parameter. The fget command also terminates recording on loss of carrier detect signal.

This command can be used when the flow of data from the remote

cannot be regulated. The maximum rate attainable without loss of data is limited by the maximum interrupt latency of the operating system and active device drivers. The time required to write a 512 character buffer to disk may also limit the maximum average data rate. Each 512 character block must be written before the modem interrupt input buffer overflows with new data. If the startup time for a floppy disk is excessive, better results will be obtained writing to a hard disk or ramdisk[9] if a suitable device is available. Tests with an IBM Personal Computer, DOS 2.1, and a Maynard Electronics hard disk suggest that no characters are lost at 9600 baud. (Your results will vary depending on your configuration and programming habits. California estimates lower.)

EXAMPLE: fget rawdata

find string pathspec Find and display lines containing matches to string in the specified files. Lower case characters in string match either case; upper case characters in string match upper case characters only. If string contains spaces, tabs, or semicolon, it must be enclosed by double quote characters. ZCOMM C style escapes may be used to represent control characters and string parameters to be searched for. Assuming normal DOS files (with CR/LF at the end of each line), a \n at the beginning of string forces a match to the beginning of a line. A \r at the end of string (\n if the file(s) have no returns in them) forces a match at the end of the line.

The file name being searched and its length are displayed in the status line. For each line that contains a match to string, the file name (if more than one file), line number, and the text of the line are displayed.

EXAMPLE: find count *.c Finds all occurrences of count or COUNT in the named files.

SEE ALSO: egrep command

FINDMore string pathspec Findmore finds a line matching string in each of the specified files, and then pages through the file beginning with the matched line. Otherwise, it is similar to the find command. When the screen is filled up, the prompt More? appears. Typing space displays another screenfull. Typing n skips to the next instance of string that has not yet been displayed. Typing ^Q or ^S displays one more character from the file. Typing ^X skips to

---

9. See comments on Extended Memory ramdisks in Chapter 26.

the next file.

SEE ALSO: egrepm, page commands

findq string pathspec Silently searches the specified files for the first line matching string. The processing of string is identical to the find command described above. Upon a successful search, the contents of this line are stored in the z0 string variable and the ? numeric parameter is incremented. The findq command is useful for fetching password information from a disk file.

SEE ALSO: egrepq command

finish Terminates Kermit server operation on the remote system.

fput file * Puts data from file to the remote at maximum speed without any protocol. After each 512 characters, the number of characters transmitted is displayed in the status line, and the keyboard is polled. Any key will abort the transfer. This is the fastest way ZCOMM can transmit characters to the modem, with possible peak speeds greater than 19kb. This command is useful for testing RS232 peripherals at high peak rates such as 56 kilobaud.

EXAMPLE: fput datafile

fpute file * Echoplex transmit a file to the remote, waiting for the correct echo to each character transmitted (for Throttle/10 seconds). The echoed character is sent to the CRT screen. If fpute receives a space as an echo to a tab, fpute waits for the spaces to stop echoing for at least 100 milliseconds before resuming transmission. Transfer speed thus suffers when tabs are present in the transmitted file unless the remote can be set to echo tabs as tab characters instead of expanding them to spaces. Throughput is less than 1/3 of normal because of the echo delay.

Fpute counts each time the correct character is not echoed as an error.

With n mode, fpute transmits only a linefeed at the end of each line. With r mode, fpute transmits only a carriage return at the end of each line. Most applications would use one of these modes.

CPMEOF (Ctrl-Z) terminates the file transmission unless b mode is set.

Because fpute waits for the correct echo to each character sent, fpute should be used for transmitting characters to programs that echo exactly.

Often it is easy to write a simple receive routine to synchronize

with the sender by echoing each character received. On some microcomputer systems, the device "TTY:" does just that. Fpute is especially useful for "spoon feeding" files to the serial inputs of microcomputers and minicomputers.

SEE ALSO: f command

get filespec Instructs a remote Kermit server to the transmit the specified file(s), then receives them. The form of filespec varies with the remote system; it must be quoted if it contains any special characters or spaces. The get command only operates with a Kermit server; use kermit rb to receive files from a regular Kermit program.

goback label Search the current script file for label: and execute commands starting at that line. The goback command begins the search at the beginning of the file. It is faster than the goto command which begins the search at the current line.

SEE ALSO: goto command

gosub name[.path] Call a script as a subroutine. The phone directory is searched for name unless another file is specified with .path. Gosub has the same action as the call command (q.v.), but does not reset modes, disconnect the modem, or modify the remote parameter.

EXAMPLE: gosub dosig Executes the dosig entry in the telephone directory.

EXAMPLE: gosub .%lib/baud.t Executes the commands in c:/yam/baud.t assuming the lib string parameter contains c:/yam.

SEE ALSO: call command

goto label Search the current script file for label: and execute commands starting at that line. A label begins at the first column and ends with a colon (:). Iff label precedes the current script line, the goback command will locate the target label more quickly. The goto command is valid only within a script or telephone directory entry. Please refer to Chapter 99 for examples using the pattern, if, goto, and source commands.

grab svar Grab reads a line from the currently open transmit file into the specified string parameter svar. Unless b mode is on, all characters starting with the first CR and/or LF are discarded. Grab inhibits transmission of the open file until g mode is explicitly set by a command.

On end of file the transmit file is closed and the string parameter

is set empty. End of file can be tested with the t test condition.

SEE ALSO: putv command

HAndshake {off|sw|on|cts|dsr|dcd|both|slow} Some modems and printers cannot accept continuous full speed data. These devices send control characters (XOFF and XON) for flow control, or generate a hardware flow control signal on the CTS, DSR, or DCD pin. The Handshake command controls the modem port hardware handshake (default sw).[10]

If hardware handshaking is selected, an ON to OFF transition on the specified line pauses transmission, and an XON character will not override the hardware restraint.

After a timeout set by the S numeric parameter (default 60 seconds), or if characters are in the keyboard input buffer, a warning message is displayed, the restraint is released, and characters are sent.

As a special case, handshake on obeys output flow control with the CTS input signal, asserts input flow control with the RTS output signal, and disables the transmission of XOFF characters when the modem input buffer becomes nearly full.

Some computers do not support concurrent disk and serial I/O at high speeds. The handshake slow command drops the RTS signal to the modem during disk writes when receiving files with YMODEM-g or ZMODEM.

The command handshake both allows either CTS or XOFF to pause output, in addition to asserting input flow control with the RTS output.

The handshake dcd command enables d mode (q.v.). Subsequently, selecting a different type of handshaking will disable d mode.

The "handshake off" command disables all flow control except for the term function.

The handshake command releases flow control (allows data to flow if it had been stopped by handshaking).

---

10. ZCOMM automatically disables its software (XON/XOFF) flow control when using XMODEM, YMODEM and similar protocols that require all 256 byte codes. These protocols will not work if the modem is set for software flow control.

Changing the communications port with the port or portx command disables hardware handshaking.

SEE ALSO: S numeric parameter

EXAMPLE: handshake cts Turns on CTS handshaking.

help The help command uses the helpfile or xhelpfile string parameter depending on whether ZCOMM is in host operation. Normally, the help command displays a command summary, pausing every 24 lines.

If the string parameter begins with the character @, ZCOMM uses the rest of the parameter as the initial command to access a pop-up help program. The contents of the f string parameter are added to this command, separated by a space. Thus, if helpfile contains "@yhp /umanh.hlp", giving the help command from the main prompt executes the DOS command "yhp /umanh.hlp main".

If the called program leaves a file yamhelp.tmp containing script commands in the current directory, ZCOMM executes this file with a source command and then deletes it.

SEE ALSO: f, helpfile, xhelpfile string parameters, source command

history [histfile] Opens histfile for use as a dual 64 entry history file for commands entered both at the ZCOMM command prompt and online with the term function. Histfile is a random access file used as a pair of circular buffers to save commands for recall. Only a file created by a previous history command may be used with the history command. If the specified histfile does not exist, it is created. Histfile stores commands with T or more characters where T is the value of the T numeric parameter.

If histfile is not specified with the history command, the current history file is updated and closed.

The history command may be given with a different file name whenever
desired to access useful commands saved from previous sessions with a particular host or application.

When history is enabled, the Up and Down function keys scroll through previously entered commands. Ctrl-P and Ctrl-N may be used in place of Up and Down respectively. An old command so selected may be edited with editing keys and executed with the <ENTER> key.

In the term function, the history accessed with the Up and Down keys is displayed and edited in the status line. [11] A Ctrl-X clears the

recalled text and restores normal status line and keyboard operation.

EXAMPLE: history /tmp/favbbs.hist

SEE ALSO: r command, T numeric parameter
N.B.: Do not give the history command before you have entered any secret passwords from the keyboard as these will be saved in the history file. The history command without an argument closes the history file and disables command recall. Alternatively, the T numeric parameter may be set to a large value to inhibit storing of passwords in histfile.

Normally, histfile should be an absolute pathname to insure that the same file will be used regardless of the directory from which ZCOMM is called from.

The history command is not available when Restricted.
N.B.: Do not attempt to delete an open file on DOS, especially the history file.

host The host command conditions ZCOMM to accept incoming calls unattended. Host operation is described in Chapter 99. The EXIT key F1 terminates Host Operation.
N.B.: The host command is normally given only by a script that sets parameters to their appropriate values. Use the "host" entry in the distributed PHODIR.t file as a prototype for your application.

SEE ALSO: remote command

if condition command ... The if command provides powerful condition testing for scripts. If executes the command(s) on the rest of the line if condition is true. Otherwise, execution continues immediately with the next script line. Chapter 24 describes the testable conditions.

SEE ALSO: else, on commands

ife condition cmd1 ...; cmd2 ... Execute cmd1 ... if condition is true; otherwise skip to the first semicolon in the rest of the line and resume execution (unconditionally) with cmd2. Iff a semicolon is not present, execution resumes at the end of the line, useful within the body of a while command.

---

11. Unix/Xenix flavors only support Backspace editing in this mode.

EXAMPLE: set f5
@ife %s1 echo "s1 =%s1"; else echo "s1 not set"

(Without the "else", the right half will always execute.)

kbdlock N * Controls acceptance of keyboarded characters by the term function and during protocol file transfers. If N is non zero, the term function does not act upon key strokes. If N is greater than 1, key strokes have no effect on protocol transfers. The Ctrl-Break key and the command prompt reset kbdlock to 0. If N is 257, the Ctrl-Break key does not reset Kbdlock. Kbdlock does not affect the k test condition or the accept command. Characters typed while kbdlock is on will become available at the next command prompt, accept command, or when kbdlock is reset unless typeahead is purged with the purgek command.

SEE ALSO: purgek command, Ctrl-Break key

kbdmon [file] captures keystrokes to file. If file exists, it is appended to. Function keys are denoted by an 0xFF character followed by the code returned by the BIOS. The kbdmon command without an argument closes the file. This command is not available when Restricted.

kermit By itself, selects Kermit or Kermit related parameters for use by the !!, p, rb, and sb commands.

Kermit rb [-options] Kermit rb receives files using the Kermit file transfer protocol. Chapter 17 describes the available options. File names are given by the sending program. The Kermit programs must have compatible parity settings as described in Chapter 11, Kermit Protocol.

Kermit rb receives files from a regular Kermit program; use the get command to receive files from a Kermit server.

EXAMPLE: kermit pi1; kermit rb Downloads files from an IBM mainframe.

ZCOMM's term function will sense the remote Kermit's parity setting and download files without user intervention When the remote Kermit starts sending, if K (Kermit autodownload) mode is enabled (the default).

Kermit sb [-options] pathspec Kermit sb sends the specified files to either a regular Kermit program or a Kermit server. Chapter 17 describes the available options. The Kermit programs must have compatible parity settings as described in Chapter 11, Kermit Protocol.

EXAMPLE: kermit pi1; kermit sb file ... Sends the specified files to an IBM mainframe.

keys, ALT-K Keys displays the definitions the user has assigned to the function keys.

ki Clears the y0...y127 string parameters and causes circular buffer writing operations to ignore data from the remote which has already been displayed. This data is still available to the review function.

EXAMPLE: The script fragment

```
pat 1c "///BEGIN///"   "@ki create -+ print.fil"
pat 2c "///END///"   "@close"
wait -f30000
```

will capture the data that arrives between "///BEGIN///" and the end of the string "///END///". Other data from the remote will not be captured to disk. The long pattern match fail time (30000 seconds) makes the the cycle repeat almost indefinitely.

SEE ALSO: W mode

kill Erases (flushes) all data stored in the circular buffer and restores the buffer pointers to their initial positions.

kill [-signum] procnum Available on Unix and OS/2 flavors, this form of the kill command supports interprocess communications. If signum is absent, the kill command checks for the existence of the specified process, but does not send it a signal. Success sets the ? numeric parameter to 0, otherwise -1.

SEE ALSO: createx command, Unix kill(1)

l, ll, ls, lx For Unix users, synonyms for the dir commands.

learn lfile TurboLearn(TM) Script Writer records timing information and term function keystrokes to lfile. The TurboLearn program tlearn.exe then generates a script using this data. Normally, learning is initiated after the connection has been established, but before the first prompt is received from the remote. This is best accomplished with the F4 key, which activates the tlearn telephone directory entry.

Function keys, cursor keys, reassigned keys, and scripts[12] should

not be used while learning.

When accepting passwords and other sensitive information, systems sometimes acknowledge each keyboard character with #, *, x, or X, instead of the keyboarded character itself. When this happens, do not type characters faster than the remote responds to them.

The resulting script should be examined for evidence of keyboarding mistakes, line noise, and dependence on prompts that change each time you access the system.

The comments below apply when the tlearn script is not used.

EXAMPLE: kill
123-4567; learn lfile

From the ZCOMM main command prompt, enter the desired phone number.

When ZCOMM connects, the learn command enters the term function with
learning (recording) turned on.

<keyboard the operations you wish recorded>

Login to the bulletin board as usual. If you make keyboarding mistakes, you can edit the script file later.

ALT-C F1

Terminate learning with ALT-C, and return to the main command prompt with the F1 key.

!tlearn lfile >newscript

From the main command prompt, execute the TurboLearn program tlearn
with a DOS Gateway.

After recording, the tlearn program reads lfile and generates a series of pattern and put script commands to let ZCOMM search for the prompts and respond with the proper keystrokes. The resulting script file newscript may be accessed with the source command.

Alternatively, the last command above may be replaced with

!tlearn -d newdirname lfile >>phones.t

12. Other than the dialing script

to add the new script to the end of your telephone directory.

The -d dirname causes tlearn to prepend the given new directory entry name newdirname and the telephone number to the resulting script commands. The redirection characters >> add the script commands to the end of your telephone directory.

You can also use the -d newdirname option to tlearn to prepare a new directory entry in a separate file. Then you can edit this file and add it somewhere within your telephone directory.

link * Link two serial ports. The link command allows remote access to a computer or other device connected to another port. For example, if port 1 is connected to an autoanswer modem and port 2 is connected to a local timesharing machine, the link command would allow dial-up callers access to the timesharing machine. Chapter 15.5 describes the link command.

list pathspec The list command uses standard DOS character output routines and any installed CRT device driver instead of ZCOMM's own CRT driver. The printer can be enabled with ^P given to DOS (not ZCOMM). List the specified file(s).

This command closes any open transmit file. ZCOMM detects SQueezed
files and prints them in ASCII.* List pauses/resumes printing with ^S. Keyboarding ^C cancels, and ^X skips to the next file (it might take a few whacks of the keyboard to get ZCOMM to hear it.) The list command defaults to a type command when ZCOMM is in host operation.

EXAMPLE: list *.cq

SEE ALSO: browse, type, page commands

lput string Displays string on the console display. String is processed for character escapes. Lput is useful for scripts sending cursor control codes to the screen. Control characters and escape sequences used with the lput command are always decoded with ZCOMM's
default extended VT52/Z19 emulation, which also recognizes ANSI "ESC [" sequences, regardless of which display emulation is selected. Unlike the echo command, lput does not display in reverse video and does not add a carriage return/linefeed to its argument.

SEE ALSO: echo command

lputp string Outputs string to the line printer. String is processed for character escapes. Strings with embedded nulls (represented with the \000 character escape) may be used. The lput command

should not be used if the printer is jammed, out of paper, or off line. These conditions may be tested with the l test condition. This command is not allowed when ZCOMM is Restricted.

EXAMPLE: if l lputp "\E\017" If the printer is ready, ZCOMM sends ESC SI to select compressed printing on an IBM 80 CPS printer.

SEE ALSO: l numeric parameter, l test condition, \dNNN (decimal) character escapes

menu Execute script commands from the file name stored in the string parameter menu.

message The message command allows a caller to keyboard a message which will be appended to a file specified by the string parameter messages. The message command allows the caller to type in up to 64 lines of text. A blank line terminates the message. This command is intended for short messages; long messages should be uploaded with a file transfer protocol. Keyboarding is controlled by the Z numeric parameter, which sets the hot zone column after which a keyboarded space character begins a new line.

mk [scancode shiftstate class string] Assign term function keyboard mapping. Without an argument, mk resets and disables keyboard mapping. The mk command is described in Chapter 24.

SEE ALSO: N numeric parameter, _ command

more pathspec See page command.

mput string The mput command transmits string to the remote at full speed. String is processed for character escapes. Unlike the put and putw commands, mput does not display characters coming from the
remote (they are held in the interrupt buffer). Control and other special characters may be entered with character escapes. If a carriage return should be sent, it must be explicitly coded with \r at the end of the string.

SEE ALSO: put, putw commands

nolog * Suppress generation of the next log entry (of any kind).

EXAMPLE: mysys nolog speed 1200 123-4567 t
Suppresses the log entry that would otherwise be made if the calllog string parameter is set.

nulls n When accessing ZCOMM in host operation, nulls sets the number of nulls (default 0) sent after each linefeed to allow slow terminals time to scroll.

EXAMPLE: nulls 4

o Terminates a data call by dropping DTR (Data Terminal Ready). DOS ZCOMM drops Clear To Send (CTS) as well as DTR if hardware flow control was selected with the handshake command. A bye or speed n command must be given to reassert DTR before making or answering another data call.[13] The o command does not release ownership of the serial port.

SEE ALSO: speed, bye, off, port commands

obey string Sometimes one wishes to execute the contents of a string parameter as a ZCOMM command. Other times one needs to reference a pathname stored in a string parameter in the context of a command that does not itself perform string substitution on its argument(s).

Obey executes string as a ZCOMM command. Character escapes in string are substituted before execution.

EXAMPLE: obey ">>%s0" Redirects the output of utility commands to the pathname stored in string parameter s0.

EXAMPLE: pat 19c "OBEY-LAST" "@obey %y2" Sets pattern 19 to execute the previous line received from the remote when the string "OBEY-LAST" is received.

N.B.: The remainder of the line after the obey command will be executed unless execution of string is terminated by a return or fail command. The construction obey "if xxx goto foo" May be used only if no commands follow the obey command's string argument.
N.B.: Backslashes in file names used with the obey command must be escaped.
N.B.: When the obey command is used to substitute file names, file names containing separator or operator characters such as & may change the syntax of the resulting command. For instance, the pathological but legal DOS filename foo&&999.bar would cause obey if f%thisfile gosub dofile to expand to if ffoo&&999.bar gosub dofile to parse as a test for a match to an illegal pattern 999.

off Disable the modem by dropping DTR (Data Terminal Ready), [14] release ownership of the serial port, and exit to the operating system. DOS ZCOMM drops Clear To Send (CTS) as well as DTR if hardware flow control was selected with the handshake command.

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13. Most telephone directory entries include a speed command.

14. The modem must be configured to use Data Terminal Ready (DTR).

Exit status is the value of the ? numeric parameter.

The next program must select the port and initialize it to reassert DTR before making or answering another data call.

SEE ALSO: bye, x, o, port commands

on [condition rest-of-line] * Executes rest-of-line if condition is true. Condition is tested after each command line executes, unless a return or fail command is executed, or when pattern is the last command on the line. An on command without predicate (on a line by itself) cancels the on command active at that script level.

EXAMPLE: on

The term function may be accessed with the wait command and no patterns active to force an exit on loss of carrier detect or pattern search timeout. Otherwise, ZCOMM could remain in term function until a command is keyboarded. Typical commands to use with the on statement are goto, return, off, and abort. Chapter 24 describes the testable conditions.

One active on statement is available for each level of script. The on statement does not propagate to succeeding script levels.

When rest-of-line is executed, the on statement at that level is cancelled. An on command cancels any previous on command at that script level.

EXAMPLE: on !c goto fooend Branches to fooend if the carrier drops out.

SEE ALSO: wait, if commands
NB: No other commands may be on the line after the on command except
for its predicate.

open [-modes] file Opens file for transmission with the term function with modes. The open command should be used when you don't want to
enter the term function immediately, or are already in it. In other situations, it may be necessary to open the file before dialing to allow transmission immediately after connection, without the delay of opening the file from a floppy disk.

SEE ALSO: seek, read, close commands

page pathspec Type the file(s) specified in pathspec a screenfull at a time. When the screen is filled up, the More? prompt appears. Typing space displays another screenfull. Typing ^X skips to the next file. Typing ^K or ^C terminates the command. This command

closes any open transmit file. ZCOMM automatically detects SQueezed files and prints them in ASCII.*

EXAMPLE: page *.doc

SEE ALSO: browse, type, list, findmore commands

PATtern [n[cilpv$] string [action]] (n = 0...24) The pattern command allows ZCOMM to search for up to 25 different responses from a remote computer, and take action based on which of those responses (or none) was "seen". A pattern match can execute specified script command(s) "on the fly" (c modifier) or return control to the calling script with an indication of which pattern was matched.

The pattern command causes the next t, f, or wait command (term function) to search for string in the data received from the remote/modem. String must be entered exactly as it will be received from the modem, in the same case and with the same embedded spaces or tabs. Control characters must be represented with ZCOMM character escapes. The metacharacter \256 matches any single character. ZCOMM %string substitutions may be used to define search patterns. If the % character is to be searched for, it must be represented as \045.

Parity, NULL, RUBOUT, XON, and XOFF characters received from the remote do not affect pattern searches. If Kermit AutoDownload (K mode) is set, strings with SOH (Ctrl-A) cannot be matched. If ZMODEM AutoDownload (Z mode) is set, strings with CAN (Ctrl-Z) cannot be matched. If B protocol (c mode) is set, strings with DLE or ENQ cannot be matched.

Strings of up to 33 characters each may be specified for simultaneous search by the term function. The search patterns are "global" among all script levels; a pattern command in a subroutine affects the patterns set by the calling script(s) and vice versa.

The term function returns when one of the patterns is matched or when the term function times out with f seconds with no characters from the remote, as determined by the f numeric parameter, or when carrier detect is lost. The first wait, t or f command given after the pattern command begins the search.

When one of the patterns is matched, that pattern is marked as found and its corresponding action is executed (if present). ZCOMM will remain in the term function until there is a pause in data transmission from the remote[15] unless the i or c modifier is used.

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15. Pause length is specified by the q numeric parameter.

The following modifiers may be used. The c, i, and l modifiers are mutually exclusive.

c The pattern is marked as found and action executed (if present). The term function then continues searching. Matching this pattern does not cause a return from the term function. The condition for this pattern will test true, but the n test condition is not affected.

i (Immediate) The pattern is marked as found and action executed (if present). The term function then returns immediately.

l (line end delay) The pattern is marked as found and action executed (if present). The term function then returns after the first LF character following the matched string.

p (permanent) A pattern with the p modifier is not reset by the pattern command without arguments. Patterns with the p modifier may be used to search for disconnect messages within an entire script. Permanent patterns are reset by the call command, each item in the outcall queue, and an explicit pattern command referencing that particular pattern number.

EXAMPLE: pattern 20 "\nCLR" "@off" Disconnects and exits ZCOMM if the phrase CLR is seen immediately following an LF.

v (verbose) The v modifier displays a message when the pattern is matched. This is often useful when debugging scripts when the large amount of output generated by large v numeric parameter values is not desired.

EXAMPLE: pat 5v "Finished Already."

$ Sometimes the only way to recognize a prompt (as distinct from the same string embedded in other data) is to require the prompt to be the last thing sent by the remote, before a pause. The $ modifier allows string to be matched only if the remote pauses for 1 to 2 seconds after transmitting the last character in string.

The optional action is a string to be sent to the remote, or executed as a command if it begins with "@". Action is executed the instant the last character of the pattern is matched, even if the i modifier is not used. Action must not use the goto, f, t, or wait commands.

The pattern command without any arguments clears the patterns that don't have the p modifier, and terminates pattern searching. The other events that terminate pattern search are a match to a pattern

that does not have the c modifier, a pattern search timeout, the call, abort, or quit commands, a major error, or the NUKE key.

EXAMPLE: pat 0c$ "" "\21"
Sends one XON character every time there is a pause in output from the remote. This recovers from situations where the remote computer stops because it receiveed a spurious XOFF character, or lost an XON character.

In the pattern n string command, if string contains a repeating sequence such as foo in foofoobar, the search may be unsuccessful if part of the phrase is received immediately prior to the desired string (foofoofoobar).

port n Change the modem port to COMn. On DOS, the legal values for n are 1...18.

Selecting a new port normally selects software handshaking ("handshake sw"). The PCDOS flavor enables both hardware and software handshaking ("handshake both") iff the port speed exceeds 2400 bps and the Clear To Send (CTS) signal is active at the time the port command is given.

The currently defined DOS ports are:

Standard Ports:
COM1 3F8 IRQ4 (Standard IBM)
COM2 2F8 IRQ3 (Standard IBM)

NON STANDARD PORTS:
COM3 3E8 IRQ4 (Alternate)
COM4 2E8 IRQ3 (Alternate)
COM5 2B8 IRQ3 (Columbia)
COM6 2B8 IRQ2 (Alternate for IBM)

COM7 3E8 IRQ5 (Alternate "COM3")
COM8 2E8 IRQ5 (Alternate "COM4")
COM9 Uses the port address and interrupt vector set by the portx command.
COM11-COM18 IBM PS/2 COM1-COM8 ports

COM1 and COM2 are the standard serial ports defined by the IBM Technical Reference Manual.

COM3 and COM4 are supported by many serial cards and modem boards.
COM3 and COM1 share the same dedicated hardware interrupt line, and
these ports may not be used at the same time. Likewise, COM4 and COM2 may not be used at the same time.

Columbia computers support COM5.

COM6 to COM8 are alternate configurations that may be accessed by cross jumpering between printer port decoders and serial port enables on some multifunction boards.

COM7 and COM8 support alternative definitions for "COM3" and "COM4" respectively.

COM11 to COM18 correspond to "COM1" to "COM8" on IBM PS/2 computers. Only one of COM12-COM18 may be used at a time unless using the special OS/2 comm driver for that board.

Since ZCOMM uses the interrupt line on the selected port, no other program or device driver may use the same port address and/or interrupt vector concurrently. Certain disk controllers and mice interfaces use IRQ2 and IRQ5. Do not use IRQ2 on a PC-AT (the extra 8259 is not reset). IRQ5 is sometimes used by network cards and printer ports. Do not select COM3 to COM18 unless you are familiar with the I/O addresses and interrupt vectors used in your machine. Ports sharing the same interrupt vector (IRQ number) cannot be used concurrently.

The port command sets the d mode (which suppress the No Carrier Detect message).

EXAMPLE: port 2

DOS ZCOMM begins with COM1 unless overidden by the DPORT environment variable.

EXAMPLE: C>set DPORT=2

On Unix, the argument of the port command is a character special file in the /dev directory. Unix and Xenix flavors have no default port. If the DPORT environment variable is set, that port will be selected when ZCOMM initializes. Otherwise, a port is selected by the startup and/or dialing script. Typical values are tty01 (386/ix) and tty2A (Xenix).

EXAMPLE: DPORT=tty1A; export DPORT

SEE ALSO: handshake command, dport string parameter

portx hbase,irq * To support specialized multiport serial interfaces, the portx command selects a communications port with a specified hexadecimal base address hbase and Interrupt Request Line irq (3 <=

irq <= 7). The portx does not check its argument for validity. The consequences of an invalid selection are quite undefined. The specified base address and IRQ number are assigned to COM9, where

they may be used by the port command and the x numeric parameter. This command not available on X.PC, Unix, Xenix, or OS/2.

EXAMPLE: portx 3f8,4 Selects a comm port with a base address of 3f8, using IRQ4.

SEE ALSO: intolink string parameter

private The private command allows a caller to keyboard a message which will be appended to a file specified by the private string parameter. The private command allows the caller to type in up to 64 lines of text. A blank line terminates the message. This command is intended for short messages; long messages should be uploaded with a file transfer protocol. Keyboarding is controlled by the Z numeric parameter, which sets the hot zone column after which a keyboarded space character begins a new line.

purgek Purge any characters the user may have typed ahead.*

purgel Purge any unprocessed characters received from the modem Line (remote).*

put string The put command transmits string to the remote. Use the put command for transmittting commands to a modem or a remote computer system. String is processed for character escapes. Control and other special characters may be entered with character escapes described in Chapter 23. If a carriage return should be sent, it must be explicitly coded with \r at the end of the string.

EXAMPLE: put "myname\r" Sends myname followed by carriage return to the modem.

A \336 (octal 336) character causes a pause in transmission (duration controlled by the p numeric parameter). This pause allows one string to contain multiple commands.

EXAMPLE: put "\336ATZ\r\336\336ATX1 M0 S0=1\r" Pauses, sends ATZ\r, pauses (twice because some modems take longer to reset!), and then sends ATX1 etc. to the modem.

Transmission with put is controlled by the 7, 8, h, p, w, and t modes.

SEE ALSO: putw, mput, putv commands

putw string The putw command transmits string to the remote, and

pauses for a period of time (determined by the q numeric parameter) before returning from the term function to allow characters to echo.

Other than that final pause, putw operates the same as the put command.
N.B.: Putw should not be used when the next operation will be a pattern or wait command. If the expected response starts before the putw command finishes, the following wait command will never get to "see" what it is waiting for. In general, the putw command should only be used as a short-cut for sending a command when the response is known in advance and can be safely ignored.

SEE ALSO: put, mput commands

putv svar The putv command transmits svar to the remote without any translation of character escapes. Putv does not append a carriage return or line feed to the transmitted string.

EXAMPLE: putv s0; put "\r"

SEE ALSO: put, mput commands

pwd Print Working Directory displays the current directory pathname, and stores it in the pwd string parameter.

EXAMPLE: pwd

SEE ALSO: cd command

pxN Set Numeric parameter x to value N. If x and N are blank, display the numeric parameters which can be set by this command and their current values. This command is not allowed if Restricted. Numeric parameters are described in Chapter 21.

EXAMPLE: ps8 Sets the status line attribute to 8 (grey), suitable for composite video displays.

EXAMPLE: pv-1 Sets the v numeric parameter ("verbose") to -1, suppressing some routine messages. More negative values suppress more routine messages.

EXAMPLE: pd1 Sets the d numeric parameter to 1, causing files received with ZMODEM or full YMODEM protocol to be stored with the modification date transmitted with the file.

EXAMPLE: pk3 Sets the k numeric parameter to 3, which kills pending output stored in the circulat buffer when ETX (Ctrl-C) (decimal 3) is keyboarded in the term function.

queue { add [string] | clear | delete [n] | list | run } Manipulate and execute a queue of commands for dialing numbers or other suitable functions. The queue contains 20 slots numbered 0 to 19.

queue clear clears all queue entries.

queue add [string] adds string to the queue after processing for string substitutions. The string is added to the first empty queue slot available. If string is absent, it is taken from the next script line. A typical string would be a command to call a system: call telegodzilla

Script entries used with the circular dialing queue should end with a t command, which will enter the term function. To stop the queue at that point, use the ALT-N (NUKE) key. NUKE

queue delete [n] Delete then nth queue entry, or the currently executing entry if n is not present.

queue list lists the non empty queue entries.

queue run begins execution of the queue entries. The ALT-N (NUKE) key, a fatal errror or any keyboarded character present after the execution of the command in the entry terminates the queue run command.

The queue commands are independant of the Outcall Queue available in Host Operation.

EXAMPLE: The script fragment:

```
queue clear
while q set? s0 Q queue add "echo %s0"
queue list
```

Sets each queue entry to echo its own queue number, then lists the queue entries.

SEE ALSO: q and Q test conditions, Shift-F5 and Shift-F6 function keys

quit * Causes an immediate return to the command prompt from any script level. Quit may be used within a command string assigned to a function key where an unconditional return to the command prompt is desired, even if keyboarded from the term function.

r [oldcmd] Search back through the history file of keyboarded lines for the first line that oldcmd is a prefix of, and execute it. If oldcmd is absent, execute the last locall entered keyboarded line.

EXAMPLE: history C:/tmp/junk.hst

```
del *.bak *.lst *.tmp *.foo
```

```
cd bazdir
r d
del *.bak *.lst *.tmp *.foo (command echoes)
```

SEE ALSO: history command

r7 [-options] [dir] [file ...] Receives with options 1 or more files using MODEM7 batch protocol. An optional directory dir may be specified. If pathname(s) have been supplied to the r7 command and the sending program attempts to send more files than the number of names supplied to the r7 command, the transfer is aborted. The command is provided for compatibility with traditional programs that do not support the superior YMODEM or ZMODEM protocols.

EXAMPLE: r7 -c Receive file(s) with MODEM7 Batch and CRC-16 (-c).

SEE ALSO: MODEM7 batch protocol, Chapter 11.

rb [-options] Receives with options 1 or more files using YMODEM batch protocol. The rb command also receives files sent with SEAlink protocol. Chapter 17 describes the available options. The pathname and length of each file are transmitted in batch mode. If a file is received in error (retries exhausted, etc.), the batch transfer will terminate. If Restricted, a file received in error will be unlinked (erased).

EXAMPLE: rb -y Receive file(s) with YMODEM replacing old files, if any.

EXAMPLE: rb -g Receive file(s) with YMODEM-g.

Many programs claiming to support YMODEM actually use XMODEM with 1024 byte blocks; use ZCOMM's sx -k, rx and rx -g XMODEM commands with these mutants.

SEE ALSO: YMODEM protocol, Chapter 11.

rb [-options] [dir] [file ...] Receives with options 1 or more files using YMODEM batch protocol. An optional disk and/or directory dir may be specified. The optional supplied pathnames file ... are used in place of pathnames normally provided by the sending program. If the sending program attempts to send more files than the number of names supplied to the rb command, the transfer is aborted.

rc [-options] file Receives with options a single file using the Ward Christensen XMODEM protocol, 128 or 1024 byte blocks, and CRC-16 instead of an 8 bit checksum. ZCOMM signals the sending program

that CRC-16 is to be used. After four errors while attempting to

receive the first sector, ZCOMM will cancel the CRC-16 option and reverts to checksum operation.

The probability of an undetected transmission error is much less if CRC-16 is used in place of the default 8 bit arithmetic checksum. Omen Technology Inc Recommends use of the 16 bit CRC to maintain data integrity at professional levels. Chapter 17 describes the available options to the rc command. If Restricted, a file received in error will be deleted.

EXAMPLE: rc foo.com

SEE ALSO: XMODEM-CRC protocol, Chapter 11.

read [file] Read file into the circular buffer. Once in the buffer, it may be examined with the review command, searched for strings, and cut and pasted to other files. If file does not fit into the buffer, the buffer may be cleared with the kill command (or review k subcommand) and subsequent read commands may be given to read more of it. Review function commands are described in Chapter 20.

EXAMPLE: read allsig.tmp<ENTER><Home>

SEE ALSO: BROwse, seek commands
CAUTION: Iff a read command has left a transmit file open, entering the term function will transmit the unread portion of the file. To prevent this, close the file first with ALT-C or closetx.

receive Receives file(s) from a Kermit program. The other program must be commanded to send the desired files.

SEE ALSO: get Kermit server access command

remote Enter Host state with unrestricted privileges to allow the currently connected remote computer/terminal to issue commands. When activated by the remote command, Host state will reset when the modem carrier goes away. This command is useful for transferring files between two machines with directly connected serial ports. Remote may be prefixed with restrict to limit privileges.*

SEE ALSO: host command

remote cwd dirspec [password] Instructs the remote Kermit server to change to the specified directory. The form of dirspec varies with the remote system; it must be quoted if it contains special characters or spaces. A password may be required by the remote Kermit server.

SEE ALSO: Kermit Protocol, Chapter 11.

remote delete filespec Instructs the remote Kermit server to delete the specified file(s). The form of filespec varies with the remote system; it must be quoted if it contains special characters or spaces.

remote dir dirspec Instructs the remote Kermit server to display the specified directory on your screen. The form of dirspec varies with the remote system; it must be quoted if it contains special characters or spaces. The resulting information may be redirected to a file with the >outfile command.

remote help Instructs the remote Kermit server to display help information on your screen. The resulting information may be redirected to a file with the >outfile command.

remote host host-command-string Instructs the remote Kermit server to perform the specified command and display its output on your screen. The form of host-command-string varies with the remote system; it must be quoted if it contains special characters or spaces. The resulting information may be redirected to a file with the >outfile command.

EXAMPLE: remote host "kill -9 0" Terminates all your processes with extreme prejudice.

SEE ALSO: !!command

remote print filespec Instructs the remote Kermit server to print the specified file(s) on the remote system. The form of filespec varies with the remote system; it must be quoted if it contains special characters or spaces.

remote space [dirspec] Instructs the remote Kermit server to display the free space in the specified directory on your screen. The form of dirspec varies with the remote system; it must be quoted if it contains special characters or spaces. The resulting information may be redirected to a file with the >outfile command.

remote type filespec Instructs the remote Kermit server to type the specified file(s) on your screen. The form of filespec varies with the remote system; it must be quoted if it contains special characters or spaces. The resulting information may be redirected to a file with the >outfile command.

remote who Instructs the remote Kermit server to display the logged in users on your screen. The resulting information may be redirected to a file with the >outfile command.

reset Write the contents of the circular buffer if a receive file is open, close all files, and reset the disk system. This allows

swapping diskettes.

reskeys Resets the Soft Keys to empty.

SEE ALSO: set command

restime * Resets elapsed time and counts of bytes transmitted and received to zero. The restime command may be given in a script immediately after login is completed to synchronize the elapsed time counter with the beginning of chargeable connect time.

SEE ALSO: timestamp command, E test condition

restrict * Restricts ZCOMM for the following command on the same line. This command is useful for testing.

EXAMPLE: restrict cd /foo

RETurn Returns from a script subroutine accessed by a call, source, or gosub command.

SEE ALSO: fail command

rewind Reset the buffer pointers for display, printer, and file output used by the term function to the beginning of the circular buffer. This will cause the term function to redisplay the data in the circular buffer. Patterns will be rescanned. A typical use of the rewind function is to allow replay of an editing session on a remote machine, or to redisplay the material received if the initial settings of the i, c, n or v modes were incorrect for the material received from the remote.
N.B.: The rewind command does not reset the buffer free character count. To write the data to disk, a write command (or ALT-W) must be given before accepting new data from the remote.

SEE ALSO: t, b, w review subcommands

REView Review the data received from the host or read by the read command. A screenfull is displayed at a time. Review function commands are listed in Chapter 20.

ro [-options] file Receives with options a single file using non-standard XMODEM-CRC protocol logic. OverThruster(TM) speeds file downloads at the expense of error recovery. OverThruster operation is controlled by the O numeric parameter. As fans of Buckaroo Bonzai know, the OverThruster is not universally applicable. A transmission error will almost always terminate an OverThruster file download.

If Restricted, a file received in error will be unlinked (erased).

EXAMPLE: ro foo.com

SEE ALSO: O numeric parameter

rt [-options] [dir] [file ...] Receives with options 1 or more files using Telink (FIDO) batch protocol. An optional disk and/or directory dir may be specified. The optional supplied pathnames file ... are used in place of pathnames normally provided by the sending program. If pathname(s) have been supplied to the rt command and the sending program attempts to send more files than the number of names supplied to the rt command, the transfer is aborted. The rt command is provided for compatibility with traditional programs that do not support the superior YMODEM or ZMODEM protocols.

EXAMPLE: rt -c

SEE ALSO: Telink protocol, Chapter 11.

rw [-options] file Receives with options a single file using the People-Link WXMODEM protocol. Chapter 17 describes the available options. If Restricted, a file received in error will be unlinked (erased).

EXAMPLE: rw foo.com

rx [-options] file Receives with options a single file using the Ward Christensen XMODEM protocol. CRC-16 is not the default because most commercial comms programs only support the 8 bit checksum. Chapter 17 describes the available options. If Restricted, a file received in error will be unlinked (erased).

EXAMPLE: rx foo.com

N.B.: The rc command should be used whenever possible instead of rx.

EXAMPLE: rx -g foo.txt Receive a single file with an ACKless XMODEM protocol mutant incorrectly called "ymodem-g" by PCBoard and Qmodem programs.

SEE ALSO: XMODEM protocol, Chapter 11.

rz [-options] Receives with options 1 or more files using ZMODEM batch protocol. Chapter 17 describes the available options. Each file's

pathname is obtained from the sending program. The +, a, b, n, N, r, and y options are accepted from the sending program, subject to Restriced privileges. If the +, b, n, N, r, or y option is

specified to the receiver, it overrides any contrary options specified to the sender. Only one of the a, b, or r options may be specified. Only one of the +, n, N, or y options may be specified. If a file is received in error (retries exhausted, etc.), the batch transfer will terminate. If Restricted, a file received in error will be unlinked (erased).

EXAMPLE: rz -y

SEE ALSO: Z mode

SEE ALSO: ZMODEM protocol, Chapter 11.

rz [-options] [dir] [file ...] Receives with options 1 or more files using ZMODEM batch protocol. An optional disk and/or directory dir may be specified. The optional supplied pathnames file ... are used in place of pathnames normally provided by the sending program. If the sending program attempts to send more files than the number of names supplied to the rz command, the transfer is aborted. To allow use of the rz command, Z mode (ZMODEM autodownload) should be turned off with a dis -Z command.

s Displays status information.

LSR and MSR refer to the Line Status Register and Modem Status Register of the modem port's 8250 UART device.

TYP refers to the type of serial chip detected. A National 16550A shows as 1, an Intel 82510 shows as 2. Other chips (without high speed enhancements) show as 0.

"Uncorrected errors" displays the e numeric parameter, which counts the number of failed file transfers and "line hits" detected by the term function.

If one or more scripts are active, the current line number (counting from the first line in the script file) for each script level is displayed.

Any patterns active as a result of a pattern or wait command are displayed. An S indicates not matched (still searching), F indicates that pattern has been matched.

SEE ALSO: ALT-S function key

s7 [-options] pathspec Send the files specified in pathspec using the MODEM7 batch Protocol. Files which cannot be opened are skipped. An empty pathspec sends all files in the current directory. A

directory name expands to all regular files in that directory.

If an error aborts a file transmission (retries exhausted, etc.), batch transfers terminate.

EXAMPLE: s7 *.com Sends all *.com files

N.B.: The receiver must be commanded to receive the files. This command is provided for compatibility with traditional programs that do not support the superior YMODEM and ZMODEM protocols.

SEE ALSO: MODEM7 batch protocol, Chapter 11.

sb [-options] [PREFIX=p | ONAME=x] pathspec Send the files specified in pathspec using True YMODEMTm Protocol. The pathname, length, and

modification time of each file are transmitted. Files which cannot be opened are skipped. An empty pathspec sends all files in the current directory. A directory name expands to all regular files in that directory.

If an error aborts a file transmission (retries exhausted, etc.), batch transfers terminate. The sb command will send files with SEAlink protocol if the receiving program requests SEAlink.

EXAMPLE: sb -k *.com Sends *.com using 1024 byte packets.

N.B.: The receiver must be commanded to receive the files with an rb command. Unix and OS/2 users: sb command cannot be used to send source files that grow after the beginning of transmission.

SEE ALSO: YMODEM protocol, Chapter 11, SEAlink protocol, Chapter 11.

seek offset Iff a transmit file is open as a result of a f, open, or read command, position the file read pointer to offset bytes from the beginning of the file if offset is positive (or 0), or from the end of the file if offest is negative. "Seek 0" rewinds the file to its beginning.

EXAMPLE: open baz; seek -20000; read<ENTER>Home Reviews the last 20000 bytes of baz.

SEE ALSO: open, read, close

send [-options] pathspec Send the files specified in pathspec with the Kermit protocol. The send command sends files to either a Kermit server or a regular Kermit program.

EXAMPLE: send -a *.asm

set[s|c] [[_]sparam string] Set String parameter sparam to string. As

with all ZCOMM strings, the string must be enclosed by double quote

characters if it contains spaces, tabs, or semicolons. Character escapes must be used to represent special characters, including return and linefeed if needed.

An optional leading underscore (_) prepended to sparam causes the string to be cleared by the next call command.

EXAMPLE: set mprefix ATDT sets the modem dialing prefix for tone (T)

EXAMPLE: set f8 \PXXXXX Assigns a five character automatically generated password (\PXXXXX character escape described in Chapter) to function key F8. Once programmed this way, the F8 key will transmit five nonsense characters determined by the xpassword string parameter and the remote system's name as stored in the remote string parameter by the last call command.

EXAMPLE: set _f1 "logout\r" Assigns the string "logout<ENTER>" to F1 until the next call command.

The parameters that may be set with this command are described in Chapter 22. Case is significant in parameter names.

Set without any arguments will display all non empty string parameters and their values. If the v (verbose) numeric parameter is non zero, all string parameters are displayed. The echo and lput commands may be used to display string parameters ("echo %svar").

The setc command performs string substitutions and character escape expansions on string before storing. The sets command performs string substitutions on string before storing.
N.B.: Chapter 23 discusses string concatenation.

EXAMPLE: sets s2 "%z1" Assigns the second token (%z1) generated by the split command to string parameter s2.

If other commands are to follow on the same line, a semicolon must be used to separate the commands.

EXAMPLE: set s1 "su"; goto sendit Would be illegal if the ";" were left out.

A string parameter may be set to empty with set sparam "" (empty string enclosed by double quote characters).

EXAMPLE: pv1; set Displays all string parameters, including all Soft Keys.

EXAMPLE: sets s8 "s9 EQUALS %s9" Substitutes the value of string parameter s9 in the argument before assigning it to s8.

SEE ALSO: echo, if, keys, reskeys, ALT-K, commands
N.B.: When defining function keys to be called from within the term function, do not use the t or f commands. Instead use the create or open commands to prevent excessive term function recursion.

Assigning a string to a function key with the set command causes that string to be sent to the remote when the key is used within the term function. If the string begins with @, the remainder of the string is executed as a ZCOMM command.

EXAMPLE: set f3 "@rb" Assigns the rb command to F3.

set[s|c] [_]sparam This form of the set command allows strings containing double quote (") characters to be defined.

Given with string parameter sparam, but no string, set reads string from the next line verbatim, with only the trailing CR/LF removed. The line should not begin with a space or tab unless one is required for string. This form may be used for entering strings containing double quotes. If a script is active, the next line is read from the current script file, otherwise the user is prompted for it.
N.B.: This form of the set command cannot be used as the predicate of an if command. The argument should not appear as a label or telephone directory entry.

EXAMPLE: set outahost
@o; pk3; sp 2400; set disks "abcd"; putw "\336ATM0H1\r" Programs outahost to drop DTR ("o"), set 2400 baud, allow disks a,b,c, and d, and send an ATM0H1 (go off hook) command to the modem to busy out the telephone line.

setn sparam expression The setn command stores as a decimal number the

result of an arithmetic expression consisting of decimal numbers, string variables, the length of string variables denoted with %, and the oprators +, -, *, and /. The expression is evaluated strictly left to right with 32 bit precision.

---

15. Because a failed if command would skip to the next line, the argument of the set command, and attempt to execute it as a script line.

EXAMPLE: setn vv 1+vv

set? sparam condition The set? command stores a decimal number representing the result of a test condition.

EXAMPLE: set? s0 S Stores the value of the S test condition (transmission speed) in string variable s0.

sleep deci-seconds Sleep causes ZCOMM to pause for the specified tenths of seconds. This command may be used in a script with one or more put commands to login to a timesharing service. The presence of a character in the keyboard buffer will cause the sleep command to finish before the specified time.

The maximum sleep time is 32000 tenths of seconds. Applications involving long sleep times may be better handled with the Host Operation callout queue.

EXAMPLE: sleep 30 Pauses for 3 seconds.

Soft Keys The Soft Keys f5-f12, fs1-fs10, fc1-fc10, fa1-fa10, fins, fdel, fhome, fend, fup, fdown, fleft, fright, fpgup, fpgdn, etc. may be programmed by set commands given in script files, including the "setup" entry in the distribution PHODIR.t file. The strings or commands assigned to these keys may be displayed with the keys or ALT-K command. To get a current list of the available soft keys (and other string parameters), keyboard the following three commands:

```
pv1
>keylist
set
close; pv0
```

source sourcefile Accept script commands from sourcefile. The source and call commands may be nested with up to six[16] scripts open at once.

If the script has a READ ONLY attribute, ZCOMM is unrestricted during execution of the script.*

---

16. Deep nesting may require a decrease in circular buffer memory allocation.

Command lines in files accessed by the source command must begin with a tab, space, or label. Goto commands within sourcefile search for labels in the same sourcefile. Gosub commands within sourcefile access subroutines in the telephone directory accessed by the phones string parameter.

EXAMPLE: bud source /usr/bin/caf/bin/callbud
This telephone directory entry pat calls a separate script file containing commands to call a secret system. Placing this information in a separate file keeps it out of the main telephone directory file, which might be used on a number of computers.

SEE ALSO: gosub command

SPeed m Set the transmission speed ("baud rate") to m. If the speed specified is odd, or equal to 110, two stop bits are transmitted; otherwise one stop bit is transmitted.

EXAMPLE: speed 1200

N.B.: Some older U.S. Robotics modems cannot accept the sustained full speed output ZCOMM is capable of. Using speed 2350 corrects such a problem with the U.S. Robotics Courier 2400.

Some 1200 and 2400 bps modems work better (lower error rate) if the speed is set to slightly less than the nominal 1200 or 2400. This also applies to communications networks that cannot accept sustained full speed data, and to serial ports whose bit rate clocks are slightly fast.

EXAMPLE: speed 1181 Sets the speed to 1181 bits per second with two stop bits.

NB: Timesharing minicomputers often transmit from their serial ports data at higher speeds than they can accept. In extreme cases, a timesharing port that supports interactive operation at 19200 bps may not tolerate file uploads above 2400 bps.

NB: Operation at extra high speeds is affected by the operating system version, device drivers, memory resident software, and the computer's hardware design. Chapter 26 describes some of the well known problems. The new generation NS16550AN or 82510 serial interface circuits should be used instead of 8250's for best results at high speed. This is important if special device drivers or TSR programs increase interrupt latency.

SEE ALSO: 7e, 7o, 7m, 7s, 8n, 8g modes, handshake command

split svar Split (parse) string parameter svar into tokens stored in string parameters z0...z9 using one or more of the characters in string parameter ifs ("Internal Field Separator") to separate the tokens. **

EXAMPLE: If string parameter s1 contains "hello there folks" and ifs contains a space and tab, split s1 Assigns "hello" to z0, "there" to z1, and "folks" to z2.

EXAMPLE: Let s0 contain "#1234567-This is big-time Parsing", and ifs contain "#1256- ". The command split s0 Assigns "34" to z0, "7" to z1, "This" to z2, "is" to z3, "big" to z4, "time" to z5, and "Parsing" to z6.

SEE ALSO: y0...y127 string parameters, I,i,p test conditions, sets command

split svar string ... uses one string for each token generated. An empty string ("") assigns the rest of svar to the next token. Otherwise, if tokens remain after the strings are exhausted, ifs is used for parsing the remaining tokens.

EXAMPLE: If s0 contains "#1234567-This is ZCOMM Parsing", The command split s0 "-" "" Assigns "#1234567" to z0 and "This is ZCOMM Parsing" to z1.

EXAMPLE: If s0 contains "503-621-3746", The command split s0 "-" "-" Assigns "503" to z0, "621" to z1, and "3746" to z2.

SEE ALSO: ss command, scripts, Chapter 99

ss svar regular-expression String Split svar according to regular-expression. ** Regular expressions are described in Chapter 23. The entire matched string (if any) is stored in the z0 string parameter.

Matched groups are stored in the z1...z9 string parameters. Parameters which do not receive a matched string or substring are set empty.

EXAMPLE: If string parameter s0 contains
From: Captain Midnight To: HBO Inc.
then the command ss s0 "From: (.*) To: (.*)"
places "Captain Midnight" in z1 and "HBO Inc." in z2. In this case, z0 will contain the entire contents of s0.

SEE ALSO: split command, regular-expressions Chapter 23

st [-options] pathspec Send the files specified in pathspec using the Telink (FIDO) batch Protocol. The pathname, length, and modification time of each file are transmitted. Files which cannot be opened are skipped. An empty pathspec sends all files in the current directory. A directory name expands to all regular files in that directory.

If an error aborts a file transmission (retries exhausted, etc.), batch transfers terminate.

EXAMPLE: st *.com Sends *.com

N.B.: The receiver must be commanded to receive the files.

SEE ALSO: Telink protocol, Chapter 11.

sum pathspec Checksums the named text files with an alogrithym compatible with sum(1) on Version 7 Unix (sum -r on System III/V). Carriage returns, and all characters starting with the first instance of CPMEOF (^Z) are excluded. This processing allows comparison of plain ASCII source files stored on the different systems, but not binary files. The checksum is printed in octal, followed by a count of 512 byte blocks and bytes read.

EXAMPLE: sum *.c Checksums all C source files in the current directory.

SEE ALSO: crc, wc commands

sx [-options] file Send a single file using the Ward Christensen XMODEM or XMODEM-CRC protocol. The receiving program may request
use of a 16 bit CRC, which is more accurate than the default checksum. DOS/Unix files sent this way will have Control-Z (CPMEOF) garbage characters appended to make the file length a multiple of 128.

EXAMPLE: sx foo.com

EXAMPLE: sx -k foo.com Sends foo.com using 1024 byte blocks

N.B.: The receiver must be commanded to receive the file with an rx filename or rc filename command.

SEE ALSO: XMODEM, XMODEM-1k, XMODEM-CRC protocols, Chapter 11.

sz [-options] [PREFIX=p | ONAME=x] pathspec Send the files specified

in pathspec using ZMODEM Protocol.[17]

N.B.: If the remote supports ZMODEM AutoDownload, or accepts rz followed by carriage return as a command to receive files with ZMODEM protocol, only the sz command need be given. Otherwise, the receiver must be commanded to receive the files with an rz command or menu choice.

The +, a, b, n, N, r, y, and Z options are sent to the receiving program. Only one of the a, b, or r options may be specified. Only one of the +, n, N, or y options may be specified. The pathname, length, and modification time of each file are transmitted. Files which cannot be opened are skipped. An empty pathspec sends all files in the current directory. A directory name expands to all regular files in that directory.

If ONAME=x is given after the options (if any) and before the file name(s), x will be used exactly as given as the COMPLETE destination pathname instead of each file's actual pathname. It is the sender's responsibility to use lower case for x unless the filename is really supposed to be all caps.

EXAMPLE: sz -y ONAME=B:/spiked/secret /soviet/sdi/newlaser.doc
Results in the destination file secret on drive B: in the /spiked directory. (Destination directories must exist and be writable).

If instead PREFIX=p is given after the options (if any) and before the file name(s), p will be added to the destination pathname(s) as a prefix. It is the sender's responsibility to use lower case for p unless the prefix is really supposed to be all caps.

EXAMPLE: sz -y PREFIX=C:/foobaz/ /biff/bam/aardvark.wak
Results in the destination file "C:/foobaz/aardvark.wak"

EXAMPLE: sz *.com Sends all files with a .com extension.

EXAMPLE: sz -r ??log Crash Recovery sends only the new data if the receiver has incomplete versions of these files.

EXAMPLE: sz -fn src/*.c src/*.h maildir
Sends only newer .c and .h files in the src subdirectory, and all new files in the maildir subdirectory.

---

17. The receiver may use the sz command to send files by uploading an sz command with the zcommand command.

EXAMPLE: zcommand "sz -fn /bin /wp"
commands a remote ZCOMM system in Host Operation (unrestricted) to send all new files in the /bin and /wp directories.

EXAMPLE: sz -Yn *.c Sends only newer versions of files that already exist at the destination.

EXAMPLE: sz -Rf usera Sends all files in the usera directory and all subdirectories thereof. Directories are not sorted when the R option is used on 16 bit systems.

SEE ALSO: ZMODEM protocol, Chapter 11, options, Chapter 17.

szb [-options] [PREFIX=p | ONAME=x] pathspec As above, but "falls back" to YMODEM if the receiver cannot receive files with ZMODEM protocol. Because of the YMODEM fallback, szb is not as error resistant as the sz command.

t [-modes] [capturefile] Invokes the term function for conversational access to the remote. Normally, ZCOMM will remain in the termfunction until the user keyboards F1.

If capturefile is specified, any currently opten capture file is closed and capturefile is opened. A file previously opened by "t file" is not closed by a t command given without an argument.

EXAMPLE: t file1 Creates file1 to capture data sent by the remote in interactive conversation.

SEE ALSO: create command

If a file upload begun by an f or open command were in progress, the upload will resume with the t command subject to the g mode.

In host operation, "t file" begins data capture, and received characters are not echoed. When the remote sends ETX, EOT, or Ctrl-Z, file is closed and the term function exits.

EXAMPLE: t comments.txt<ENTER>
jabber ... jabber ... Ctrl-Z

Optional modes may be enabled to modify the display, storage, or transmission of information.

Subcommands available from the term function are explained in

Chapter 19. Characters special to the term function are also described in Chapter 19.

timestamp * Iff a capture file is open, write out the circular buffer. Then write a line containing the remote system name, number of characters transmitted from disk, the number of characters received to disk, average characters received per second, [18] the date and time, and the term function status line information (time, modes, etc.) to the file and to the display.

EXAMPLE: timestamp; echoc "End: %e Errors"
Timestamp: vif 0 127857 97/sec 1342:37 07-09-86
01 24 13:42 21:50 28672 2:1200 7e EhjSt >cis0709.tmp
Allsig Ends: 0 Errors

The character counts are reset when the corresponding files are opened.

SEE ALSO: restime, ALT-E commands, E test condition, t string parameter

trs svar string1 string2 String1 and string2 are first processed for character escapes. Then translate string variable svar from the character set in string1 into the character set in string2. * Characters in String1 with no corresponding character in String2 are deleted. Characters in svar not appearing in String1 are not modified. The "trs" command may not be used in the body of a "while" command.

EXAMPLE: trs s0 "\\{}" "/" Changes backslashes to slashes, and removes "{" and "}" characters.

TYPe pathspec Type the specified file(s). This command closes any open transmit file. ZCOMM automatically detects SQueezed files and prints them in ASCII.* Type pauses/resumes printing with ^S. Keyboarding ^C or Ctrl-Break cancels, and ^X skips to the next file. <Ctrl-Home> clears the screen without pausing, avoiding scrolling.

SEE ALSO: browse, list, page commands, Unix b, bro, typ commands

EXAMPLE: type *.txt *.doc

---

18. Since the last call or restime command.

unrestrict Prompts for a password and unrestricts ZCOMM if the password exactly matches the contents of the unrestrict string parameter. If unrestrict is empty or the given password does not match in three attempts, the call is immediately terminated. Unrestrict is used in Host Operation by a caller who wishes unrestricted access to ZCOMM's computer to view confidential files or perform maintenance.

EXAMPLE: unrestrict Prompts for a password (to match the unrestrict parameter), then allows three tries to enter it correctly.

SEE ALSO: Host operation

usq pathspec * Unsqueeze the specified files back to their original form. If pathspec is empty, ZCOMM checks all files in the current directory and unsqueezes those that are found to be SQueezed. If pathspec contains the name of a directory, all files in that directory are checked. Iff a file has not been SQueezed, ZCOMM will complain and proceed to the next file. ZCOMM checks the first word of the file(s) to determine whether that file is SQueezed. If the SQueezed file has been encrypted, such as a Demand Upgrade(TM) copy of ZCOMM, ZCOMM will fetch the key file relative to the current directory for use in decrypting.
N.B.: The original pathname and the keyfile pathname (if present), stored in the SQueezed file is interpreted relative to the current directory.

EXAMPLE: cd /tmp; usq a: Unsqueezes all the SQueezed files on A:, placing the output files relative to /tmp.

EXAMPLE: usq ZCOMM.EQE Unsqueezes an encrypted Demand Upgrade(TM) copy of ZCOMM. The key file (such as yampc08.key) must be in the current directory.

videobios N Sets the video BIOS mode to N. This command is useful for accessing the high resolution super EGA display text modes, such as 100 columns by 75 lines corresponding to high resolution 800x600 displays. The $ and # mumeric parameters must be separately set to agree with the new BIOS video mode.

The action of the video ROM BIOS to specific values depends on the particular EGA/VGA ROM BIOS used. To support boards using an extended code in the bl register, calculate N = bl + (256 * al).

Some codes produce spectacular unpredictable results. This command is restricted, and is available on medium model DOS flavors only.

EXAMPLE: videobios 3 Sets BIOS video mode 3 (80x25).

SEE ALSO: V and W numeric parameters

w Writes the contents of the circular buffer to the capture file.

wait [-mode] Wait activates the term function to search for each pattern that has been defined with the pattern command. If a file has been opened with the create or t file commands, buffer capture continues during the wait command. If a file upload (inititated by an f file command) was in progress, the upload will resume with the wait command subject to the g mode.

Script execution resumes when the wait command returns because of a pattern match, timeout, no carrier detect, or keyboarded F1. The wait command's pattern search timeout is effective even if no search patterns have been set with the pattern command.

SEE ALSO: pattern, put, putw commands, fN mode

wc pathspec Counts lines, words, printing characters, and all characters for the specified files. The totals are then presented. Characters beginning with CPMEOF (^Z) are excluded.[19] The count of printing characters is useful for estimating laser toner and printer ribbon usage.

EXAMPLE: wc *.c *.h

SEE ALSO: crc, sum commands

while condition rest-of-line Scripts must often repeat a command or set of commands while some condition remains true. The while command executes the command(s) on the rest of the line while condition is true. Chapter 24 describes testable conditions. An inadvertently generated while loop may be stopped by keyboarding NUKE (ALT-N).
N.B.: The rest of the line must not contain an if command or semicolons separating commands. While commands may not be nested.

EXAMPLE: pat 1 "ogin:"; while !1 put "\r" wait -f1 Repeatedly sends a carriage return until the remote responds with "Login:".[20]

---

19. The line and word counts agree with the Unix word count program, but the character count will differ because of CR characters not stored in most Unix text files. The Unix word count program does not have a count of printing characters.

20. The "L" in "Login" is not searched for on purpose. On Unix

systems, the "l" is not always capitalized.

EXAMPLE: while "!1&&L<5" put "\r" wait -f1 Works as above, but only tries 5 times.

x (eXit) Writes and closes any open files, releases ownership of the serial port, then exits to the operating system without disconnecting the phone line.[21] Exit status is the value of the ? numeric parameter. This command is not allowed if Restricted.

xpc ... * The ZCOMMXPC flavor of ZCOMM supports the Tymnet(TM) X.PC link level protocol with the xpc commands. See a following subchapter of Chapter 16 for a more detailed description of the X.PC packet driver and the xpc commands that control it.

zcommandi COMMAND Send COMMAND with ZMODEM protocol, do NOT wait for command completion.

EXAMPLE: zcommandi "!make whoopie"

zcommandic COMMAND Process COMMAND for string substitutions and character escapes and send with ZMODEM protocol, do NOT wait for command completion.

zcommandw COMMAND Send COMMAND to the remote with ZMODEM protocol. ZMODEM assures an error free command upload. Wait for COMMAND to complete on the remote. Store the command's exit value in the ? numeric parameter, available to the ? test condition.
N.B.: With the exception of sz, no command that involves the serial port may be the argument of zcommand.

EXAMPLE: zcommandw "sz foo.bar" Causes the remote to send a file with ZMODEM protocol.

EXAMPLE: zcommandw "!ls -l | sz -a -" Causes a remote Unix system to send a file containing a directory listing to ZCOMM.

As a special case, zcommandw with an empty command fetches the remote's disk file system free character count. This quantity is then available to the R test condition.

EXAMPLE: zcommandw ""; if "R>10000" sz hugefile Fetches the free

21. On some Unix systems, the operating system may alter the state of the serial port after ZCOMM exits.

disk space from the remote, and sends hugefile if the destination's free space is greater than 10000 kilobytes.

zcommandwc COMMAND Process COMMAND for string substitutions and character escapes and send with ZMODEM protocol, wait for command completion.

zmodem Used as a prefix to the p command to select the "zmodem" parameters, or by itself to select the ZMODEM protocol for commands which operate in a choice of protocols depending on past history.

EXAMPLE: zmodem
!!sz *.*
Uses ZMODEM to send a command to the remote machine to send all the
files in its current directory.

_ Enter a disgnostic routine that prints information about each keystroke entered. Keyboarding LF (Ctrl-Enter) exits the _ (underscore) command. When a key is struck, the scancode, modified scancode, and the shift state are displayed in decimal. The modified scancode is either the raw scancode as returned by the BIOS or 224 added to the ZCOMM internal code iff the raw scancode equals 224. The ZCOMM internal code for the key (usually the ASCII value) is displayed in octal. This command may be used for exploring keyboard encoding and preparing alternate keyboard mappings for use with the mk command.

SEE ALSO: mk command

![%][~]command Execute command (either a program or a DOS built-in command) as a subprogram. A leading % (percent sign) processes Command for string parameter substitutions. See Chapter 16.6 for details on DOS Gateways and Unix Shell Escapes.

SEE ALSO: obey command

!!host-command Sends the rest of the line (after !!) to a remote ZMODEM program or Kermit server for execution on the server machine.
host-command is not processed for string parameters. This is a convenient alternative to remote host host-command-string particularly if host-command contains spaces.

label: A label begins at the first column and ends with a colon. One or more commands may appear on the same line separated from the label by white space. A label may have the same name as a directory entry provided the directory entry appears first in the script file.

N.B.: a label differs from a directory entry, which does't end with a colon. When ZCOMM encounters the next directory entry in script

processing, an automatic "return" is performed.

EXAMPLE: if 1 goto cond1
echo "Pattern 1 not matched"
cond1: echo "processing continues"
foosys speed 2400 666-1234 t

:comment A colon as first character in a command causes the rest of the command line to be ignored. This is also useful for "commenting out" commands in script files.

EXAMPLE: : this line does nothing at all

; Semicolon is a command delimiter which may be used in place of RETURN to place multiple commands on a line. Since commands such as

echo, set, sb, pattern, list, and type take an indefinite number of operands, the semicolon must be used to string such commands together.

EXAMPLE: sb *.c; off Batch transmits all *.c files, then puts the modem on hook and exits to DOS.

Semicolon is not a command delimiter if it is escaped by a backslash or if it appears within a quoted string.

EXAMPLE: pat 0 ";" Sets pattern 0 to search for a semicolon.

Commands that take a fixed number of arguments may be strung together without a semicolon unless otherwise noted.

EXAMPLE: port 1 speed 1200

<file Redirects input used by the command prompt and review function. When reading input from file, certain characters are special:

~ Accept the next character verbatim.

| Sleep for one second.

'' Double quote echoes succeeding characters to the display with highliting until the next double quote is encountered.

On end of file, a ^U is returned and input reverts to the keyboard. The file rev on the demonstration disk is a typical file which might be used with the < command.

>[>]outfile Redirects output from succeeding utility commands and debug output (if the v numeric parameter is non zero) to outfile.

Capture from the circular buffer is also enabled, but there is no

automatic writing of the circular buffer to the file on close. >>outfile appends to outfile. The output redirection is canceled by the close command or by > without a filename. DOS predefined device names such as "prn" may be used.

The syntax of ZCOMM's redirection differs from that used by DOS and UNIX. ZCOMM's output must be redirected before the command(s) are given, and the redirection stays in effect until explicitly canceled. ZCOMM's command prompt is not redirected.

EXAMPLE: bdump file0
kill
>file1
dump file0
close
Dumps the contents of the modem input buffer to file0. Output is then redirected to file1 and contents of file0 are displayed in side by side hex/ascii format.

Note that the create and t filename commands do not redirect utility command output to the file.

17.2 Function Key Commands

Some function keys are recognized at the command prompt. Function key commands may not be mixed with any other character. For example, keyboarding "t PgUp" elicits an error bell. Some scrips redefine the function keys. The standard assignments may be restored with a gosub setup command.

F2 From the command prompt, F2 enters term function.

SEE ALSO: t [file] command

Up Select the previous command in the command stack for reentry.

Down Select the next command in the command stack for reentry.

Home,PgUp,End Enter the review function.

F3...F10 Function keys F3 to F10 are programmed by set commands in the "setup" directory in the distributed telephone directory. The key definitions in PHODIR.t may be modified or removed at your discretion.

F3 Receives files with YMODEM protocol, or XMODEM. [22]

F4 Invokes TurboLearn Script Writer(TM) to record keystrokes and computer dialog, then generates a script using this information.

If ZCOMM is not currently connected to a system, the script called by F4 prompts the user for telephone number, baud rate, and parity. When recording is finished, the script prompts for a pathname to store the completed TruboDial script in.

F5 On Unix systems, begin background operation and issue a sub shell for the user. ZCOMM operation proceeds with screen output suppressed. If ZCOMM should require keyboard input before the user returns, ZCOMM waits for the user to return.

F6 Prompts for a file name, then receives that file with the XMODEM-CRC protocol. ZCOMM will revert to the basic XMODEM protocol after a few timeouts if the sender does not support CRC-16.

F7 Prompts for a file name, then transmits that file with XMODEM protocol. If the file name includes wildcard characters, or if more than one file name is given, or if a directory name is given, YMODEM protocol will be used.

F8 Generates and transmits a password based on the called system's name and the string parameter xpassword. * This command is valid only when called from the term function.

F9 Calls a script to add a new system entry to the Telephone Directory. The script prompts for a system name, and checks for duplications with entries currently in the Phone Directory. The script prompts for comments which will display when that system is called. Speed and parity are then prompted for, and the entry is added to the end of the Phone Directory.

F10 Invokes the "help" command or help processor.

Shift-F1 List the Phone directory.

Shift-F2 Search Phone Directory for system names matching user supplied string.

Shift-F3 List voice calls in the Phone Directory.

---

22. ZCOMM generates a file name if the sending program does not provide one.

Shift-F4 Dsconnect the modem from telephone line (hang it up).

Shift-F5 Prompt for a system name and add a command to call it to the circular dialing queue. List the queue contents.

Shift-F6 Run (execute) the circular dialing queue.
The following function keys are valid at the main command prompt, from the term function, and from the review function.

Ctrl-Home Resets display modes and clears the screen.

ALT-C Writes the circular buffer to disk and closes any open send or receive file(s). ZCOMM complains if no files were open.

SEE ALSO: close command

ALT-D Lists the current directory of the default disk.

SEE ALSO: dirr command

ALT-M Toggles keyboard mapping.

SEE ALSO: display mapkb command, N numeric parameter

ALT-R Enter the review function.

SEE ALSO: review command

ALT-S Displays status on the local screen only, even if ZCOMM is in host operation.

SEE ALSO: s command

ALT-U Toggles Upper case conversion of keyboard and file characters sent with the term function (t, f, F2 commands). The answerback and programmed strings are not affected. Protocol file transfers are not affected. The u mode is reset by the call command.

SEE ALSO: u mode

ALT-W Writes the circular buffer to the receive file. Equivalent to the main w command.

SEE ALSO: w command

F1...FA10 etc. The Soft Keys can be programmed (with "set" commands) either to send a string of characters to the remote or to invoke a ZCOMM command sequence. Iff the string begins with "@", the remainder of the string is treated as a ZCOMM command. No strings are sent to the remote from the command prompt or from the review function.

The soft keys can be changed for each remote system or different application programs, with set commands embedded in the appropriate telephone directory entry. The ALT-K key displays the strings assigned to these keys.

There are 48 soft keys, f1 to f12,fs1 to fs12,fc1 to fc12,fa1 to fa12, plus some of the cursor keys. (fs1 is obtained by Shift-F1. fc1 is obtained by Ctrl-F1. fa1 is obtained by Alt-F1.) In addition, the cursor keys may be reassigned to send strings to the remote when in the term function. To list them, set the v (verbose) parameter non zero ("pv1"), then give a "set" command. Most soft keys have names beginning with f, and are described in Chapter 22.

17.3 Browse Command

BROwse pathspec browses through the specified files. If pathspec is empty, all files are presented. For each matched pathname, the filename, date, and length are displayed. The status line displays some of the possible (one letter) commands.

```
EXAMPLE: >>>c:bro *.c
CFLOW.C         13:18:10 02-25-86   6072 ?
app, back, copy, Del, mv, next, page, sz, S, quit, {rR}ead, usq, view,
!, @
```

a, A Prompts for a pathname and then appends the current file to it. Both DOS and CP/M format files are handled correctly. The A choice then deletes the file.

b Backs up to the previous file. Browse will not back up past a deleted or renamed file.

c prompts for a target pathname. The resulting DOS command copy file target is executed by a copy of COMMAND.COM. Target may include the switches available with the DOS copy command. The pathnames given must be legal for DOS, with \ separating directories from filenames.[23]

EXAMPLE: c
Copy to: a:

SEE ALSO: "HINT" below

---

23. Unless the DOS SWITCHAR has been changed to "/".

D Deletes the file.

SP, CR skip to the next file.

r, R The R subcommand first kills the circular buffer. Then read the file (or as much as will fit) into the circular buffer, then call the review function. The review function subcommands can be used to page back and forth through the file, write portions of the buffer to files, and so on. If review is exited with the file still open, browse closes it. This subcommand is not available if Restricted.

SEE ALSO: review function

n Sends the file with the ZMODEM n option (send file only if the source is newer than the destination).

S sends the selected file with XMODEM protocol. The user must start an XMODEM receive on the other machine.

s sends the selected file with ZMODEM or YMODEM Protocol and 1kb packets. If the other program has ZMODEM AutoDownload enabled (Z mode) the file transmission will be automatic. Otherwise, the user must start a YMODEM or ZMODEM receive on the other machine. The s and S subcommands are useful when issued by a remote caller browsing through files in a directory.

t Tail reads the tail of the file into the circular buffer and displays the last 24 lines.

Q, X Quit ends the file list. X is provided for the convenience of users accustomed to the wash and sweep programs.

V, Ctrl-V View the file, whether it is a regular or SQueezed file.

! prompts for a DOS command and then attempts to execute it. Some DOS commands that might be useful are rename, del, print, move, emacs, mince, edlin, chkdsk, and chmod. When entering the DOS command, a keyboarded % is replaced by the pathname of the currently selected file.

Please refer to the ! command for details and caveats.

EXAMPLE: !emacs % calls EMACS to edit the selected file.

@ Prompts for a ZCOMM command, and then executes that command as if it had been entered at the main command prompt. The @ subcommand should not be used for any command that involves file names.

EXAMPLE: @display vt100

* Any other letter redisplays the file information and repeats the prompt.

After the file list is exhausted, ZCOMM prints the free storage remaining on the default disk.
HINT: Use a directory command to change the order in which the files are presented for the browse command. For example, assume we have a directory src on drive c: (hard disk) and a floppy drive F: with a scratch disk inserted. The command sequence

```
dirt
f:
browse c:/src
```

displays each file in the src directory beginning with the newest. Typing c tells ZCOMM you want to copy the file. When ZCOMM asks for the filename, just hit <CR> and the file is copied. (The resulting command to command.com is "COPY c:/src/file"). This sequence may be used to "clean up" a directory.

17.4 DOS Gateway

A "Shell Escape" or "DOS Gateway" executes a DOS COMMAND (a program or command) as a subroutine. If the first non white-space character of the line is !, the entire line, less the !, is executed as a DOS command, as if it were typed to DOS in the absence of ZCOMM. If the ! command is not the first command on the line, the command string must conform to ZCOMM's rules pertaining to strings. DOS Gateways are not allowed if ZCOMM is RESTRICTED.

If the next character is % the rest of the command is processed for string substitutions.

If DOS fails to execute COMMAND.COM, (actually, the program specified in COMSPEC), the message Shell Escape DOS error return = N is displayed. The usual DOS error returns are 1002,1005,1008,1010, and 1011, which are the DOS error return values + 1000:

2 File not found (COMMAND.COM)

5 Access Denied

8 Insufficient memory

10 Invalid environment

11 Invalid format

Return values less than 1000 are returned by the application but are lost by current versions of COMMAND.COM. The return value is saved in

the ? numeric parameter and may be tested with the ? test condition.

EXAMPLE: !whereis thebeef.* Uses the public domain WHEREIS.COM program
to find certain files on the hard disk.

EXAMPLE: !dir >foo Generate a directory listing, with output redirected by DOS to foo.

The command line keys !dir keys displays the soft keys, executes a DOS "dir" command without arguments, and then displays the soft keys again, while the command line !dir keys calls DOS to print directory information for the file keys.

! commands are interpreted by DOS's COMMAND.COM; Batch files and built-in commands may be invoked as well as programs. Some useful DOS
built-in commands are rename, copy, date, and time.

Caution should be exercised with commands that affect disk files if ZCOMM has files open at the time. Programs that remain resident in low memory (such as spoolers) should NOT be invoked from ZCOMM unless
they are already resident, as memory would become fragmented. Invoking the DOS "print" command (if print isn't already resident) has caused DOS to crash when ZCOMM exits.

Memory available for !command will be less than when the command is given directly to DOS without ZCOMM running. The command "!chkdsk" will display the amount of memory available for subprograms.

NOTE: Some commands under some conditions may cause DOS to crash immediately, after more commands are given, or when the user attempts
to return to DOS, especially if insufficient memory is available. The EXEC functions of nonstandard operating systems are notorious sources of interesting debugging experiences.

Before executing a ! command, ZCOMM restores the modem port's Interrupt Service Routine's previous interrupt vector and interrupt enable bits. ZCOMM also synchronizes the BIOS display driver. After return from the DOS command, ZCOMM enables DTR, the ISR vector, interrupts on the modem port, and resumes direct control of the display.

If the command name begins with "%" (per cent sign) the remainder of the command string is processed for string substitution (but not character escapes).

EXAMPLE: set s0 this.txt
!%mv %s0 bakdir

If the command name (after an optional leading "%") begins with ~ (tilde), ZCOMM does NOT restore the modem port's Interrupt Service Routine's previous interrupt vector and interrupt enable bits. The called program may then access the modem with the ROM BIOS interrupt

hex 14, which is mapped to ZCOMM's modem service routines during the execution of the !~ command.

When the modem is accessed this way, incoming characters are buffered in ZCOMM's interrupt buffer, preventing loss of characters when scrolling above 300 bits per second. Unlike the ROM BIOS routines (which are a compromise to allow driving serial printers), the ZCOMM int 14h handler does not depend on the state of DSR or CTS.

This interface allows other programs to perform specialized functions, such as graphic screen operation or special CRT terminal emulation. One such program is COMSH.EXE available on Compuserve's Programmers' Special Interest Group (GO PCS-158).[24]

EXAMPLE: !~comsh

The ZCOMM BIOS EMULATOR replacing the int 14h modem service routine accepts the standard BIOS INT 14h functions encoded in the AH register as described in the IBM Technical Reference Manual. Since the modem port is selected by ZCOMM, the DX register is ignored. The character ready status bit reflects whether ZCOMM's modem interrupt buffer has one or more characters waiting.

The !~ command uses special logic to allow programs to exit gracefully when carrier detect is lost.

24. COMSH supports graphic images transmitted by Compuserve's Weather
Radar service.

18. OPTIONS for Protocol File Transfers

Options modify the way the protocol file transfer commands send and receive files. They are reset before each command line. The a and b options are mutually exclusive. A b option given to the sender or receiver will override any a option. The +, r, N, n, p, and y options are mutually exclusive. The Y option may be followed by the +, r, n, or N option.

+ When receiving to a file already on disk, append the new data to the old file (if one exists). This option is not allowed if ZCOMM is Restricted.

When sending files with ZMODEM, the + option commands the receiver to append to a file already on the receiver's disk.

EXAMPLE: sz -+ ONAME=master.log *.log sends all .log files in the current directory to be appended to master.log on the receiver's computer.

7 Strip data to 7 bits for file transfers with the Kermit protocol. Program images and other 8 bit binary files cannot be sent this way. In the absence of the 7 option ZCOMM transfers all 8 bits of each byte. If the communications line is set to 8 bits no parity, the 8th bit is tranmitted, otherwise ZCOMM requests 8th bit quoting.
NOTE: The 7 option is distinct from the 7e and 7o modes.

a (ASCII) The a option applies to files received with XMODEM, YMODEM, or ZMODEM protocol. It converts newlines not preceded by CR to CR/LF pairs. NULL, RUBOUT, and all characters in each packet beginning with Ctrl-Z are excluded. The a option is useful when receiving text files without carriage returns directly from Unix systems.

When sending with ZMODEM, the a option instructs the receiver to convert text files to the conventions used in its operating environment.

The a option does not apply to Kermit. Files transferred with the a option cannot be processed with the ZMODEM r (recover/resume) option.

EXAMPLE: rc -a program.c receives program.c and converts end of lines to CR/LF.

b (Binary) With ZMODEM, inhibits the receiver from translating the file contents. If either the ZMODEM sender or receiver specifies b

option, any contrary requests will be ignored.

EXAMPLE: sz -b program.exe

c Use CRC-16 with the rx, rt, and r7 commands.

e Escape control characters when sending files with the ZMODEM protocol. Normally, ZMODEM escapes XON, XOFF, Ctrl-P, CR-@-CR, and Ctrl-X. This option is useful when operating with brain damaged data PBX systems and other types of "front ends".

f Send the full pathname as specified (exclusive of disk identifier) when using a batch send command. Normally only the file name portion (without any directory prefix) is transmitted. The f option applies to batch file transmission with the kermit sb, sb, send, and sz commands.

EXAMPLE: cd /src; sz -f robot/r2d2.h sends the file with the pathname robot/r2d2.h.

EXAMPLE: sz -f /src/robot/vox/3tpi0.*

SEE ALSO: PREFIX=p flag for the sb and sz commands.

F Insert a pause after each transmitted data subpacket transmitted with ZMODEM. This is useful in certain situations when conventional flow control methods are unavailable, ineffective, or unreasonably slow (i.e., "broken"). The length of pause is set by the zmodem F numeric parameter.

EXAMPLE: sz -F honker.dat

SEE ALSO: zmodem F numeric parameter

g Given to the receiving program, the g option to the rb command allows the sender and receiver to dispense with acknowledging each transmitted packet when using YMODEM batch transfers. YMODEM-g increases throughput when the transmitting medium itself (direct connection, X.PC session, or error correcting modems) provides error free transmission. The transmitting medium can use XOFF and XON to enforce flow control.

If the transmitting medium does not enforce flow control,[1] the

---

1. X.PC automatically enforces end to end flow control.

user must insure the receiver is not overrun. ZCOMM on a PC or XT accepts data at 9600 bps without flow control when the file is being written to a hard disk or ramdisk.[2]

If an error is detected when the g option is used, the transfer is aborted.

EXAMPLE: rb -g

The g option may also be used with the rx command to receive files from Qmodem's G protocol.

k Use 1024 byte (1K) packets with the sb and sx commands. The default packet length is 128. This increases throughput when the speed is high relative to the response times of the communications channel and the computers. The k option is useful with 9600 or 19200 bps transfers with directly connected timesharing systems. The k option may not work properly uploading to some systems, particularly heavily loaded or poorly implemented timesharing systems at high speeds. The k option is valid only when sending to ZCOMM, Unix rb, or other compatible programs. If the file length is not a multiple of 1024, the remainder of the file will be sent with 128 byte blocks. This option does not affect Kermit transfers.

EXAMPLE: sb -k *.c *.h

With the sz command, the k option forces an initial 1024 byte subpacket length.

EXAMPLE: sz -k *.c *.h

l Force incoming pathnames that are all uppercase to lower case. This is reset by the call command. This option is ignored on DOS and OS/2.

n (ZMODEM) Each file is transferred if the corresponding destination file does not exist, or if the source file is newer. The n option can be given with either the sz or rz commands. This option is not allowed if the receiver is Restricted.

EXAMPLE: sz -n *.* attempts to send all files in the current

---

2. Provided no memory resident programs or special drivers hog CPU cycles.

directory. Only those files that do not exist in the destination directory, and those for which the source is newer will be sent.

N (ZMODEM) Transfer the file if the corresponding destination file does not exist, or if the source file is newer or longer. The N option be used with the sz and rz commands. This option is not allowed if the receiver is Restricted.

EXAMPLE: sz -N *.*

p (ZMODEM) Protect destination file; bypass this file if it already exists on the destination system.

q (Quiet) suppresses block by block status line update during Kermit and X/YMODEM file transfers.

r (ZMODEM) Resume/Recover an interrupted file transfer with the ZMODEM protocol. May be given with either the sz or rz commands.

The r option may be used to resume the transmission of a long file after a disconnect or power loss, without having to start over at the beginning of the file. The r option may also be used when the source file grows from time to time and only the incremental portion needs to be sent. The r option assumes that the contents of the destination file are identical to the corresponding beginning portion of the source file. The r option should not be applied to a file that has been modified by the a option, or to a file that has been edited on the destination system. This option is not allowed if the receiver is Restricted.

EXAMPLE: sz -r hugefile.lst

rr As above, but the files are compared by taking a 32 bit CRC on the contents before deciding on whether to start a fresh transfer.

EXAMPLE: sz -rr maybenewer.lst

With the -rr option, all of the files are compared or transmitted by default. The number of bytes used in the comparision may be restricted by setting the zmodem R numeric parameter to a number between 2048 and 32000 (1 billion on 32 bit flavors).

EXAMPLE: zmodem pR20000

R (32 bit Unix systems) Recursively descend directories specified in wild cards when expanding file names.

EXAMPLE: sz -Rf src
Sends the files in the src directory and its dubdirectories (R option), and transmits the full relative pathname (f option).

SEE ALSO: f option

s SlugBait modifies the logic of ZMODEM sending to detect and report attempts at evading accountability for receiving files. Such attempts are flagged with a Q status in the log of sent files. SnailBait adds a slight delay to file transmission, and a transfer that is cut off at the very end of file may very infrequently be reported with Questionable instead of ERROR status.

S When sending file(s) with ZMODEM, interrogate the receiving prgram for its serial number. S option terminates when a serial number is received or when the call command is given. Receiving file(s) with YMODEM or ZMODEM from programs providing a serial number also provides the other program's serial number. The serial number received is listed by the performance log.

t Enter the term function after file transfer(s) complete. The t option should not be used in commands given from within the term function, either directly or with soft key definitions.

u Unlink (remove, delete) the file after it has been sent with the sz command.

v View the data being transmitted or received. Only correct data is displayed. Viewing standard ASCII files does not interfere with correct transmission at high speeds, although throughput may be degraded.

The output may be redirected to a capture file or DOS device with the > or >> command. Unless output is redirected, this option must not be used when ZCOMM is in Host Operation.

wN Use a window size of N bytes with the sz command, overriding the zmodem w numeric parameter. If N is missing, use a ZMODEM window size of 3072 bytes.

SEE ALSO: Flow Control Chapter 13, zmodem w numeric parameter

y Yes it is OK to replace a file already on disk when receiving to a file. If absent, the operator is given a choice of appending to the current file (a), erasing it (y) or aborting (n). This option is not allowed if ZCOMM is Restricted. When sending with ZMODEM, commands the receiver to replace a file on its disk.

Y (ZMODEM) Transfer only those files for which a file with the same pathname exists at the destination, overwriting the destination

files. The Y option may be followed by other ZMODEM options to further qualify the selection of files to transfer. This option is not allowed if ZCOMM is Restricted.

EXAMPLE: sz -Yn *.* If the source directory contains files A, B, and C, each dated today, and the destination directory contains B and C, with B a week old and C dated today, only B will be sent.

zT Use T minutes behind GMT (Greenwich Mean Time) as the local timezone instead of the z parameter value for the file(s) transferred with this command.

EXAMPLE: sb -k -z300 ESTfile sends ESTfile corrected for creation in Eastern Standard Time.

Z Transmit files with compression. The ZMODEM receiver must indicate its ability to decompress received files for this option to take effect.

When sending between Unix systems, files are compressed with 12 bit Lempel-Ziv compression. Otherwise, packets are transmitted with Run Length Encoding.

Over slow channels, compression increases the transmission speed of compiler listings, screen dumps, etc. by up to 50 per cent. LZW compression is more effective on more types of data than RLE compression. Some files, including the Personal Computing Magazine ASCII Test File, speed up by more than an order of magnitude with either RLE or LZW compression. Heavily encrypted data and compressed files, including ARC and ZOO archives, do not benefit from ZMODEM compression.

The situation with fast compressed modems is more complex. The benefits of ZMODEM compression will depend on the particular application; try the transfers with and without ZMODEM compression to determine the most efficient options.

19. MODES for Data Capture

The modes described in this chapter affect the operation of the f, put, wait, and t commands. The b, n, p, r, w modes are mutually exclusive.

All modes except f and n are reset by the call and init commands.

Modes may be set with flags to the conference, create, enable, disable, f, open, t, and wait commands.

The call command resets ZCOMM and the communications port to 8 bits no parity.

! Negates the sense of the following mode(s). The ! modifier is not used with the 7 and 8 modes.

EXAMPLE: t -Z!tl enables ZMODEM AutoDownload and turns off throttle and line printer output.

7e 7o 7m 7s Sets 7 bits plus {Even Odd Marking Spacing} parity for transmission with the put, f, and t commands, and file transfers using the Kermit protocol. The parity setting does not affect the information content of received characters.[1] If 7e or 7o mode is used, each incoming byte of Kermit packets is checked for parity for extra accuracy in file transfers.

Some applications require a 7 bit transmission mode. Even parity is often used for TWX and IBM mainframe communications. 7m mode sets the parity bit to "marking" (8th bit set to ONE), sometimes used with DEC minicomputers and IBM mainframes.

7s mode masks data transmitted by the term function to 7 bits (spacing is equivalent to binary 0).

If a paritied mode is specified, the term function counts each character received with the opposite parity as an uncorrected error.

The call command resets ZCOMM and the communications port to 8 bits no parity (8n).

EXAMPLE: ena -E7e enables Error Containment(TM) with 7 bits even

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1. The term function normally strips the parity bit unless 8g

(graphics) mode is set.

parity.

SEE ALSO: E mode

8n Sets 8 bits no parity (default) for transmission with the Kermit, and t commands.

The call command resets ZCOMM and the communications port to 8 bits no parity (8n).

8g Some PC based bulletin boards send line drawing characters intended for IBM display adapters encoded with the 8th bit set. 8g mode uses 8 data bits with no parity. All 8 bits are also passed to the display, allowing the special graphics characters to be displayed, including those sent by many IBM-PC bulletin boards. 8g mode must not be used when the remote is sending 7 bits with marking, even, or odd parity,

8o 8e 8e sets the hardware to 8 bits even parity; 8o sets the hardware to 8 bits odd parity. The 8e and 8o modes are used only with very specialized applications. No known dial-up systems use either of these modes. Most modems do not support 8e or 8o mode.

A Sends characters from the remote to DOS, bypassing ZCOMM's CRT driver. A mode allows a screen driver such as FCONSOLE.DEV to pcocess extended ANSI or special terminal codes which ZCOMM would not otherwise understand. The A mode affects the term function only.

When using the A mode, the term function status line should be disabled with a "display stat=off" command if the display driver uses all 25 CRT lines. Fansi-Console(TM) or other drivers with definable scrolling regions may be set to scroll only the top 24 lines, leaving the 25th line free for ZCOMM's status information. WARNING: Fansi-Console and ANSI.SYS allow input data from the remote to redefine keys and/or cause commands to be executed. Such capabilities pose a security breach. For example, an innocuous looking message could contain an invisible escape sequence to make your "keyboard" issue "del \COMMAND.COM" the next time you strike the ESC key.

EXAMPLE: display stat=off; t -A disables Zcomm's status line and routes characters from the remote to DOS standard output.

SEE ALSO: list command

a Addlf adds a linefeed to each carriage return received from the remote. This is displayed as newline (return/linefeed). The same

action takes place if addlf is in effect when the term function is

writing the circular buffer to a file. This mode is useful when the data from the remote contains carriage returns but no linefeeds. The a mode may be used with the s (Strip control characters) mode.
NOTE: i (image) mode supersedes a mode.

EXAMPLE: read nolffile.txt; create -a withlf.txt; w; close reads nolffile.txt into the circular buffer, then writes it to withlf.txt with linefeeds added.

b Binary mode of file transmission with the f file command. All 8 bits are sent. This is handy for uploading binary files using the f command to adjacent machines without any useful file transfer protocol.

Don't confuse this mode with the protocol file transfer commands which send files with error correcting protocols. Also don't confuse this with the i mode which affects files received with the term function.
NOTE: The fput command can also be used to send a binary file when no monitoring of the remote's responses is needed.

EXAMPLE: f -b binfile

c, C Compuserve mode allows the remote computer to invoke the Compuserve B protocol. c causes formfeed from the remote to clear the screen, C does not. When enabled with c or C mode, the Compuserve B protocol uses ENQ and DLE for special functions.

EXAMPLE: t -c

SEE ALSO: w numeric parameter

D Delays detection of carrier detect loss. * When carrier detect is lost, D mode causes ZCOMM to wait up to two seconds for carrier detect to return. If carrier detect returns within that two seconds, ZCOMM pauses another two seconds to allow the modems time to stabilize. D mode allows file transfers to continue in the presence of interruptions from call waiting or cellular radio communications dropouts. The modem's carrier dropout timer must be lengthened to two seconds to accomodate such droputs without disconnecting by adding a Hayes S10=20 command to the modem initialization string sent by the dial telephone directory entry.

d (Dropout) Suppresses the No Carrier Detect message otherwise generated by the term function and protocol file transfers when the

communications port detects a loss of carrier detect. This mode is useful when operating with direct connections that do not properly

drive the carrier detect line. The call command sets d mode; the standard dialing scripts cancel it when the modem reports a connection.

EXAMPLE: ena -d

E Error Containment(TM) When the remote is transmitting continuously, a single "line hit" may garble many characters before the hardware can recover. E mode makes the term function send an XOFF (^S) character to stop the transmission of data when a "line hit" is detected. A line hit is detected by the presence of a break signal or framing error. If the 7e, 7o, 7m, or 7s mode is set, ZCOMM also detects parity errors as line hits.[2] After a brief pause, an XON (^Q) is sent to resume transmission.

E mode does not effect protocol transfers. It is effective only when the remote recognizes XOFF to stop transmission. E mode cannot be used with programs such as EMACS which use ^S and ^Q as

editing commands; it should not be used with X.PC.

EXAMPLE: create -+E7e capture.fil creates capture.fil for output, appending it to any existing instance of the file, enabling 7 bits even parity and Error Containment.

SEE ALSO: E and e numeric parameters

e EMACS editors and a few other programs use the ASCII flow control characters XON and XOFF as commands. These characters cannot be used for their normal flow control functions with EMACS. Emacs mode suppresses the automatic transmission of XOFF (^S) and XON (^Q) when ZCOMM's circular buffer fills up. Opening a receive file with the t file command cancels EMACS mode, but it may be turned back on later. ("t -e file" won't activate e mode.)

When capturing data to a file with e (Emacs) mode on, the user must manually stop the data from the remote and dump the buffer with the w command or the Alt-W key. Keyboarded characters automatically trigger a buffer write.

EXAMPLE: create capturefile; t -e

---

2. Many medium speed modems, including 1200 and 2400 bps units, do not generate framing errors in response to line hits. When such modems are used, parity must be used to detect line hits.

SEE ALSO: j mode

f Full duplex. ZCOMM does not echo keyboarded characters to the screen.

FN Sets the pattern match fail time for the current wait command to N seconds absolute.

EXAMPLE: wait -F5 searches for a pattern match, and will fail after five seconds.

fN Sets the pattern match fail time for the current wait command to N seconds of inactivity.

EXAMPLE: wait -f5 searches for a pattern match, and will fail after five seconds of inactivity.

SEE ALSO: f numeric parameter

g resumes sending the file once in the term function, equivalent to an XON character. Disabling g causes a file queued for transmission to wait for an XON character. Enabling g mode (ena -g) will resume file transmission after a grab command.

SEE ALSO: grab command

G, GG G mode (the default) allows the term function to recognize XON and XOFF flow control. A number of characters may be sent before ZCOMM responds to XOFF. GG mode prevents the term function from recognizing XON and XOFF flow control.

As a special case, disabling G mode allows the interrupt driven output routines in ZCOMM to respond immediately to XOFF and XON characters instead of waiting for the term function to receive and act upon them. A consequence of this selection is that the term function may be "stuck" waiting for the interrupt level routines, while at the same time the interrupt level routines are "waiting" for an XON character. A spurious XOFF or lost XON character can cause this deadlock. The S numeric parameter should be set to an appropriate value to allow timeout and recovery from this condition.

EXAMPLE: f -!G asciifile.txt

H,h Half Duplex Displays keyboarded characters as they are sent to the host. H mode causes keyboarded carriage return to be echoed as cr/lf.

Two half duplex modes are provided to match computer systems that send a linefeed in response to carriage return ("t -h") and others that give no echo at all to carriage return ("t -H").

SEE ALSO: h numeric parameter

i If a file is being received with the Term function, Image mode allows all characters received, including NULLS, to be output when the capture buffer is written to disk. Image mode makes the review function act upon ESCAPE characters. Image mode overrides the a, s and z modes. Image mode does not override the A, c, C or Z modes, and does not control the parity bit.

EXAMPLE: t -i

SEE ALSO: I, v and 8g modes

SEE ALSO: ALT-I key

SEE ALSO: fget command The fget command is faster as there is no display of the received data.

Image mode does not affect data transmitted by ZCOMM.[3]

I Super Image mode sets completely transparent 8 bit data capture with the term function. In addition, the A, c, C, and Z modes are superceded, XON, XOFF, ENQ are not executed. Super Image mode is useful for capturing binary data from sources that require keyboard or script intervention. If the incoming data contains random escape sequences, ZCOMM's terminal emulation decoding of escape sequences should be suppressed. Either v mode should be set, or a display dumb command should be given.

J On Unix and Xenix systems, the J mode smooths the display of data coming from slow serial lines by accepting data in smaller chunks. It may be used for interactive applications where jerky output is unesthetic. J mode increases CPU utilization and context switching overhead.

SEE ALSO: ALT-J

j * The jabberwrite mode causes the term function to dump the circular buffer to disk once a second if a receive file is open,

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3. The b (Binary) mode modifies files transmitted with the term function.

without interrupting the data flow from the remote. This avoids the delay required when dumping the entire buffer to disk, but may cause loss of data if the output device is too slow, or if its driver software inhibits data interrupts from the remote. It should not be used with the PCjr because the PCjr disk cannot overlap i/o with disk activity.

EXAMPLE: t -j

K Enables automatic downloading of files with the Kermit protocol. The y mode applies to Kermit AutoDownload.

l (letter l) List unit (Printer) on. Since ZCOMM buffers the printer, it needn't be as fast as the incoming data as long as the buffered data doesn't exceed the circular buffer size. The rewind command may be used to get extra copies of the received data (assuming it all fits in the circular buffer). The list unit is accessed with the rom bios printer interface (int 17h).

EXAMPLE: t -l enables printer spooling.

EXAMPLE: disable -l disables printer spooling.

NOTE: If ZCOMM is terminated before all of the circular buffer is output to the printer, the remainder of the data will be lost.

SEE ALSO: The ALT-L key toggles printing starting with next character received from the remote. The l numeric parameter selects the printer device. The lpnono string parameter allows unwanted control characters to be filtered from the printer.

n sends newline (lf) only when transmitting a file with the term function (no CR). Keyboarded CR is sent as a newline. When receiving a file to disk with the term function, Newline is stored on disk as CR LF. n mode causes newlines to be displayed as CR LF. The n mode is not reset by the call command.

EXAMPLE: f -n file

p,P When transmitting a file with the term function, the contents of eolstr (CR by default) are sent at the end of each line. Prompt mode then waits for a prompt character (g numeric parameter[4]) from the remote after each line transmitted from a file. If GOchar

is not received, the wait times out and transmission proceeds in the same manner as with w mode. The duration of this timeout is controlled by the p numeric parameter. The q numeric parameter controls the pause between recognizing GOchar and resuming transmission. This pause is not reset by characters from the remote.

EXAMPLE: f -p file

SEE ALSO: g, p, q numeric parameters

As a convenience, P mode implicitly sets GOchar to 17. As a special case, if GOchar is set to 17 (called XON, DC1, or ^Q) before the p mode is set, file transmission is stopped until an XON is keyboarded or received from the remote.

EXAMPLE: f -P file

q Setting q mode causes the term function to guarantee the contents of the circular buffer have been written to disk[5] and then transmit the answerback string parameter in response to ENQ. An ACK from the local keyboard or a transmitted file also transmits the answerback. An EOT or carrier loss closes the receive file and exits the term function.

Q Quiet inhibits the term function display of data from the remote.* The status line, ZCOMM messages, and output from utility commands are not affected. The Q mode may be used to suppress unwanted characters during modem initialization, logins, etc.

SEE ALSO: display inhibit command

r CRmode sends the contents of eolstr (CR by default) at the end of each line transmitted from a file with the f command. There is no pause at the end of each line.

EXAMPLE: f -r file

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4. The default for numeric parameter g (GOchar) is linefeed .

5. On DOS, the file is written, closed, and reopened. The TWX protocol assumes that transmitted information has been safely stored before an answerback is sent in response to ENQ.

S SuperStrip mode strips Form Feed (FF) from the file in addition to the actions of s mode.

EXAMPLE: t -S capture.txt

s Strip all Control Characters except LF, FF, HT, and BS when capturing to a file with the term function. Most escape sequences are completely removed, especially common ANSI codes for setting colors and positioning. In s mode, a BS character causes ZCOMM to attempt to erase the previous character from the output file with an fseek() function call. This is guaranteed to work only if the output is to a disk file and sufficient characters come after the BS to overlay the "erased" character.[6] An LF is stored in the file as CR LF to make up for the CR that is discarded in s mode. XON, XOFF, and DEL (RUBOUT) do not display when s mode is in effect. The a (Addlf, add linefeed to carriage return) mode may be used with the s mode.
NOTE: i (image) mode supersedes s mode editing.

When displaying file(s) with the cat, more, type, page, bro/v, and bro/p commands, stop when ^Z (CP/M EOF) is read.

sss In addition to the above, sss inhibits the display of blank lines.

SEE ALSO: display vt100 command

t Some remote systems cannot accept input at full speed. Throttle mode slows the sending of characters to the remote. The speed is controlled by the t numeric parameter. The default value slows transmission to about 50 words per minute. The t mode does not affect protocol transfers.

EXAMPLE: f -t command.fil

SEE ALSO: t numeric parameter

TN Sets the pattern match fail time for the current wait command to N seconds absolute. In addition, the term function will return (without matching any patterns) after an enabled Kermit, Compuserve-B, or ZMODEM automatic file transfer (successful or otherwise).

EXAMPLE: wait -T99 searches for a pattern match, and will fail

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6. This backspace simulation does not stop at a virtual left margin.

after 99 seconds.

u Enables Upper case conversion of keyboard and file characters sent with the term function (t, f, F2 commands). The answerback and programmed strings are not affected. Protocol file transfers are not affected.

EXAMPLE: ena -u

SEE ALSO: ALT-U key

v View control characters as ^C. In addition to the above, vv mode denotes characters with the parity bit set by prepending a tilde (~). Finally, vvv mode prints incoming characters in hex.* The v modes override the A, c, C, and Z modes.

EXAMPLE: t -iv bincapt.fil captures binary data from the modem to bincapt.fil, with control characters displayed legibly.

NOTE: View mode is distinct from view option.

w Wait mode. When sending files with the term function, send the contents of eolstr (CR by default) at the end of each line, and then wait until echoes from the remote have stopped. Useful for sending files to bulletin boards where the remote needs time to prepare for the next text line. The p numeric parameter controls the length of this wait, which is reset by each character received from the remote.

EXAMPLE: f -w file

W Enable writing from the circular buffer to capture file (default enabled).* The echof and echoc commands are not affected.

SEE ALSO: ki command

x,X EXit from the term function when EOF is encountered on transmitted file. In addition, X mode causes the term function to exit when the file upload is interrupted by reading a character matching the value of the m numeric parameter. The x mode is the standard way for a script to regain control after uploading a file with the term function.

EXAMPLE: f -x upload.txt

SEE ALSO: m numeric parameter

y Yes it is OK to clobber a file already on disk when receiving to a file. If absent, the operator is given a choice of appending to the current file (a), erasing it (y) or aborting (n). This mode is reset at each command line and at each obey and function key, pattern action, or downloaded command. This mode is not allowed if ZCOMM is Restricted.

Z (Case is significant!) enables ZMODEM AutoDownload of commands and files when the term function is active (this is the default). The term function recognizes ZMODEM AutoDownload at 300 bps and higher speeds.

EXAMPLE: dis -Z disables ZMODEM AutoDownload.

ZMODEM AutoDownload performs a security check to reject Trojan Horse messages. The challenge may be disabled with an ena -yZ command, resulting in a time savings when using some modems.

z Close file when CPMEOF (^Z) is encountered while writing the capture buffer. z mode also appends a CTRL-Z (CP/M EOF) to the end of files created with the apd, create, t file, browse/a, browse/A, review/w, review/W, and > commands. Otherwise, ^Z is ignored. NOTE: The Source coughs up an occasional ^Z just as the UPI program is about to print an interesting article.

+ When receiving to a file already on disk, append the new data to the old file. This mode is reset at each command line and at each obey and function key, pattern action, or downloaded command. This mode is not allowed if ZCOMM is Restricted.

20. TERM FUNCTION

Interactive conversation with the remote is controlled by the term function. The term function provides the conversational link between the keyboard, display, printer, and the remote computer. ZCOMM's term function also controls the capture of data from the remote, "non-protocol" sending of files and commands, and recognition of the remote's responses (pattern searches).

The term function is entered by the F2, f, put, putw, t and wait commands, and by the rx and sx commands when the t option is used.

Normally, the term function acts upon keyboarded characters immediately. If the term function is sending a string with the put or putw commands, or if the keyboard has been locked with the kbdlock command, keystrokes are not drained from the keyboard buffer. If ANSI KAM (Keyboard Action Mode) escape sequence has been received, keystrokes are discarded with a bleep of the bell.

Normal ASCII printing and control characters are sent to the remote. Some keys may be redefined with the set command. NUKE (ALT-N) returns control to the main command prompt. The term function returns to its caller when an F1 or ALT-X key is struck.

A carrier detect loss during a pattern search or a satisfied search[1] cause the term function to return. Counting the error count (e numeric parameter) UP TO 0 makes the term function return. An ETX or EOT received from the remote when q mode is on also does the trick. Finally, an EOF on a file uploaded with x mode, or a match on a file uploaded with X mode makes the term function return.

20.1 Major Modes of Operation

The term function can operate in several Major Modes affecting keyboarded characters.[2]

Terminal Emulation Normal mode operates according to the terminal emulation selected. Keyboard mapping with set and mk commands is effective.

Conference The conference command (described at the end of this chapter) provides local editing of keyboarded characters before transmission.

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1. Unless the c modifier was used

2. Not all Major Modes are supported on all operating systems.

Chat The chat command links two keyboards interactively.

Doorway Doorway is activated with the ALT-= key to allow function and alt keys to be passed to certain BBS systems.

Scancode Scancode passes raw scancodes to VP/ix and similar applications.

20.2 Command Characters

In the term function, soft key definitions override the keys' normal functions.

ALT-= Toggles the term function keyboard handling between normal, doorway, and scancode operation.

In doorway operation, ALT, cursor, and function keys are transmitted as NULL followed by the raw scan code. This is especially useful when operating the PC Board ProDoor full screen editor.

In scancode mode, raw scan codes are transmitted for use by VP/ix and other programs that require raw IBM keyboard scan codes.

Both doorway or scancode operation override all term function key bindings escept for ALT-= which toggles between these forms of operation.

Backspace Normally the term function sends backspace to the remote without any special processing. This is ideal for most systems where backspace implies deletion of the character immediately to the left of the cursor. Other systems, including VMS, use RUBOUT for this function. The GCOS system uses the # character for this function. The special requirements of these systems can be optimally accomodated by assigning a string or series of commands to the BS key. Chapter 99 provides some examples.

F1, ALT-X Return from the term function. ALT-X is an alternate to F1 in case the user has assigned his own string or command to F1.

F2, PgUp, PgDn, ALT-R Enter the review function displaying data starting with either the first character received after the last character keyboarded (except space, Ctrl-Q, or Ctrl-S), or about 48 lines back if less than 400 characters have been received since the last character keyboarded. This allows the output from the last command to be conveniently reviewed. Review then awaits the next command.

F2 followed by "k" is a handy way to clear both the screen and the circular buffer.

Up Enter remote command recall and select the previous remote command
for editing in the status line. Backspace, and Ctrl-W may be used for editing the line. Ctrl-U and Ctrl-X clear the line's contents and restore normal term function operation.

Down Enter remote command recall and select the next remote command
for editing in the status line.

Home Enter review function, displaying text starting at the beginning of the buffer. ALT-R is an alternate to F2 in case the user has assigned his own string or command to F2.

F3...F10, FS1...FS4 Chapter 15 describes the functions that the "setup" entry in the sample PHODIR.t file assigns to these keys.

Ctrl-Break Sends a 200 millisecond (default) break signal to the remote. The function of this key may be reassigned with a set command.
NOTE: Some modems do not correctly pass a break signal to the remote.

Ctrl-Shift-2 Some remote computer systems may require sending the NULL
(000) character. NULL may be keyboarded by Ctrl-Shift-2.

^F Iff q (TWX) mode is in effect, transmit the string parameter answerback to the remote. This is equivalent to HEREIS on a Teletype(TM) machine.

Enter Iff n mode is set, send a newline (LF). Otherwise, send the contents of entstr (default CR) to the remote.

^Q Iff a transmit file is open and its transmission has been stopped by a XOFF, transmission is resumed. Resumes counting of the inactivity timeout associated with the wait and pattern commands. Otherwise no special treatment.

Rubout The ASCII delete (rubout) character (hex 7F, octal 177) is generated by Ctrl-Backspace (the left arrow above the ENTER key on the PC keyboard). The "Del" key near the lower right of the keyboard does not generate delete, but may be programmed to do so with a "set fdel \177" command.

^S Iff a transmit file is open, transmission is stopped. Otherwise ^S is transmitted. ^S also suspends counting of the inactivity timeout associated with the wait and pattern commands.

ALT-B Sends a 100 millisecond break signal to the remote.
NOTE: Some modems do not correctly pass the break signal to the

remote.

ALT-N The NUKE key exits from the term function with a message and cancels any scripts or functions that may have been executing.

ALT-1 Prompts for a DOS command, then executes that command as a subroutine.

EXAMPLE: ALT-1 whereis *.lst

ALT-2 Prompts for a ZCOMM command, then executes that command. A particularly useful command is "create file" which creates a capture file without having to return to the main command prompt. Care should be exercised not to force excessive recursion by issuing a command (such as t or f) which would invoke the term function recursively.

EXAMPLE: ALT-2 create capture.fil

EXAMPLE: ALT-2 display vt100

ALT-E Resets the elapsed time indication to zero.

ALT-F Full Duplex resets local echo of keyboarded characters.

ALT-H Toggles Half duplex in the sequence 0 (full duplex), 1 (local echo), and 2 (local echo CR as CR LF). SEE ALSO: h numeric parameter

ALT-I Three way toggle of i and I (Image) mode. When toggling to I (super image) mode, ZCOMM's display emulation is set to dumb to disable all escape sequences, most importantly those that do strange things when used in the wrong context. When toggling out of I mode, dumb terminal emulation is turned off.

ALT-J Toggles j (Jabberwrite) mode (q.v.).*

ALT-K Displays the contents of the soft keys.

ALT-L Ctrl-PrtSc Toggles the line printer on flag. If the printer is being turned on, printing commences with the next character received from the remote.

ALT-M Toggles keyboard mapping.

SEE ALSO: display mapkb command

ALT-O Toggles the Overstrike display mode, and restores the normal CRT attribute.

ALT-P Toggles the parity the term function uses between 8 bits no parity, 8 bits graphics, 7 bits plus even parity, 7 bits plus odd parity, 7 bits marking parity (8th bit set), and 7 bits spacing parity (8 bit reset).

ALT-V Four way toggles v mode between normal, show control characters as ^C, denote characters with parity bit (in addition to the above) set by prepending a tilde (~), and display all characters in hex.*

20.3 Control Characters

The following characters are recognized by the term function when they are received from the remote.

ENQ, DLE If c or C (Compuserve) mode and v mode is not in effect, engage the Compuserve B+ Protocol. This protocol is used with the FILTRN program and the SIG/ACCESS DOW and UPL commands. See Compuserve's CP-MIG user group documentation for more information. Iff enabled, these codes are acted upon when drained from the interrupt input buffer and are not passed to the circular buffer.

The following received characters are recognized by the term function, regardless of parity, when they are fetched from the circular buffer for the display.

Modem Error Detected modem errors (parity error, framing error, break, overrun) are counted in the e numeric parameter. The E numeric parameter may be used to represent modem errors as specific, searchable characters.

A detected overrun is displayed as a large fuzzy rectangle (hex B2).

ETX EOT Ctrl-Z When receiving a message with the TWX protocol (in Host
Operation) these control characters will terminate the message.

ENQ Iff q (TWX) mode or VT100 emulation ("display vt") is in effect, transmit the answerback string parameter to the remote. This is equivalent to HEREIS on a Teletype(TM) machine.

BELL Generates a tone in the speaker unless visual bell display is enabled ("display bell=visual"). If the display has fallen behind the incoming data, ZCOMM suppresses the bell due to the relatively long time required to perform a bell ring. If a file is being transmitted with the term function, a bell character will pause transmission for a short time. (Some computers send bell characters to indicate their input buffers are becoming overloaded.)

FF If c mode is enabled, erase the screen.

XOFF Suspends file transmission from ZCOMM. XOFF is excluded from

pattern searches and does not display unless v mode is set. After a

timeout determined by the Kermit s numeric parameter (default 60 seconds), transmission will resume even if no XON character is received.[3]

XON Resumes file transmission from ZCOMM. XON is excluded from pattern searches and does not display unless v mode is set.

NULL, Rubout (Hex 7F) and NULL (0) are not displayed unless ZCOMM is in i (image) or v mode. They are excluded from pattern searches.

20.4 Buffer Writing

If e (Emacs) mode is set, a buffer dump is performed before each keyboarded character is sent to the remote, since normal XOFF based flow control is assumed to be disabled.

When the free space in the circular buffer is nearly exhausted, ZCOMM sends an XOFF character to the remote[4] and writes the buffer contents to the receive file[5] (if any). The circular buffer is also written to the receive file as a result of a "w" command, ALT-W key, or once per second if j mode is in effect.

When the circular buffer is written to a receive file, several control characters are treated specially if i (image) mode is not set. Iff s mode is set, all control characters, except for those listed below, are excluded from the received file.

NULL ACK BELL XON XOFF RUBOUT ESC These characters are excluded from
the file. Most "escape sequences" are also filtered form the cpature file. NULL, DELETE, XON, and XOFF are excluded from pattern searches.

ETX, EOT These characters close the file if q mode is in effect, as when ZCOMM is receiving a message in host state using TWX protocol.

Ctrl-Z (CPMEOF) Iff z mode is enabled, close the file. Otherwise this character is discarded.

LF Iff n (nlmode) mode is on, a CR is written to the file before the LF. Linefeed is always passed to the file.

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3. There is no timeout if the parameter is 0.

4. Assuming e mode is not in effect.

5. An XON is sent to the remote after this automatic buffer write operation.

CR Iff a mode is in effect, a CR LF sequence is written to the file. Otherwise, if s mode is on, CR is only written to the file as a response to an LF in the circular buffer.

BS Backspace is written to the file unless s mode is in effect, in which case it, and the last character written in the disk file, are deleted by backspacing the file write pointer. This simulates the function of backspace on common CRT terminals.
NOTE: This backspacing of the file write pointer operates the same as Teco and Emacs editors; it does not stop at the beginning of the line. Backspacing over tab characters is tricky because it may take several backspaces to eliminate the spaces corresponding to one tab character, but only one is needed to eliminate the tab character in the output file.

HT, FF These characters are always passed to the file, even if s mode is in effect. If ss mode is in effect, FF is not passed to the file.

20.5 Real Time Status Line

A real time status line is displayed when DOS and OS/2 ZCOMM are in the term function. The left part of this status line is also displayed when ZCOMM is in Host Operation awaiting a call.

The first character position shows a blinking W if the circular buffer is being written to disk. Otherwise, the first character position shows an L if the keyboard has been locked by a kbdlock command, or C if the Caps Lock key is activated.

The second position shows an X if hardware handshaking is enabled and Clear to Send (CTS) is not received from the modem, or if an XOFF character has been received (software handshake). This also happens when a file upload is using the p mode with GOchar = 17 (17 is decimal for XON) and ZCOMM has stopped at the end of a line. Otherwise, an M is shown to indicate Keypad Mapped operation for terminal emulation. Otherwise, an N appears if the Num Lock key is activated.
SEE ALSO: handshake command, Terminal Emulation, Chapter 24.

The third position displays the real time status of the following five conditions. If more than one of the conditions is active at once, the displayed character will represent the condition listed first.

X if the buffer has nearly filled up and ZCOMM has sent an XOFF to suspend data transmission from the remote.

E when ZCOMM has sent an XOFF to suspend data transmission for Error Containment(TM).

S if the term function is searching for one or more strings (defined

by the pattern command).

W if term is waiting for a character echo before resuming transmission.

w if term is waiting for a fixed time before sending the next character or returning from a putw or wait command.

The display column and row numbers are displayed next with the home position equivalent to 1, 1. DOS's idea of the time of day is next. The minutes of elapsed time follow the time of day, modulo 24 hours (1440 minutes). The elapsed time is reset by the ALT-E term subcommand and by the autodial.

If carrier detect is absent, an L(Local) appears after the elapsed time. The X.PC version will display c, p, or L in this position depending on whether ZCOMM is in character state, packet state, or Local (no carrier detect).

The number of free characters in the Circular Buffer appears next.

The right side of the status line shows the communications port,[6] transmission speed ("baud rate") and the parity.

The next field represents the modes that are enabled. If the b, n, p, r, or w mode is set, that letter shows. If p mode is set with with GOchar equal to XON (decimal 17), a P is shown.

The v mode causes the view indicator to show ^ if control characters are being displayed in the style ^C where C is the alphabetic character corresponding to the control character. The indicator shows ~ if characters with the 8th bit set are being displayed with a leading ~.

Setting the a, c, e, h, i, j, l, q, s, t, u, x, and z modes causes the corresponding letter to be displayed. The c, h, and s modes are displayed in upper case if their value is greater than 1.

ON HOOK is displayed if the computer has disabled DTR (Data Terminal Ready). The speed command should be used to assert DTR and allow the

modem to go off hook (connect to line), e.g., "speed 1200".

If a transmit file is open, a < followed by the transmit file name is shown.

If the file upload has been stopped by a grab command, Stopped(grab) is diplayed.

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6. Virtual channel number for X.PC

If a receive capture file is open, a > followed by the file name is shown.

EXAMPLE: LX 01 24 23:57 ET 0:46 L 31424 1:1200 8n p^t <upload.fil
The keyboard has been "locked" by a kbdlock 1 command. File upload has been stopped by an XOFF character. The cursor in in column 1, line 24. The elapsed time is 46 seconds. Carrier is not present (L). There are 31424 free bytes in the circular buffer. Transmission speed is 1200 bits per second. Transmitted word length is 8 bits no parity (8n). Since a speed of 1200 selects 1 stop bit, the mode is the same as "8-N-1" mentioned by many bulletin board systems. The p mode makes
file upload pause at the end of each line for a prompt character. View mode is set (ena -v). Finally, t mode slows the transmission of each character from a soft keys or file. The disk file upload.fil is being uploaded.

The s numeric parameter sets the status line display attribute. The default of 7 provides normal video. With some displays, you can set it to dim with a ps8 command so it won't distract you. It may be disabled with an "ESC x 1" sequence.

20.5.1 X Windows status line When operating under the X Windows xterm program, Unix flavors display a status line indicating Carrier Detect, elapsed time, and buffer free size.

20.6 Conference Command/Local Editing

When the conference command is given, two cursors appear. The usual cursor will follow text as it arrives from the remote computer. A second cursor in the conference window follows the text that you enter.

While entering text to the conference window, the editing keys may be used to correct keyboarding mistakes.

Beginning at column 64, the characters you enter will show in reverse video to remind you that the line is getting long. (Conferencing software prepends your identifier or "handle" to each line you send; a long line will drop characters or otherwise mess up others' displays.)

When you keyboard ENTER, LF, or ESC, or when you fill up the conference window, ZCOMM queues the line for transmission. The conference window cursor disappears while the line is queued for transmission.

The line is transmitted as soon as the previous line (if any) has been sent. When transmission begins, the conference window is cleared and the conference cursor reappears, allowing the next line to be keyboarded. Attempts to enter characters into the conference window before transmission begins will ring the bell and be discarded.

When in the conference command, the function keys operate the same way as they normally do in the term function. The review subcommands (F2, PgUp, etc.) may be used to review portions of the conversation that have scrolled off the main screen. The exit command F1 causes any characters entered in the conference window to be discarded.

The following characters are passed directly to the remote and are not entered into the conference window: ETX SI DLE XON XOFF DC2 DC4 (^C ^O ^P ^Q ^S ^R ^T).

Transmission from the conference window is controlled by the t, p, and w modes and their associated parameters. If none of these modes are set, the line is transmitted at full speed. If Half Duplex mode h is set, ZCOMM echoes the line as it is transmitted. If H is set, a linefeed is transmitted and displayed after the carriage return.

21. REVIEW FUNCTION

Review function commands page, search, cut, paste, and otherwise manipulate captured data stored in the circular buffer.

The review function displays the approximate location of the displayed text within the circular buffer as a percentage of the buffer contents on the status line. Unless i mode is in effect, escape characters are printed as $ (dollar sign) so they will not interfere with scrolling.

Review subcommands consist of a single character preceded by an optional numeric argument. (The default value is 1.) The numeric digits and the command are not echoed as they are entered. For example, keyboarding 69+ moves down 69 lines.

You don't have to wait for the screen to fill before entering the next review subcommand. This comes in handy with the n subcommand. Since the N subcommand searches in the reverse direction, you can thumb through messages (by searching for the subject header) very quickly, knowing that you can back up if you went past something interesting.

21.1 Review Subcommands

Defined soft keys are executed from review iff they do not conflict with the permanent definitions.

Ctrl-L, Ctrl-Home Ctrl-L (form feed) clears the screen and refreshes the display without moving it. Ctrl-L is useful after an error printout within review, or after a subcommand that writes to the screen such as ALT-D or ALT-S.

a Toggles the autowarp display mode, then refreshes the display. If the autowrap display mode is enabled, long lines can be viewed, but will cause lines at the top of the screen to scroll off.

G Go to the Nth line and display from there. If N is omitted, go to the end instead.

Home Display starting at the beginning of the capture buffer.

r, R If a file is open as a result of a read command, read some more of the file into the buffer, replacing about 3/4 of the previous buffer contents (all if R subcommand). A successful r subcommand erases the pointers set by the t and b subcommands. The data read in from the file may overwrite the data currently displayed on the screen. In this case, ZCOMM displays data starting with the oldest.

F2, PgUp, ^B, * Display the Nth previous page (one line overlap is provided).

SP, PgDn, ^F Clear screen and display the next Nth page.

s, / Accept a search string, terminated by RETURN. This string may have character escapes. Search through the buffer for the Nth instance of string. Lower case characters in string match either case; upper case characters in string match upper case characters only. The display starts with that line. If the search is unsuccessful, ring bell. The search begins at the top of the display.

SEE ALSO: ?, n, N subcommands

? Prompts for search string as above, then searches backwards for the Nth occurrence of string starting with the line above the top of the buffer.

n Next searches for Nth occurrence of the previously entered string in the direction of the last "/" or "?" subcommand. Typical usage would be to search for the first occurrence with the "/" subcommand, then use "n" to find more matches.

N Next searches for next Nth occurrence of the previously entered search string in the opposite direction to the original "/" or "?" subcommand.

UpCursor, - Backup N lines and redisplay.

DownCursor, +, Ctrl-J(LF) Move the display down N lines and redisplay.

End Go to the buffer end (where the most recent data is) and display.

x eXit returns to the previous function, and makes the term function redisplay the last page of buffer contents.[1] This restores the screen and keyboard to the same state they were in before review was entered. The x subcommand allows you to see where you were if you were in the midst of keyboarding a command to the remote when you entered review.

EXAMPLE: Suppose you are typing in a line of commands and you need to "thumb back" through the remote's output for some vital nugget of information. (After you enter a 20 line email reply

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1. When the term function takes control, which is immediately if review was called from the term function.

message, NOW Compuserve asks you for a certain random 8 digit account number to mail it to!) No sweat, just hit some PgUp's until you see the account number on the screen. Now you can't remember whether or not you typed a space after the last part of you command to the remote. No problem, just exit review with x and you'll see just where you were.
NOTE: This subcommand should not be used when scripts are active.

k Kill the capture buffer contents and return to the previous function.

Ctrl-Z, Ctrl-PgDn Kill the rest of the buffer by setting the character insertion pointer to just after the end of the current display. ZCOMM then redisplays the last lines of the buffer and returns to the previous function.

t Set the file dump[2] and printer dump pointers to the top of displayed text, and sets the bottom pointer to the end of the buffer. The t subcommand is used with the b subcommand to specify which portion of the circular buffer should be written to a file with the w subcommand. (Text between the top and bottom pointers is highlighted.)

b Set the bottom pointer to the beginning of the first line of displayed text. If the top pointer had not been previously set, or if the bottom pointer is before the top pointer, ZCOMM will ring the bell and ignore the subcommand. Otherwise, the text on the screen that was highlighted will now be displayed in normal intensity as what is showing on the screen has just been deselected. (Text between the top and bottom pointers is highlighted.)

w, W Write the text between the top and bottom pointers to a disk file or DOS device.[3] If the bottom pointer is not set, the rest of the buffer will be written. ZCOMM prompts for a pathname. If the top pointer is not set, a reminder is printed. No log entry is made by this subcommand. The W subcommand automatically appends the data to an existing file.

F1, CR Return to previous function.

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2. This command should not be used while outputting to the printer (l mode) or while a Receive File is open unless you wish to select the data to be output.

3. Useful DOS devices are PRN, LPT1, LPT2, and LPT3.

! Prompts for a DOS command, then attempts to execute it (DOS Gateway).

@ Prompts for a ZCOMM command, then executes it.

22. NUMERIC PARAMETERS

Numeric parameters are set with the p command in the form px# where x is the one letter name of the parameter and "#" is the numeric value.

Numbers may have an optional leading "-" (minus) sign. Numbers are normally decimal, but hex numbers may be input as 0xHH, printing ASCII character values may be entered as 0cC, and control characters may be represented as 0^C.

Value	Possible entries
65	65 0x41 0cA
3	3 0x3 0^C

Typing "p" without a parameter name displays the current values of the numeric parameters in decimal.

EXAMPLE: pS5 sets the timeout interval in seconds waiting for XON characters or positive flow control. to decimal 5 seconds.

EXAMPLE: pv-1 sets the v numeric parameter to -1, suppressing some routine messages

The # numeric parameter sets the number of lines used by the built in display driver. The default value is 24. A value of 25 may be used for applications which require access to all 25 display lines. A small value may be used when running ZCOMM under TopView to fit the information into a small window. The cls or reset command should be given after setting the parameters to initialize the screen driver to the new values. If running with a virtual screen with TopView or DESQview, the # and $ numeric parameters are limited to 24 by 80 maximum. Full screen applications may give abnormal displays if these parameters are set too small. Nonsensical values tend to produce nonsensical displays.

EXAMPLE: cls; p#9; reset clears the screen, sets a 9 line window, and initializes the screen driver to the new value.

$ Sets the number of CRT columns. A cls or reset command should be given after changing the $ numeric parameter. The default value (80) is that returned by the BIOS video interrupt 15h call. This parameter may be set to support 132 column displays if the 132 column display mode is set before ZCOMM is called.[1] ZCOMM does

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1. With most display BIOS ROMs, ZCOMM reads the columns and lines

values from the BIOS when starting up or regaining control after a

not support displays less than 80 columns wide. The display hardware must use the same number of columns as the $ parameter if the resultant presentation is to make any sense.

SEE ALSO: # and V numeric parameters

- If non zero, the DOS Gateway (used with the ! command, etc.) uses the undocumented DOS 37h function to fetch the current value of SWITCHAR.

If negative, ZCOMM uses DOS line input (function 0xA) for commands given from the main prompt. This enables DOS command line editors such as POLYboost [2] and CED. When these editors are active, they (and not ZCOMM) interpret control, function and ALT- keys.

* Sets the CRT attribute for highlighted messages.

EXAMPLE: p*12 gives bright red.

? Count of the number of files sent or received with a protocol, and the number of lines matched by the find command. A failed password validation sets this negative. The exit status of subprograms is stored in this parameter. Because of a bug in DOS COMMAND.COM, the

return value is valid only with Unix/Xenix flavors.

SEE ALSO: ? test condition

@ Sets the CRT attribute for the (normally) blinking messages such as FILES OPEN. The numeric values are explained below, with the n numeric parameter.

EXAMPLE: p@12 makes ZCOMM's normally blinking messages appear bright red.

If set non zero (the default), causes a drop of DTR, equivalent to a bye command each time a telephone number is dialed as a command.

B If set non zero (the default), causes a bye command to be issued each time a telephone number is executed as a command.

SEE ALSO: mcommand string parameter, number dialing commands

DOS Gateway.

2. POLYboost is a product of the POLYTRON corporation.

C If non zero, only display C ESC sequences per screen in the Review Function, and count escape sequences when advancing or backing up in the review buffer. Otherwise, ESC sequences are not counted.

E If non 0, substitute this for characters with bad parity detected by the term function with e mode (Error Containment(TM)).

EXAMPLE: ena -7e; pE63 Substitute ? for characters received with odd parity.

F Sets the CRT attribute for dim (faint) messages such as ANSI SGR2.

EXAMPLE: pF8 gives gray.

H Sets the timeout in seconds for entering a command or string in response to a command or other prompt, including the accept command. A value of 0 (the default) disables this timeout.

K If non 0, executes keyboard BIOS calls to recover extended codes from 101 key keyboards.

N When enabled with display mapkb, this parameter controls the relationship between ANSI/VT52 Alternate Keypad mode (DECKPAM, ESC=), ANSI Numeric Keypad mode (DECKPNM, ESC>), and the PC's keyboard Num-Lock state.

0 causes ZCOMM to set the PC's keyboard Num_Lock state to match Numeric Keypad mode when DECKPNM or DECKPAM is received.

32 causes ZCOMM to set the PC's keyboard Num_Lock state to the opposite of Numeric Keypad mode when DECKPNM or DECKPAM is received.

1 causes ZCOMM to set the PC's keyboard Num_Lock on in response to either DECKPNM or DECKPAM.

2 causes ZCOMM to set the PC's keyboard Num_Lock off in response to either DECKPNM or DECKPAM.

SEE ALSO: display, mk and ALT-M commands

O Controls OverThruster(TM) operation with XMODEM, XMODEM-1k, YMODEM, and YMODEM-1k downloads. This parameter should be set as follows:

CompuServe XMODEM This OverThruster mode is known to be effective on CompuServe. Negative numbers control the number of bytes

added to the window on XMODEM downloads from the network. Larger numbers increase throughput, but cause improperly interfaced MNP modems and network nodes to drop characters

under stress, disrupting the file transfer.

EXAMPLE: pO-512; ro file1.ext

Other XMODEM Positive numbers up to a system dependent value less than the protocol block size increase throughput. Larger values induce timeouts and/or retransmitted blocks. The optimum value must be determined by experiment. If you see the message: Retry 0: Received dup Sector very often, the value should be reduced. 60 usually give best results with MNP modems at 2400 bps. The optimum value varies depending on the remote computer, modem(s), system traffic, and the network node.

EXAMPLE: pO60; ro file1.ext

R If non zero, remove incomplete files received with a protocol except those received with the + option (default 0).

S Timeout interval in seconds waiting for XON characters or positive flow control (default 15). If an XON is not received within this time, transmission resumes anyway. A value of 0 disables this timeout.

T If Command Reentry has been enabled with the history command, the T parameter prevents commands with fewer than T characters from being stored in the history file. Excluding short and easy to type commands from the history file makes it easier to find the commands that are difficult to keyboard.

Setting T to a large number disables the storage of commands and strings. This may be used to exclude passwords and other sensitive information from the history file.

SEE ALSO: history command

V VIDEO BIOS display mode to switch the display to 132 columns in response to a VT-100 DECCOLM mode set command. To support boards using an extended code in the bl register, calculate N = bl + (256 * al).

A popular value is 35 for the Tseng, ATI, and other extended EGA boards. The Genoa Super EGA Hi-Res likes 96. The Everex EVGA uses 28684. The default value of 0 inhibits this function.

W This numeric parameter supports Video7 and similar boards which require a non 0 value in the AH register on INT 10h bios calls for setting video modes (e.g., 132 columns). The value of the W numeric parameter (default 0) is placed in the AH register when

attempting to switch video modes.

X On Unix flavors, preset to +1 if the XTERM environment variable contains xterm, preset to -1 if the variable contains the string 401 indicating a Tektronix storage tube graphics terminal, otherwise remains at 0. Positive values allow the term function to use the X Windows xterm status line. Negative values inhibit status line updates while Tek graphics are active.

Z Hot zone column used for keyboard entry with the message and privatecommands. A space character keyboarded within the hot zone finishes the line.

a The a parameter calibrates certain XMODEM and YMODEM protocol timeouts. The default value is set during initialization to an appropriate value for an IBM Personal Computer, PC-jr, DG/One, or 8mHz PC-AT (2000 for 4.77 mHz PC, 4000 for a PS2/30, 6000 for an 8 mHz AT, 12000 for a PS2/80). If ZCOMM is run on a non standard machine, accelerator, or under a time slicing operating environment such as TopView, these timeouts may be recalibrated with the a numeric parameter. Larger numbers give longer timeouts. This parameter should then be set with a pa# command in the telephone directory setup entry. The value for this parameter will change if ZCOMM is used with a different computer type or multitasking operating system.

b Sets the video color for the screen border. The mapping of b parameter values to color is hardware dependent. New values of the b parameter take effect with the next screen clear.

c The c parameter sets the callout interval in seconds between scans for outgoing messages. The default is 300 seconds (five minutes).

EXAMPLE: pc600 sets the interval between callout queue scans to 10 minutes.

SEE ALSO: Callout queue

d A non zero value (the default) causes incoming files received with ZMODEM and full YMODEM Batch protocol to have their Date set to that sent in the file header. ZMODEM's file management features depend on the transmission of each file's modification date. Files between two copies of ZCOMM will have the same creation date, even if the two machines are in different time zones. When transferring files to/from a Unix system, creation dates are interpreted according to GMT or Universal Coordinated Time. File dating should be enabled with a pd1 command in the telephone directory setup entry.

SEE ALSO: z numeric parameter, ZONE environment variable

NOTE: Backdating file creation times may confuse some backup programs.

e Indicates the number of errors, failed file transfers and the number of characters received by the term function with parity error, framing error or overrun.

EXAMPLE: if e>30 goto badline

If the term function increments the error count to 0[3] (from a negative number), and E mode is set, the term function exits. This allows the script to regain control in the event of a noisy line. This condition is indicated by the e test condition being false (0).

EXAMPLE: pe-20; ... wait; if !e goto badline

This parameter is reset to 0 by the call command.

SEE ALSO: e numeric parameter, E mode

SEE ALSO: e test condition (if, while commands)

f Fail time. Sets the default timeout in seconds for matching a pattern. This timeout is reset whenever a character is received from the remote. Timeout is suspended whenever a XOFF (DC3 or Control-S) is keyboarded, and resumed when XON (DC1 or Control-Q) is keyboarded. The f parameter value may be overridden for one command by the ftime mode.

EXAMPLE: pf15 sets a default 15 second inactivity timeout for pattern searches.

g Set the "gochar" (decimal). (See the ASCII/Decimal conversion table in Chapter 29). The g parameter is reset to its default (linefeed, 10) by the call command. (See documentation on the p mode.)

Some remote systems accept uploads with a ? (decimal 63) prompt for each line. Optimum operation with such a system might call for

pg63 pp1000 pt4 f -tp file1

---

3. Refer to E mode description for caveats.

The pg63 sets the goahead character to question mark. The pp1000 sets the timeout to a long delay (10 seconds). The pt4 sets the upload throttle to 40 milliseconds per characters, a speed which allows the remote to echo somewhat slowly (assuming no tabs). Finally, the command f -tp file sends file1 with Throttle and wait for Prompt at end of line.

As a special case, if the "gochar" is set to 17 (called XON, DC1, or ^Q) before the p mode is set, file transmission is stopped until an XON is keyboarded or received from the remote.

EXAMPLE: pg17; ena -p

h Iff the h numeric parameter is set non zero, the h (Half Duplex) mode causes characters transmitted by the term function to be stored in the circular buffer as if they had been received from the remote. This allows the review function to display them. Since the echoed characters appear to have come from the remote, scripts may be affected, especially pattern searches.

EXAMPLE: ph1; ena -h

i Set the interval between retries to n seconds.

EXAMPLE: pi4; call -200 busysys attack dials up to 201 times at 4 second intervals.

SEE ALSO: call -n command

j Sets the maximum connect time in seconds allowed restricted callers in host operation. The default value of 0 does not restrict connect time.

EXAMPLE: pj300 disconnects restricted callers at the first command prompt after 5 minutes' connect time.

k When receiving data from the remote at high speeds (9600 or faster), the display may fall behind data from the remote. Under these conditions, keyboarding an interrupt character (often Ctrl-C, or Break) will immediately stop the output from the remote, but the display will continue to scroll for some time while the data in the circular buffer is displayed. If this is objectionable, the k parameter may be set to the remote's particular interrupt character (in decimal). This parameter also affects the link command. When this character is keyboarded, undisplayed data pending in the circular buffer is skipped over. (This data is still available to the review command. The call command resets this parameter to -1,

disabling its function.

EXAMPLE: Many DEC systems use ETX (Ctrl-C) to interrupt programs. Many Unix users also use ETX for interrupting programs. The command pk3 causes ZCOMM to skip buffered output from the remote. Unix users using the default interrupt character of RUBOUT may give the command pk127

l Selects LPTn for term function output when the l mode is set. In addition, adding 8 to the number allows terminal emulation escape codes to select "printer controller mode" iff the printer is ready at the time. Adding 16 to the number allows "printer controller mode" to be selected even if the printer is not ready at the time.

Default is 1 (LPT1).

EXAMPLE: pl2 selects LPT2.

EXAMPLE: pl9 selects LPT1 and allows the remote application to enable "printer controller mode".

m Causes file transmission with the f file command to pause when a character matching the decimal value is read from the file. That character is NOT transmitted. When the file uploading is paused, a keyboarded Ctrl-Q will resume transmission. The call command resets the m parameter to -1 (which matches nothing).

EXAMPLE: pm12 Causes file uploading to pause on FormFeed (FF).

n Set the normal display attribute. The default of 7 gives a normal white on black display. The numbers associated with the s, r, and n are stored in the attribute byte of each character position written in the corresponding mode.

The bit configuration (color display) is: Blink R G B Intensity R G B with the leftmost the most significant.

Users with color monitors often use 2 (green) to avoid color fringes caused by misconverged color monitors.
NOTE: the actual writing color attribute is not changed until the next time the display is reset. Some attributes generate unreadable displays. Other attributes generate text that can only be seen on some monitors.

EXAMPLE: pn3 sets cyan; pn2 sets green.

o Iff non zero, allows overlap of file writing and incoming data from the remote. This increases throughput when receiving files with B,

Extended Quick B, XMODEM, and YMODEM Batch protocols. ZCOMM sets this to 1 on startup unless a PC-jr is detected.

p Pause sets the echo wait period (in hundredths of seconds) used with the pattern command and the w and p modes. Larger numbers give longer pauses. The default works well with most micro based bulletin board systems. The p parameter is reset to its default of 70 (700 milliseconds approximately) by the call command.

SEE ALSO: p mode

q Sets the "gopause". When sending a file with a wait for "gochar" (p mode), ZCOMM waits Gopause hundredths of seconds AFTER it receives the "gochar". The q parameter also controls the time delay after a normal pattern match or putw command.

The q parameter is reset to its default of 70 (700 milliseconds approximately) by the call command. The default value allows time for immediate echoes to be displayed and for the Hayes SmartModem(TM) to respond to most commands.

SEE ALSO: p mode

r Set the attribute for "reverse video".

EXAMPLE: pr97 sets "reverse video" to blue on yellow.

SEE ALSO: n numeric parameter

s Set the attribute of the status line display (default 7, for white). A value of 8 (grey) may be chosen to prevent the status line display from distracting from the information being printed. The low intensity grey also minimizes phosphor burn. Some other possibilities are 2 for green, and 1 for blue (or underlined on the monochrome board).

SEE ALSO: n numeric parameter

t Sets the throttle speed (delay between characters in hundredths of seconds) used by the term function when uploading files with an f -t file command. The default value of 4 corresponds to about 20 characters per second sending speed when t mode is enabled. Larger numbers give slower transmission. The effective resolution of the t parameter is limited by the timekeeping resolution of the operating system; on PC-DOS the resolution is about 18 per second.

A negative value (-1 to -32767) may be used to specify a software timing loop, with more negative values giving slower transmission. The speed effect of a negative t value depends on the processor

speed and operating environment.

The t parameter is reset to its default by the call command.

SEE ALSO: t mode

u Sets the video attribute used to represent underline.

EXAMPLE: pu14 sets "underline" to yellow.

SEE ALSO: n numeric parameter

v Sets the verbose level (default 0). A value less than zero inhibits some routine messages. A value greater then zero causes the set command to list all string parameters, including empty string parameters. The screen erase after data calls in host operation is disabled. Values greater than 1 display script commands as they are fetched from the script file.* Larger values give more detailed tracing information. A value of 50+ causes data read by the read command to be displayed and acted upon by the term function (when called) as if it had arrived from the remote. NOTE: A v parameter value greater than zero affects scripts that generate files with the > command.

w Controls the block length used by the CompuServe B Protocol. A longer length increases throughput, but may overload some networks, resulting in excessive retransmissions or failed transfers. With the new Extended Quick-B protocol, the maximum block length is 1024 data bytes. A value of 0 (the default) allows the Compuserve computer to control the block length, up to 1024 with Extended Quick-B.

A negative value controls the upload block length but still allows Compuserve to control the download block length (1024 with Extended Quick B).

Uploads to Compuserve using longer block lengths are especially sensitive to poor flow control, especially when error correcting modems (MNP, etc.) are used. If B protocol uploads fail or require excessive retransmissions, correct the flow control arrangements, disable the modem's error correction, or try a smaller upload block size.

The data contents of successfully transferred file(s) are not affected by this parameter.

x Sets the port number linked with the link command.

SEE ALSO: link command, y numeric parameter

y Sets the transmission speed used by the linked port.

SEE ALSO: link command, x numeric parameter

z Set the timeZone in minutes behind GMT (Greenwich Mean Time).

EXAMPLE: pz300 sets timezone 300 minutes behind GMT for EST.

EXAMPLE: pz480 sets timezone 480 minutes behind GMT for PST.

SEE ALSO: d numeric parameter, ZONE environment variable

_ The _ numeric parameter controls the action taken by ZCOMM when a fatal error (one that generates the "ZCOMM: Error..." message).
Any non zero value causes DTR to be dropped (disconnect the modem).
A value greater than 100 causes ZCOMM to exit to the operating system. The NUKE key does not invoke this processing.

EXAMPLE: p_101

22.1 Kermit Numeric Parameters

The Super-Kermit parameters control Kermit protocol transfers. They are set with the kermit px# command. Their current values may be displayed with a kermit p command. These parameters rarely need changing for most systems. They can be changed in case of difficulty with Kermit transfers, especially with mainframe programs or obscure microcomputer Kermit impelementations.

Certain of these parameters require character values expressed in decimal. The ASCII code chart in Chapter 29 gives the decimal value of all ASCII characters.

When transferring files with Kermit programs operating on IBM mainframes with half duplex front ends, the kermit i parameter should be set to 1, and the kermit s parameter set to the longest response time expected, perhaps 45 seconds.

EXAMPLE: kermit pi1; kermit ps45

SEE ALSO: Kermit protocol in Chapter 11

7 If non zero, force seven bit line transmission with eighth bit quoting Kermit transmission even if ZCOMM is otherwise using eight bits no parity. This parameter is reset by the call command.

8 If non zero, force 8 bit transparent Kermit transmission even if ZCOMM is otherwise using seven bit line transmission. Normally, the

Kermit file transfer commands use 7 bit line transmission and

attempt to negotiate 8th bit quoting if one of the 7 bit modes (7e, 7o, 7m, 7s) is used. This parameter is reset by the call command.

a Incoming packet-start character, default 1 (SOH).

A Outgoing packet-start character, default 1 (SOH).

b Block check type requested: 1=1 byte checksum, 2=2 byte checksum, 3=3 byte CRC-16 (default). Selecting a type 1 checksum instead of type 3 will increase throughput by 2-4 percent[4] at the expense of weaker error checking. The probability of undetected errors when using Kermit in checksum mode instead of CRC-16 increases dramatically with noisy lines and longer packets.

c Control prefix in incoming data, default 35 (pound sign).

C Control prefix in outgoing data, default 35 (pound sign).

d Delay in seconds before initial sending, default 0.

e Incoming end of line character, default 13 (CR).

E Outgoing end of line character, default 13 (CR).

i Use IBM line turnaround, default 0 (don't use IBM line turnaround). The Kermit x numeric parameter sets the turnaround character. This may be necessary when communicating with IBM mainframes with half duplex front ends.

l Maximum outgoing packet length, default 1000, 1000 maximum. A value greater than 94 implies Kermit long packets. The receiving program may force shorter packets.

L Maximum incoming packet length, default 1000, 1000 maximum. A value greater than 94 implies Kermit long packets. This sets a limit; the sending program may use shorter packets.

p Sets the number of padding characters (default 0) to send before and after each transmitted packet.

SEE ALSO: kermit y numeric parameter

r If non zero, remove incomplete files received with a protocol except those received with the + option (default 0).

4. for 96 byte packets

s Timeout interval in seconds waiting for XON characters or positive flow control (default 15). If an XON is not received within this time, transmission resumes anyway. A value of 0 disables this timeout.

t Override timeout interval in seconds for incoming packets. The default of 0 allows the other program to specifiy the timeout.

T Timeout interval for outgoing packets, default 4 seconds.

v Eighth bit quoting character, default 38 (ampersand). Sliding Window size in Kermit packets, 1 minimum, 31 maximum, 15 default. Setting w to zero disables the sliding window.

x IBM turnaround character, default 17 (XON).

y Pad character to send, default 0 (NUL).

SEE ALSO: kermit p numeric parameter

22.2 X/Y/ZMODEM Numeric Parameters

These parameters control XMODEM, YMODEM, and ZMODEM protocol transfers. They are set with the z px# command available with ZMODEM flavors of ZCOMM. Their current values can be displayed with a z p command. These parameters rarely need changing in normal environments.

b If non zero, ZMODEM sends a break when it is sending a file and receives a retransmission request. This mode of operation may be used with high speed modems to clear unwanted characters from the modem's buffer during error recovery. Usually, the modem must be given a configuration command to set the proper action to take when receiving a break signal.

B Sets the duration of the break signal in tenths of a second, default 2 (200 milliseconds).

c Enables Cybernetic Data Recovery(TM) on XMODEM and YMODEM transfers. Setting this parameter to 0 accommodates programs with non standard XMODEM/YMODEM protocols and slightly quickens file transfers. The default value of 1 provides optimum reliability for XMODEM and YMODEM transfers with programs that meet the XMODEM/YMODEM spec.

C Sets the number of times ZMODEM will attempt to send a command (as a result of a zcommand command) (default 11).

d Sets a delay time in tenths of seconds that the sz command will wait for a ZMODEM packet in response to the rz<ENTER> string it sends to the remote before sending a ZMODEM packet. This facilitates automatic ZMODEM uploads to VMS, which interrupts programs with the

Ctrl-X character. The call command resets this parameter to its default of 1. Higher values increase the startup time when the receiving ZMODEM program is started before the sender.

e If non zero, escape all control characters. This allows ZMODEM transfers to operate over data PBX and other systems that freak out when they receive control characters.

f Flow control mask, only used with Unix/Xenix systems. Setting this to 0 (the default) disables hardware (RTS/CTS) flow control for Xenix/Unix systems with broken hardware flow control. On Xenix/Unix systems where only CTS flow control works properly, set this to 8192 to allow CTS flow control only.

F Sets the pause after each data subpacket sent with the sz command when the F option is used, or when failing flow control is detected. The default value of 1 causes a one tenth second delay.

SEE ALSO: F option On some Unix operating systems the pause will be rounded up to the next second or two.

l Normally, the ZMODEM "packet length" is the file length. Setting this parameter non zero forces ZMODEM to close a frame and wait for an ACK after each # bytes (default 0). This makes ZMODEM behave like XMODEM, YMODEM, or JMODEM, which wait after each block/packet for an acknowledgement before going on to the next block. The frame length may be adjusted to prevent buffer overflow in data PBX systems. The call command resets this parameter to 0.

L (Default 0) If non zero, overrides the nominal length of data subpackets within each ZMODEM frame. A smaller value speeds error recovery on noisy lines, a large value (maximum 1024) reduces the overhead of CRC characters. The call command resets this parameter to 0.

Please note that ZMODEM has no equivalent to the XMODEM/YMODEM/JMODEM packet/block length. In the absence of errors, ZMODEM normally sends the entire file without pause. If somebody claims ZMODEM's 1024 byte subpacket length is slowing things down by more than one half per cent, he doesn't understand ZMODEM and should be ignored.

n Sets the number of NULLS (default 0) sent before each ZDATA frame. Some buffered modems (Fastcomm) have a firmware bug which loses characters when changing the direction of transmission. This causes data frames to fail with a CRC or other error. ZMODEM n parameter values in the range of 100 to 150 have obviated this syndrome.

P When set to 2 (the default), purge the transmit buffer and force a receiver response when a CR/LF sequence (indicating a PC-Pursuit DATA LOSS message) is detected. A value of 1 does not purge the

transmit buffer. A value of 0 disables special processing of CR/LF sequences received by the sending ZMODEM.

w If non 0, restrict the ZMODEM transmit window to the specified number of bytes. Setting this parameter to N requests acknowledgements from the receiver every N/4 characters. ZCOMM then waits for acknowledgements from the receiver whenever it has sent N more characters than it has received acknowledgements for. This parameter is useful with networks with defective flow control, and with networks that store an excessive number of characters in transit. The call command resets this parameter to 0.

W Adjusts the number of characters the ZMODEM receiver will silently ignore when searching for the beginning of a new frame. This may be set larger to accomodate networks with excessive in transit storage, smaller to speed error recovery from long error bursts on direct connections. The call command resets this parameter to the default (1400).

Z Number of minutes (default 0) to adjust the file modification date when using the Telink or Clink/SEAlink file transfer protocol to transfer a file between different time zones.

The timeout parameters below may be set lower for faster X/YMODEM error recovery when transferring files between two micros, higher to accomodate extremely sluggish systems. Only in pathological cases is it necessary to modify these parameters. The call command resets these parameter to their defaults.

p Timeout in tenths of seconds for gaps within a packet (default 50).

r If non zero, remove incomplete files received with a protocol except those received with the + option (default 0).

R When non 0, limits the number of bytes of file comparision used with the sz and rz -rr option. This parameter may be set to a value between 2048 and 32000 (1 billion on 32 bit systems).

SEE ALSO: -rr option

s Timeout interval in seconds waiting for XON characters or positive flow control (default 15). If an XON is not received within this time, transmission resumes anyway. A value of 0 disables this timeout.

t XMODEM, YMODEM, and ZMODEM Receiver timeout in tenths of seconds waiting for a packet or command acknowledgement (default 100).

T Transmitter timeout in tenths of seconds waiting for a packet

(default 600).

23. STRING PARAMETERS

Case is significant in parameter names.

ZCOMM provides two types of string parameters, permament and temporary. Permanent string parameters are always defined, and most perform specific defined functions. The permanent string parameters are described below. The names of the permament string parameters may be displayed with the command sequence pv1; set given at the command prompt. Without the pv1 only non empty string parameters are displayed.

Temporary string parameters* are created by the set, sets, accept, and grab commands when they do not reference a permament string parameter. Temporary string parameter names begin with any letter except y and may have up to 16 letters or digits.

The contents of temporary string parameters may be accessed and modified when ZCOMM is Restricted. New temporary string parameter names may not be created when ZCOMM is Restricted.

The set command without arguments displays the current values and maximum string length for each of the non-empty string parameters. To set a parameter empty, enter "" as the parameter string (e.g., set txlog ""). Certain string parameters may be entered with ZCOMM's character escapes.

When a string parameter is executed, it may be either sent to the remote as a string or executed as a command if its first character is @.

EXAMPLE: set f7 "logout\r" programs F7 to send a string to the remote.

EXAMPLE: set f7 "@echo logout" programs F7 to display logout on the screen.

In strings sent to the remote, a \336 (octal 336) character causes a pause in transmission[1] (controlled by the p numeric parameter), which may be used to send multiple commands with one string.

An optional underscore prepended to the name of a permament string parameter causes that string parameter to be cleared by the next call command.

---

1. Not including the mput command

The following string parameters may not be accessed or modified by the set command or in string expansions when ZCOMM is Restricted:
backtab bbs break bs esc etx exrc f1...f12 fs1...fs12 fc1...fc12 fa1...fa12 fcdel* fcdown* fcend* fchome* fcins* fcleft* fcpgdn* fcpgup* fcright* fcup* fdel fdown fhome fins fleft fnp5* fpgdn fpgup fright fup intolink* l linkpass* m oncloserx onclosetx onexit outahost outalink* password quitcmd rub tab unrestrict xpassword*

The following may not be modified by the set command when ZCOMM is restricted:
answerback baudstr blankfill call1** call2 call3* callers* calllog* callpath** challenge dircx dirfx dirrx dirsx disks dport e emdir entstr eolstr helpfile home hprompt lib lpnono mcommand mconnect menu messages mprefix mprompt msuffix n1 n2 n3 phones picture plog private rcmdlog* remote rname* rxlog* telno tmp tname* twxfile txlog* welcome xhelpfile

The following parameters can never be modified by the set command: ano
args c d drive e h oname1...oname5 pwd s t w y y0...y127 yb yf

String Parameters for Remote Operation:
answerback baudstr bbs call1** call2 call3* callers callpath** challenge dircx dirfx dirrx dirsx disks emdir exrc helpfile home hprompt intolink* linkpass* menu messages oncloserx onclosetx outahost outalink* password private pwd rcmdlog* rmtcmd* rname* rmtcheck* tname* twxfile unrestrict welcome xhelpfile
String Parameters for Protocol File Transfer:
adlopts dirrx dirsx oncloserx onclosetx
String Parameters for Non Protocol File Transfer:
blankfill dircx dirfx eolstr
String Parameters for Interactive Operation:
backtab break bs entstr esc etx lpnono mprompt Soft Keys tab rub xpassword*
String Parameters for Scripts:
ano args c d e h ifs item lib oncloserx onclosetx onexit oname1...oname5 remote rxcnt s s0...s9 t tmp y y0...y127 yb yf
String Parameters for Making Calls:
l m mcommand mconnect mprefix msuffix telno
String Parameters for Log Keeping:

callers* calllog* plog rcmdlog* rxlog* txlog*
Other String Parameters:
helpfile home kermreset menu onexit picture phones quitcmd

adlopts Contains option(s) to be used for ZMODEM AutoDownloads.

EXAMPLE: set adlopts "r" Use the r option (crash recovery) for files automatically downloaded with ZMODEM.

ano After invoking one of the date related string parameters, the ano string contains the last two digits of the year.

answerback When term is in q (TWX) mode, an answerback is sent in response to an incoming ENQ. The format of Answerback is determined by the Western Union Telegraph Company. It typically consists of

\r\nNAME CITY\r\n\021

as entered by the set command using character escapes. (In the TWX protocol, the 021 (XON) at the end of the answerback turns on the tape reader.) The answerback string must begin with CR,LF.

args contains the complete calling sequence to the current script level.

EXAMPLE: call ge,upl accesses the genie telephone directory entry and stores ge.upl in args.

backtab Assigns a string or command to the BACKTAB (Shift TAB) key.

baudstr When ZCOMM gets a connect in host operation, ZCOMM executes baudstr.

EXAMPLE: set baudstr "@gosub .%lib/baud.t"

bbs May contain a shell escape command to activate a Bulletin Board program via a DOS Gateway. The bbs string parameter is always processed as a shell escape command, and should not include a leading "!". For security reasons, it should specify an absolute pathname.

EXAMPLE: set bbs "~bbsprog"

blankfill When transmitting a file with the term function with p, r, or w modes, ZCOMM sends the contents of blankfill (if set) to prevent the remote from receiving a blank (empty) line. (Some programs interpret a blank line as an exit from text entry.) ZCOMM Character Escapes must be used to represent control characters. If blankfill is empty, nothing is sent. The call command resets blankfill to empty.

break Stores a string or command to be executed by the Ctrl-Break key instead of the default 100 ms break.

EXAMPLE: Some Novation modems cannot pass a break signal:

set break "@break putw %B\336\ 1\r putw %U\336\ 0\r"

Causes the break key to send a break to get the modem's attention, then tells the modem to send the break itself, and finally restores

the modem's ersatz "transparent" mode.

SEE ALSO: break command

bs Stores an alternate string or command to be executed by the backspace key when in the term function.

c When the h or s string parameters is accessed, the hundredths of a second are stored in the c string parameter. The accuracy and precision of this quantity depend on the operating environment.

call1 ** Sets the string to be sent to the modem or command to be executed before each time ZCOMM scans for outgoing message control

scripts. Typically this would consist of a modem command disabling autoanswer, to allow outgoing calls. This string is not used if callpath is empty.

EXAMPLE: set call1 "ATMS0=0\r" (Hayes Modem)

call2 Sets the string to be sent to the modem or command to be executed each time ZCOMM begins to wait for a call in Host State. Typically this would command the modem to enable autoanswer for incoming calls.

EXAMPLE: set call2 "ATMS0=1\r" (Hayes Modem)

call3 * Sets the string to be sent to the modem or command to be executed each time ZCOMM begins waiting for incoming calls. Typically this would consist of a lput command to display an informational message on the local screen. Note that such a message will remain on the screen for long periods of time, possibly creating an afterimage on the CRT display.

EXAMPLE: set call3
@lput "\n\nAwaiting Incoming Call. Press F1 to exit.\n"

callers A pathname in which a log of successful host state logins is kept. If callers is null (the default), no log is kept.

calllog * The filename that contains the log of successful autodialed calls. If empty (the default), this function is disabled. A typical entry with 6.3 minutes connect time with a system called cis02 is shown.

C 2143:22 01-25-84 1200 c:226-0627 63 cis02

callpath ** Sets the ambiguous pathname that scans for scripts to transmit outgoing messages. If empty (the default), no scans are made.

EXAMPLE: set callpath "/tmp/outmsg.*"

NOTE: The "disks" string parameter must be set to include any drive specified in "callpath".

SEE ALSO: call1, call2 string parameters

challenge is executed when the caller connects and handshakes to determine transmission speed. This script runs without restriction, and should check for carrier after each reading of data.

EXAMPLE: set challenge "@gosub .%lib/challeng.t"

d Is set to the date when called, in the form "mmdd".

EXAMPLE: t cia%d.TXT If the date is December 7, ZCOMM enters the term function with capture to KGB1207.txt

EXAMPLE: create -st+ cbbs%d.tmp

SEE ALSO: h, t string parameters

drive Is set to the current default disk drive letter when ZCOMM starts and when logging into a new disk drive with an A: command. mprompt, hprompt string parameters

dircx

dirfx

dirrx

dirsx String parameters for default/override directories. Their uses are described in Chapter 14.

disks Contains the disks that may be logged into with with the d: command where "d" is the drive letter, or that may appear as part of a pathname. If empty (the default), drive letters are not checked. This parameter should be set to prevent local or remote users from hanging the system by accessing an off-line disk drive. It is also used to prevent restricted remote users from accessing private data files. This string must be entered in lower case.

EXAMPLE: set disks "abc"

SEE ALSO: home string parameter

dport Contains the name of the active communications port, otherwise empty.

SEE ALSO: port command

emdir A directory pathname for incoming electronic mail files. emdir affects twxfile unless twxfile is an absolute path. emdir is also used for incoming electronic mail using the YMODEM Batch protocol in the absence of a login.

EXAMPLE: set emdir "/memo"

entstr If entstr is set, ZCOMM sends the contents of entstr when ENTER (carriage return key) is keyboarded in the term function, unless n mode is in effect. ZCOMM Character Escapes must be used to represent control characters. If entstr is empty, a carriage return is sent. The "call" command resets entstr to empty.

EXAMPLE: set entstr "\3"

sends an ETX (octal 3) when Enter is keyboarded. This is handy for some computer systems that expect keyboarded lines to be terminated with something other than the usual carriage return.
NOTE: The characters in entstr are always sent at full speed.

SEE ALSO: eolstr string parameter

eolstr When transmitting a file with the term function with p, r, or w modes, ZCOMM sends the contents of eolstr (if set) to terminate the line. ZCOMM Character Escapes must be used to represent control characters. If eolstr is empty, a carriage return is sent. The "call" command resets eolstr to empty.

EXAMPLE: set eolstr "\r."

sends a carriage return followed by a period at the end of each line read from the transmit file.
NOTE: The characters in eolstr are always sent at full speed.

SEE ALSO: entstr, blankfill string parameters

esc Stores an alternate string or command to be executed by the ESC key when in term function.

etx Stores an alternate string or command to be executed by ETX (Ctrl-C) when in the term function.

exrc Is sent to the modem/executed when an interactive Host Operation session logs out.

EXAMPLE: set exrc "@set disks c" resets the disks parameter in case privileged (unrestricted) callers modify this parameter.

h is set to the hour of the day in the form hhmm.

EXAMPLE: echo "It is now %h Hours"
displays: It is now 1930 Hours.

SEE ALSO: hh, mm, d, t string parameters

helpfile The pathname that contains the online help file. You may wish to set this in the phone directory "setup" entry. Iff helpfile begins with the character @, the rest of helpfile is treated as a Zcomm command.

SEE ALSO: xhelpfile string parameters, help command, T test condition

hh is set to the hour of the day in the form hh.

EXAMPLE: echo "It is now hour %h."
displays: It is now hour 09.

SEE ALSO: h, mm, d, t string parameters

home When ZCOMM is invoked, home is set to the current directory. When the "cd" command is given without an argument, the directory is changed to the contents of home. When ZCOMM is Restricted, absolute pathnames (those beginning with \ or /) must have home as a prefix. This restricts unprivileged users to the directory given in home and/or its subdirectories on any of the disks allowed by the disks string parameter. When changing the value of home, use slashes (/) and not backslases (\), and do not use a disk identifier.

SEE ALSO: disks string parameter

hprompt Overrides the default host operation command prompt.

SEE ALSO: mprompt, drive, pwd string parameters

ifs The "Internal Field Separator" string contains the default characters to be used by the split command to parse a string into fields.

item * When the expand command is executing a script, the item string parameter is set to the pathname of the matched file.

intolink * A command that is executed or a string sent to the modem when ZCOMM enters the link command.

EXAMPLE: set intolink "\r" sends CR to the linked computer.

EXAMPLE: set intolink "@portx 0f8,2" selects a nonstandard link port.

SEE ALSO: linkpass, outalink string parameters

kermreset A string (up to 32 characters) may be sent by Pro-YAM's Kermit when it attempts to recover from a transmission error. The default value for this string is empty. Two metacharacters are special: \336 inserts a one second pause, \335 sends a break.

l l (letter l) indicates selection of a long distance carrier for calls to other area codes. It is set to "1" as a default. l may be set to the access code of the particular alternate long distance service desired with a "set" command.

SEE ALSO: m string parameter

lib A string variable which may be used to indicate the directory containing scripts.

linkpass * If set, callers must enter this password when accessing the link command.

lpnono Do not send any of the characters in lpnono to the printer. lpnono may use ZCOMM Character Escapes to represent control characters.

EXAMPLE: set lpnono "\023" prevents the printer from receiving the DC3 (XOFF) character that places some printers off line.

EXAMPLE: set lpnono "\7" prevents the printing of bell characters.

SEE ALSO: l mode

m m is used to indicate selection of a long distance carrier for calls within the same area code. It is set to "1" as a default.

m may be set to the access code of the particular alternate long distance service desired with a "set" command. It is separate from the l string parameter because the default "1" prefix may not work if the area code is given, but some alternative long distance services require the area code to be specified for calls within the same area code.

SEE ALSO: l string parameter

mcommand A command that is executed instead of ZCOMM's built in dialing routine.

This may be either "gosub dial" which would access the "dial" entry in the phones file, or "source /dial" which would access the script from a separate file. The second method allows a separate "dial" file for each machine, but requires one more file to be kept track of.

Note that mcommand does not start with an @. The default value is empty, disabling this function.

EXAMPLE: set mcommand "gosub dial"

SEE ALSO: telno string parameter

mconnect A command that is executed or string that is sent to the modem when the modem makes a connection. A typical use is to set transparent mode for some Novation modems. The default value is empty, disabling this function.

menu The filename that contains the script accessed by the menu command.

EXAMPLE: set menu /host/menu.hst

messages Messages entered with the message command are appended to

this pathname. By convention, this file should be readable when ZCOMM is running in Restricted host mode.

EXAMPLE: set messages "/host/messages"

mprefix A command that is executed or a string that is sent to the modem as a prefix to dialing a number. The default ATD works with the Hayes Smartmodem(TM) 1200. ATDT instructs the modem to use DTMF (Touch Tone(TM)) dialing instead of pulse dialing. Character escapes may be used.

mm is set to the minute of the hour. It expands to the form mm.

EXAMPLE: echo "It is now %h minutes past the hour"
displays: It is now 30 minutes past the hour.

SEE ALSO: h, hh, d, t string parameters

mprompt Overrides the default main command prompt.

EXAMPLE: set mprompt "\r\E[1m%drive:\L%pwd <<<\E[m " Sets the host
operation command prompt to display the current disk drive (%c) and directory (%pwd) highlighted (\E[1m) and in lower case (\L).

N.B.: If you access Unix systems with ZCOMM, choose an mprompt string that is distinct from your Unix prompt.

SEE ALSO: hprompt, drive, pwd string parameters

msuffix A command that is executed or a string sent to the modem after the last digit in the phone number. Most intelligent modems require the default value of "\r".

n1 n2 n3 General purpose parameters.

oname1...oname5 contains the information stored by the args string parameter for each level.

oncloserx Optional user exit commands to execute after each file is received with a protocol filr transfer.* Its use is described in Chapter 11.

onclosetx Optional user exit commands to execute after each file is sent with a protocol filr transfer.* Its use is described in Chapter 11.

onexit Optional commands to execute as ZCOMM exits to the operating system.

EXAMPLE: set onexit "@echo GOODBYE CRUEL WORLD!!"

outahost A command that is executed or a string sent to the modem when
ZCOMM exits host operation with a F1 or ALT-N key.

EXAMPLE: set outahost ATZ\r sends the ATZ command to a Hayes modem
to restore its default no autoanswer state.

outalink * A command that is executed or a string sent to the modem when ZCOMM exits the link command.

EXAMPLE: set outalink "@kill; px0" clears the circular buffer and prevents restricted callers from accessing the link command.

SEE ALSO: intolink string parameter

password Changes the password callers must enter to gain access to your computer when ZCOMM is in host operation. If password is empty no password will be demanded.

EXAMPLE: set password "Change This Already"

SEE ALSO: challeng.t script, demand command

phones The filename that contains the telephone directory entries and associated commands used with the call and gosub commands. The default is "/PHODIR.t". The default may be changed at installation time by the putsnp program. The DOS environment variable PHONES will override the default when ZCOMM is started. Finally, a set command may be used to change the telephone directory once ZCOMM has started.

picture The filename used by the ALT-Z command to "zap" a copy of the display memory to the specified file.

plog The filename that contains the file transfer performance log. If empty (the default), this function is disabled.

private Pathname that messages are stored into by the private command.
This file should NOT be readable when ZCOMM is running in Restricted host mode.

EXAMPLE: set private "/private"

pwd This parameter is set to the current working directory by each cd and pwd command.

quitcmd Sets the string to be sent to the modem or command to be executed when a protocol file transfer has been completed if the ALT-Q key was typed during that transfer.

EXAMPLE: set quitcmd t\r\336\r\336\r\025off\r would send t<ENTER>, a pause, <ENTER>, a pause, <ENTER>, and ^Uoff<ENTER>. This sequence may be useful for automatically logging off Compuserve after downloading a file.

SEE ALSO: ALT-Q special key

rcmdlog * The filename that contains the log of commands issued remotely (in Host Operation) along with the time, transmission speed, and the name of the caller. If set to "prn", the commands are logged on the printer. A highly buffered printer, hard disk file or ramdisk file is recommended because this file will be opened and closed for each host command. If empty (the default), this function is disabled.

EXAMPLE: set rcmdlog D:rcmds

remote ZCOMM reads The full name of the remote system from the telephone directory entry when the call command is given.

EXAMPLE: call omen using the omen entry in the distributed PHODIR.t file assigns omen-tech to the remote string parameter.

In Host Operation, the caller's name is read into remote.

SEE ALSO: call command, xpassword string parameter, \PXXXX character escape

rmtcheck Sets the string to be sent to the modem or command to be executed each time ZCOMM accepts a command line or ZMODEM protocol
Command Download from the remote caller when in Host Operation, before that command is executed.

SEE ALSO: rmtcmd, pwd string parameters

EXAMPLE: set rmtcheck "@source D:remcheck.t"

rmtcmd Contains the command line entered by the caller or received by ZMODEM protocol Command Download in Host Operation. This may be
modified by an unrestricted script invoked via the rmtcheck string parameter.

SEE ALSO: rmtcheck string parameter, checkrmt.t script

rname * Contains the name of the last file received by a protocol, successful or not.

rub Assigns a string or command to the RUBOUT (Shift Backspace) key.

rxcnt A three digit number which counts the number of files that have been created for receiving. An incoming file with an illegal name is changed to rename.n with n is incremented from the value stored in rxcnt (or 0).

rxlog * The filename that contains the log of received files. If
empty (the default), this function is disabled.

s * Contains the current time in seconds since the last minute.

s0...s9 These may be tested with the if %sN and if i%sN,string commands, or expanded into a string using character escapes with the "%sN" construction, where N is 1...9. Use set param "" (empty string enclosed by double quote characters) to set a string parameter to empty.

Soft Keys The f1 to fa12 strings are executed by the respective keys from the term function, review function, or command prompt. In the term function, soft keys definitions for fins, fdel, fhome, fup, fdown, fpgup, fpgdn, fleft, fright, fend will override ZCOMM's built-in definitions for these keys. The built-in definitions take precedence in the review function, conference command, and at the command prompt.

Computers with the 101 key extended keyboard and ROM BIOS support allow ZCOMM to distinguish the cursor cluster keys and the two new function keys labelled F11 and F12. Extended keyboard cursor cluster keys may be reassigned with the fcdel, fcdown, fcend, fchome, fcins, fcleft, fcpgdn, fcpgup, fcright, and fcup string parameters. The fnp5 key may be assigned to the "5" key on the numeric pad.[2] ZCOMM's character escapes can be used to encode special characters, including spaces and/or tabs.

EXAMPLE: set bs "\177"; set rubout "\b" Swap backspace and rubout for VMS

The contents of these keys may be displayed by ALT-K or by the keys command.

If the assigned string begins with "@" (commercial at), the string is executed as a command. A soft key command called from the term function should not end with a t or f command because this would cause excessive recursion (calling the term function from within the term function). (Use the create or open instead.)

In the conference command, soft keys are inserted into the editing window unless they are commands, which are executed.

Soft keys are not executed from review or the command prompt unless they are commands (beginning with "@").

---

2. Visible on extended 101 key keyboards with extended BIOS support only

EXAMPLE: set f3 @rb Assigns the rb command to F3.

t expands to the current time and date each time it is used.

SEE ALSO: d, h string parameters

tab Assigns a string or command to the TAB key.

telno The current telephone number string.

SEE ALSO: mcommand string parameter

tmp A string variable which may be used to indicate the directory used for data to be transmitted or received.

tname * Contains the name of the last file sent with a protocol, successful or not.

twxfile Pathname for storing all incoming TWX messages. Please refer to Chapter 99 on Host Operation for more information.

txlog * The filename that contains the log of transmitted files. If empty (the default), this function is disabled.

unrestrict Changes the password callers must match to allow remote functions that are normally restricted such as erasing files, listing and changing parameters, and changing to private directories. If unrestrict is empty (the default), the unrestrict command will fail.

SEE ALSO: unrestrict command

w Contains the day of the week (local time) as Mon, Tue, Wed, Thu, Fri, Sat, or Sun.

welcome is executed after the password (if any) has been demanded and accepted.

EXAMPLE: set welcome "@type welcome.txt; purgek; nulls 0"

xhelpfile The pathname that contains the online help file for host mode commands. This should be readable when ZCOMM is in Restricted Host Operation. Iff xhelpfile begins with the character @, the rest of xhelpfile is treated as a Zcomm command.

SEE ALSO: helpfile string parameters, help command

xpassword * xpassword is a master password string that may be used to generate a unique password for each system called. xpassword is encrypted by the name of the remote system (string parameter remote) to generate a password unique to each remote system called. The generated password is transmitted as a result of a Soft Key programmed with the \PXXXX construction described in Chapter 23. To view the generated password, set the remote string parameter to the full remote system name as it appears in the appropriate telephone directory (up to but not including any "-" character), then keyboard lput \PXXXX from the main command prompt.

EXAMPLE: set f8 "\PXXXX" Programs F8 to transmit a 5 character password from the term function.
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y0...y127 Read only string parameters y0 to y127 expand to represent lines displayed by the term function. y0 corresponds to the current partially finished line as displayed by the term function. The last line referenced by y0...y127 becomes the y string parameter current line used by the y, yb, and yf string paramrters. Each time the term function displays a newline from the remote, the y parameter is set to the new, unfinished line from the remote.

y expands to represent the y parameter current line.

yb Referencing the yb read only string parameter backs up the y string parameter current line one line, and then represents that line.

yf Referencing the yb read only string parameter advances the y string parameter current line one line, and then represents that line.

SEE ALSO: H, h test conditions

24. CHARACTER ESCAPES

Some commands use strings with character escapes similar to those used by the C programming language for describing string constants. When translating a string for character escapes, ZCOMM substitutes strings (%svar) and then translates the result for backslash (\) encoded character escapes.

String-Parameter	%svar
Environment-Param	%SVAR
% (per cent)	\045
password*	\PXXXXXXX
cleartext*	\C+clear-text+
ciphertext*	\M+ciphertext+
newline (LF)	\n
return (CR)	\r
tab (HT)	\t
alarm (BEL)	\a
backspace (BS)	\b
form feed (FF)	\f
escape (ESC)	\E
transparent	\T
lowercase	\L
uppercase	\U
octal byte	\nnn
decimal byte	\dnnn
hex byte	\xHH
control char	\^C
concatenation	\&
backslash	\\

To preserve compatibility with future TurboDial enhancements, a backslash should not be followed by a character not listed above.

%svar is replaced by the value of the corresponding string parameter. The string parameter name must be written exactly, in the correct case, with no extra letters or digits at the end. Any non alphanumeric character delimits the parameter name. The DOS environment is searched for parameters after exhausting the ZCOMM string parameters.[1]

\PXXXXXXX uses the xpassword and remote string parameters to generate a password unique to each remote system, replacing each X character with an upper case alphabetic character.* The xpassword parameter must have at least as many characters as the number of characters used in

1. DOS environment parameters are upper case only

the \PXXXXX construction.

SEE ALSO: xpassword, remote string parameters

\M+ciphertext+ uses a cipher and the contents of the mpassword string parameter to decrypt and transmit the cleartext equivalent to ciphertext. Ciphertext is delimited by the character immediately following "M".

\C+cleartext+ is treated as above, except for no decryption.

EXAMPLE: \C+foobar+ is translated to foobar by ZCOMM's character escape expansion.

A separate program pga encrypts instances of \C+cleartext+ into \M+ciphertext+ according to a user specified master password. Pga also decrypts \M sequences to either cleartext, or encrypts them with a new master password. Please refer to Chapter 99.

The \n, \r, \t, \b, \f, \E, \nnn, \xHH, \^C and \\ character escapes generate the associated character.

The \T character escape inhibits the processing of character eascpes (but not string substitutions) in the remainder of the string. It is useful when the raw string contains backslashes which must not be treated as character escapes.

The \L character escape forces the rest of the string to lower case, up to the next \ character. Likewise, \U forces upper case.

Octal byte escapes (\nnn) accept 1 to 3 octal digits terminated by the first non octal digit. Decimal byte escapes (\dnnn) accept 1 to 3 digits terminated by the first non digit. Hex byte escapes (\xHH) accept exactly 2 hex digits. Control characters may also be represented by \^C where C is the printing representation for Ctrl-C and ^ is the circumflex character.

The \& character escape generates nothing; it is useful to delimit the lexical end of a string parameter name in string concatenation applications.

24.1 Concatenating String Parameters

To concatenate the contents of a string parameter with other characters, one must escape the next character with a backslash if it is a letter or digit. The \& character escape expands to nothing.

EXAMPLE: Assume string parameter s1 contains "foo".

```
putw "%s1\&bar"
```

sends "foobar".
putw "%s1\142ar"
sends "foobar".
putw "%s1-skidoo"
sends "foo-skidoo".
putw "%s1bar"
is undefined.
putw "%s1\bar"
sends "foo<BS>ar"

Failure to observe this property causes the sets and put commands to give unexpected results.

An encrypted password* is generated from the prototype string \PXXXXXXXX where each X generates an upper case alphabetic character by encrypting the leading letters of the remote system name by xpassword.

Only the leading letters of the remote system name are used to allow a directory to have a number of alternate access methods for a given system, yet produce the same automatic password. For example, "source", "source-telenet", "source300" would all generate the same password, but "sourceb" would generate a different password. xpassword must have at least as many characters as X characters in the prototype string.

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An arbitrary byte is generated by backslash followed by one to three octal digits, backslash x followed by exactly two hex digits, or by backslash circumflex followed by three decimal digits. 7 bit transmission modes (7s, 7m, 7e, 7o) modify the parity bit of characters transmitted by the term function during the put[w] command.

24.2 Quoting Strings

Strings must be enclosed by double quotes (Shift ' on the IBM Personal Computer) to allow white space and/or semicolon to be included in the string. If a string containing white space were not quoted, it would be terminated by the first space or tab, and ZCOMM would consider the rest of the intended string as another (incorrect) command.

24.3 Layering of Escaped Characters

Sometimes a string will be processed two (or more) times by ZCOMM's character escapes.

```
set fs2 "@accept s1 Name:; find \n%s1 %phones"
```

This example causes ZCOMM to ask for a name when F12 (shift F2) is typed. The name is read into string parameter S1, which is then used as part of the argument for the find command. The find command searches the telephone directory for lines beginning with the string you just typed in. To match only lines starting with the given string, a linefeed (\n) is prepended to the argument of the find command. When the obey command executes, the backslash-space sequences translate to spaces, and the double backslash translates to a single backslash.

The space after "find" and after "%s1" must be escaped because the obey command accepts a single string argument. If these spaces were not escaped, the obey command would not "see" the rest of the line after "find".

The find command performs its own character escape translation, changing the \n to a linefeed character.

25. TEST CONDITIONS (if, on, while commands)

The following conditions may be tested with the if, on and while commands.

Where a string parameter is indicated, it is an error to specify a nonexistient string parameter.

When an immediate string argument is indicated, that argument is delimited only by white space. As a result, if "is1,hello&&L<5" command ... won't work as expected, but if is1,hello if "L<5" command ... will work.

Some of the test conditions described below may be used with ">", "==", "!=", or "<" for numeric comparisions. The right hand argument of a numeric comparision may be:

+ A decimal number.

EXAMPLE: if "L>5" abort

+ A string paremeter which contains a decimal number.

EXAMPLE: set maxloops "5"
if "L>maxloops" abort

+ The length of the string stored in a string parameter, denoted by a leading % character.

EXAMPLE: set s1 "Hello"
set s2 "foo"
if "%s1>%s2" echo "%s1 is longer than %s2"

These comparisions should be quoted in case a future version of ZCOMM implements output redirection in the same manner as COMMAND.COM or the Unix shell. On 16 bit machines, 16 bit numerical values are used in comparisions; numbers greater than 32767 should not be used.

Numeric conditions may also be tested against a bit mask using the & operator.

EXAMPLE: if s&64 echo "Caps Lock is ON"

0...25 The specified pattern (see pattern command) was matched in the last wait command.

%svar The specified string parameter svar (see the set command) is non empty. May be used with ">", "==", or "<" for numeric comparisions of the string length of svar.

EXAMPLE: if %s1 putw %s1

EXAMPLE: if %symbol>4 ss symbol "(.*)[A-z]"; sets symbol %z1
If the length of the string in string variable symbol exceeds 4, chop off the rightmost letter.

? The ? numeric parameter counts the number of files sent or received with a protocol, and the number of lines matched by the find command. The fFILE test condition (if true) assigns the file length to the ? parameter. On 16 bit computers, file lengths greater than 32767 are represented as 32767. With certain operating systems, the exit status of a subprogram accessed by a DOS Gateway is stored in the ? numeric parameter.

The ? numeric parameter may then be tested with the ? test condition. It can be used with ">", "==", or "<" for numeric comparisions.

EXAMPLE: p?0 find fizzbin *.txt; if ? echo "Found fizzbin"

SEE ALSO: ? numeric parameter

B True iff Ctrl-Break has been pressed since the last purgek command.

Csvar True iff string parameter svar contains any control characters less than 040 (hex 20) or rubout.

EXAMPLE: if Cs0 echo "Please Retype

E True iff the elapsed time in seconds is non 0. Used with ">", "==", or "<" for numeric comparisions.
NOTE: Elapsed time may be off by up to one second. On 16 bit machines, the maximum testable value for elapsed time is 32767 seconds.

EXAMPLE: if "E>300" off Disconnects the modem if the elapsed time is greater than 300 seconds.

SEE ALSO: restime command

F>N True iff more than N kilobytes (1 kilobyte = 1024 bytes) of free space remain on the default drive.

EXAMPLE: if "F>2000" usq hugefile.q

Hregular-expression Searches backward thru the circular buffer for the next line matching regular-expression. If the search is successful, the y string parameter points to the matched line.

The N test condition may be used to test the number of lines that were searched before finding a match.

EXAMPLE: To allow processing of information such as:
5 Review folder UFO (0 stories) (a typical news item in the Executive News Service), one must scan for lines with a certain pattern (in this case the character "(" immediately followed by 1...9 indicating 1 or more stories).

while "H\([1-9]" ss (rest of line)

The above searches backwards for the next line containing "(1" to "(9". Note that "(" is a magic character in regular-expressions, and must be escaped.

The h test condition is similar, but starts the search with the last displayed line.

SEE ALSO: ens.t and kcdisl.t scripts, regular-expressions, y, yb, y0...y127 string parameters, N test condition

Isvara,svarb Tests whether the contents of string variable svara are IDENTICAL to the contents of string variable svarb. Case is significant.

EXAMPLE: if Is0,s9 goto exactmatch

SEE ALSO: i test condition (compares a string parameter and an immediate string)

Jsvar,string Tests whether any of the characters in the immediate string string appear one or more times in string parameter svar.

EXAMPLE:
if "Js0,!@#$%^&()_" echo "No funny characters"; goto getname

L>N True iff this while command has made more then N loops.

EXAMPLE: while !1 put "\r" wait ife "L>5" off Disconnects the modem if the while command has sent more than five "\r"'s. The "L>N"

should be quoted in case a future version of ZCOMM implements output redirection in the same manner as command.com or the Unix shell.

N>N True iff the last h or H condition searched more than N lines before a match.

SEE ALSO: h and H test conditions

Q>N True iff the number of active queue entries is greater than N.

R>N After a zcommand "" command, evaluates true iff more than N kilobytes (1 kilobyte = 1024 bytes) of free space remain on the remote system's default disk drive.

EXAMPLE: zcommand ""; if "R>1000" sz -y hugefile

S>N True iff the transmission speed is greater N bits per second.

EXAMPLE: if S>2400 put "set verbose\r"

U True if ZCOMM was unrestricted when the first level of the current set of scripts was activated.

SEE ALSO: u test condition

asvar The numeric value of the specified string parameter svar is non zero. May be used with ">", "==", or "<" for numeric comparisions. The string variable may contain leading spaces or tabs, an optional + or - sign, and digits.

EXAMPLE: if "as1==30" goto seen30 Performs the goto if s1 contains "30".

bTIME True if the current time is Before TIME. TIME is written in the form [yy[mm[dd]]]hhmm. No further conditions may be given in the if statement after the b condition.

EXAMPLE: if b2300 return Returns from the script if the time is before 11 p.m.

EXAMPLE: if b8512250900 return Returns from the script if the date/time is before 9 a.m. Christmas day in 1985.

c Carrier detect is present on the modem port.

EXAMPLE: if !c goto lostit

NOTE: On Unix systems, a dis -d command must be given to "arm" the system to detect carrier loss.

SEE ALSO: d mode

d{?ADLMPSTXZacdflmrtu} True iff the corresponding configuration is true:

? True if an unrecoverable error or manual abort was detected on the last protocol file transfer.

A True if the term function's emulation Alternate Keypad Mode mode is on.

C>N Numeric, true if the display column is greater than N.

D The script is running on a demonstration program.

L True if ZCOMM is recording TurboLearn(TM) script information (learn command).

M True if term function Keyboard Mapping is on ("display mapkb").

P Packet state is active (X.PC driver).

R>N Numeric, true if the display row is greater than N.

EXAMPLE: set fa10
@pat 23cp \n "@lput \E[K if dR>23 lput \E[H\E[K"
When the Alt-F10 key is struck, a search pattern (23) is set. This searches for each linefeed from the remote and performs a local display clear to end of line on each new line. If the display row exceeds 23, jump to the top of the screen and clear the first line. This "trick" may be used to prevent scrolling on displays that smear badly.

S The script is running on a shareware program (e.g., ZCOMM).

T True if a higher level of the script has called the Term Function. When True, the script should return to the Term Function; the script should not invoke the Term Function.

X The X.PC commands are available.

EXAMPLE: if dX goto xpclogin

Z The ZMODEM commands are available.

EXAMPLE: if dZ sz -n logfile

a>N True iff ZCOMM was called from the operating system with more than N arguments (counting the program name).

c The color/graphics display is selected.

d ZCOMM is executing under DOS.

f The program is running in the foreground. On DOS, a script is considered to be running in the foreground when it is NOT called by the Callout Queue as described in Chapter 99. A program running in the background is unlikely to have an operator available for interaction.

Under Unix, a script is considered to be running in the background if it is detached from possible keyboard input, and ZCOMM will exit when it reaches the main command prompt.

SEE ALSO: fg, bg commands

l>N True iff the script level (nesting) is greatern than N.

m The monochrome display is selected.

r Data Set Ready (DSR) on the modem is active.

t ZCOMM is running under a Topview or DESQview virtual screen which may be smaller than the physical screen size

u ZCOMM is executing under Unix/Xenix.

e True iff an t, sz, or rz command terminated with an error, or if the term function has detected framing or overrun errors, since the last autodial.

e>N True iff the e parameter (number of errors) is greater than N.

EXAMPLE: if "e>5" off Disconnects the modem if more than 5 errors have been counted.

The "e>N" should be quoted in case a future version of ZCOMM implements output redirection in the same manner as command.com or the Unix shell.

NOTE: The e parameter is not compared within the term function, so "detection" may be delayed.

SEE ALSO: e numeric parameter

fFILE (No space between f and FILE). Tests whether FILE exists as a normal readable file (not a directory or hidden file). FILE is expanded for string parameters. If the test is successful, the ? numeric parameter (testable with the ? test condition) is set to the file length. [1] The N test condition reflects the number of links to the file.

EXAMPLE: if fnit put "message\r"; f -xp nit; put "\r\336y" If nit exists, give a "message" command, upload the file, then send carriage return, pause, and the letter "y".

When used in a numeric context, the fFILE test represents the size of the file in full kilobytes (1024 bytes), or 1, whichever is greater.

EXAMPLE: if ffoo.bar>30 echo "File Longer than 30kb"

EXAMPLE: if fspy.kgb if !% echo "Zero Length File"

SEE ALSO: obey command

g Tests whether term function file transmission flow is go (not stopped by an XOFF character).

EXAMPLE: if !g echo "Remote has not sent XON"; pg1

SEE ALSO: g mode, term function XON and XOFF

hregular-expression Please refer to the Hregular-expression test condition.

isvar,string Tests whether the contents of string variable svar are identical to the immediate string string. Case is significant. No further conditions may be given in the if statement after the i condition. This test is useful in designing menu applications. The menu script menu.hst uses this test condition extensively.

EXAMPLE: accept s1 Choice:; if is1,a goto choicea Executes a goto choicea if the user keyboards an a in response to the "Choice:" prompt.

---

1. On 16 bit computers, file lengths greater than 32767 are represented as 32767.

SEE ALSO: I test condition (compares two string parameters)

jsvar,string Tests whether the immediate string string is a substring of (contained somewhere within) the contents of string variable svar. Lower case characters in string match characters in either case. Upper case characters in string match upper case characters. No further conditions may be given in the if statement after the j condition. This test is useful in designing menu applications, and for examining message lines read with the grab command.

EXAMPLE: grab s1; if js1,sig= goto endofsig Executes a goto if the line read by the grab command contained "sig=" or "This SIG=".

k One or more characters have been received from the keyboard and are in the interrupt queue awaiting processing. Note: Keyboard characters are transmitted to the remote by the term function, except during a put command.

l True if the line printer is ready to accept a character.

m One or more characters have been received from the modem and are in the interrupt queue awaiting processing.

n No pattern was matched as a result of the last wait command or search pending term function. n detects a search timeout, loss of carrier detect signal, or manual exit with F1 or ALT-X.

psvar,string Tests whether the immediate string string is a prefix of the contents of string variable svar. The match is case sensitive. No further conditions may be given in the if statement after the p condition. This test is useful for examining message lines read with the grab command.

EXAMPLE: grab s1; if ps1,sig= goto endofsig Executes a goto if the line read by the grab command contained "sig=", but not if it contained "This sig=" or "SIG=".

q>N True iff the number of free queue entries is greater than N.

r True iff a receive file is open for capture.

SEE ALSO: create, t commands

s>N True iff the keyboard shift state is greater than N.

EXAMPLE: if "s>63" echo "Caps Lock is Active"

t True iff a transmit file is open.

EXAMPLE: if !t echoc "%1 Short file! "; goto foobar

SEE ALSO: f, open commands

u True if ZCOMM is unrestricted.

SEE ALSO: U test condition

v True if the v (Verbose) numeric parameter is non zero.

EXAMPLE: if v s Displays the status on the console if the v numeric parameter (Verbose) is non zero.

y ZCOMM accepts a single character from the keyboard, which is printed followed by a newline. True if the character is "y" or "Y". False the H numeric is non zero, and a character is not typed within the time limit set by that parameter.

EXAMPLE: echo "Really quit?"; if y quit

Compound tests may be formed with the unary ! (not), binary || (or), and binary && (and) operators. The tests are evaluated strictly left to right. The unary ! operator applies to the following operand only.

EXAMPLE: if n&&!n||c echo "Carrier Detect Present" simply tests carrier because the result of the binary and operation above is always false.

EXAMPLE: if !c||1||2 o abort Disconnects the modem and aborts the script if carrier detect is off, or if either pattern 1 or pattern 2 were matched.

EXAMPLE: on e>45||!c goto allsignd Each time the term function returns, branch to the end of the script if carrier detect is lost or more than 45 line hits have been detected.

26. TERMINAL (CRT) EMULATION

ZCOMM emulates the H19, Z19, VT52, VT100, VT102, VT220, Wyse, and LSI-ADM3a terminals.

26.1 Wyse 60 Emulation

DOS flavors can emulate the Wyse 60 terminal given the command display wyse. Wyse (wy60) terminal emulation supports operation with applications on Unix/Xenix systems. The command display wyse enables Wyse screen emulation.

Wyse emulation can place YAM in "PC Terminal" mode with 25 display lines (status line invisible) and "scan code" operation. Since the SysRq key does not return a code to Zcomm, the sequence LeftShift Alt = sends the scancodes generated by the SysRq key. To exit from VP/ix, hold down on the LeftShift and Alt keys, tap =, tap m (for menu), and then tap q before releasing the Alt and Shift keys.

26.2 VT220 8 bit Controls

The command display 8bit casuses ZCOMM to emulate the VT220 in "level 2" operation. The DEC "GR" display characters are not currently supported.

Similarly, 8 bit Dasher terminal emulation is enabled by the display 8bit command.

26.3 Keyboard Mapping

When enabled by a display mapkb command, DOS flavors of ZCOMM reassign keys to simulate the function keys of the emulated terminal. Keyboard Mapping operartes only in the term function, where the mappings override the other meanings of the affected keys.

The following key assignments for a PC-AT style 84 key keyboard are made by the distribution setup entry.

VT100 Keyboard Mappings for PC-AT Keyboard

PC Key	VT100 keyCharacter	
F7	UP A	Cursor Keys
F8	DOWN B	
F9	LEFT D	
F10	RIGHT C	
F1	PF1 P	PF Keys

F2.....PF2.....Q
F3.....PF3.....R
F4.....PF4.....S
Pad 0.....Pad 0....p Number-Pad Keys

...
Pad 9.....Pad 9....y
Pad -.....Pad -....m
Pad *(PrtSC)....., comma..l (lowercase L)
Del (.).....(.) (period)n
Pad +.....ENTER....M

Many users prefer a different keyboard layout for terminal emulation. Laptop computers that do not use a standard keyboard layout may not map well in Alternate Keypad Mode, suggesting different mappings.

The mk command, K and N numeric parameters provide a flexible, if complex, keyboard mapping ability for various terminal emulations.

ZCOMM's term function maps the keyboard by scanning a table of mappings for a match to the key's modified scan code, shift state, and the state of the emulation machine. Iff the match is successful, special characters required by the emulation are sent to the application according to the class field, followed by the character(s) defined in the mapping.

If you have a 101 key keyboard and ROM BIOS support for it, set the K numeric parameter to 1 to activate the extra keys,[1] and set the N numeric parameter to 1 to keep the keyboard in its preferred NumLock state at all times.

With a regular keyboard, you must make more compromises in selecting your keyboard mapping, depending on which keys are important to your particular application. In particular, the "5" key on the numeric pad doesn't work unless NumLock is on. The four possible values of the N numeric parameter allow the keyboard to be placed in NumLock none of the time, all the time, when the emulation's Numeric Keypad mode is on, or when Alternate Keypad mode is on.

To devise your own mapping, you will need to know the modified scan code, shift state, and ZCOMM internal value for each key you wish to use. The modified scan code and internal value information are provided by the _ (underscore) command.

To clear the keyboard mappings, give the mk command without arguments.

For each term function keyboard mapping, the mk command takes four arguments.

---

1. This may cause problems with certain versions of IBM BIOS.

modified scan code This is normally the value returned by the ROM BIOS indicating the key's physical location on the keyboard. If the raw scancode equals 224 (extended keyboard only), the modified scancode consists of the scancode added to the ZCOMM internal code. It is shown by the second number printed by the _ (underscore) command.

shift state The arithmetic sum of the following conditions:

1 Right hand shift key

2 Left hand shift key

4 Ctrl Key

8 Alt key

16 Provided the Shift, Crrl, and Alt key states match, select this mapping regardless of whether the Application Keypad Mode or the Decoded Function Key conditions (below) are true.

32 Alternate Keypad Mode (not numeric)

64 Decoded Function Key (Character value greater than 0400 as displayed by the _ (underscore) command.

128 Select this mapping unconditionally.

class

0 Cursor Code (LRUD). In VT52 mode, ESC is prepended to the string. In VT100 Application mode, "ESC [" is prepended. In VT100 Cursor mode, "ESC O" is prepended.

1 PFK Key. In VT52 mode, ESC is prepended, otherwise "ESC O".

2 Numeric Keypad. Not mapped in Numeric Keypad mode. In Alternate Keypad mode, the string is prepended with with "ESC ?" for VT52, "ESC O" for VT100.

3 An ESC is prepended.

4 No characters are added to the string.

string A string of 1 to 7 characters taken from the third column above. Control characters must be represented with ZCOMM character escapes.

96 keyboard mapping entries are allowed.

EXAMPLE: We wish to map the Up key to send the VT100 cursor up code. First, we see _ (underscore) command dislays 72 72 0 510 for the Up key, indicating a scan code of 72, modified scan code of 72, 0 shift state, and a ZCOMM internal code of 0510 (Function Key). (Exit the _ command by typing Ctrl-Enter).

To make this key always active in "display mapkb" mode, assign it a shift state of 16. Since VT100 cursor keys have class 0, the command is: mk 72 16 0 A

EXAMPLE: mk 72 1 0 A maps "right shift keypad 8" to send the VT100 cursor up code (assumes right shift key).

The set command may also be used to define suitable key mappings.

SEE ALSO: dA and dM test conditions, std.mk and 101.mk key mapping script files.

26.4 Display Operation

When ZCOMM starts up, or regains control after a DOS Gateway, the video mode and number of columns and rows are interrogated with a BIOS interrupt call. If the columns are less than 80, or if the BIOS video mode is between 4 and 6, the video mode is changed to 3 (color, 80x25). If other BIOS video modes cause problems, give a DOS "mode co80" or "mode mono" command before starting ZCOMM. Display boards with more than 80 columns or more than 25 lines are supported by the # and $ numeric parameters (q.v.). If a monochrome or EGA board is detected during initialization, warpdrive is selected for best performance.

ZCOMM supports extended EGA displays with ANSI 132 column escape codes and the V numeric parameter. Special text video modes can be accessed with the videobios command.

If ZCOMM is started with a Topview or DESQview virtual screen, the video memory pointers are adjusted.

For special applications, the display may be completely inhibited with a "display inhibit" command. Updating of the display is reenabled by a display NOinhibit command or a fatal error disgnostic.

In addition, ZCOMM can emulate hard copy terminals by displaying identical overstruck characters in bold (high intensity) and by

underlining characters when the overstrike involves the ASCII underline character. This is enabled with a "display overstrike" command. (With the Color/Graphics board, underlining is represented by reverse video.) (A character position on the screen is overstruck if the character position being written already contains a character.)

If the applications used involve backspacing and overstriking for character editing, overstrike will produce random bold characters and may be shut off with a "display NOoverstrike" command. Alternatively, the term function subcommand ALT-O will toggle overstrike.

Normally, a received linefeed causes vertical movement only. If nlmode is set with a "display nlmode" command, a received linefeed also performs a carriage return. Nlmode is useful for Unix(TM) and similar systems. ZCOMM's Nlmode setting must agree with Unix's nlmode
setting for screen oriented programs such as Berkeley Editor to function properly.

Normally ZCOMM autowraps if there are too many characters on a line. This can be turned off with a "display noautowrap" command.

Normally a received bell character will jangle the speaker with a beep. The command "display bell=visual" silently displays BEL as a flashing musical note without spacing to the next character position.

The monochrome display adapter and some Color/Graphics boards allow DMA access to the video RAM without snow (sometimes called Chromablizzard). Warpdrive can be used with the Paradise Systems Multidisplay Card, The IBM Enhanced Graphics Adapter, and on the Compaq without daggers flying about the screen. Many of the aftermarket graphics display boards also work properly with warpdrive. Warpdrive doubles the raw display update speed.

When operating with some color/graphics display controllers (including the IBM CGA board), updating the display will cause snow to appear on the screen unless warpdrive is disabled.

26.5 Non Standard Displays

ZCOMM defaults to a 80 by 25 display, with the bottom line used for status information. Some displays support more than 25 lines and/or more than 80 characters per line. In other cases, ZCOMM might be run in a small window in multitasking environments such as TopView, DESQview, or Windows.

The $ and # numeric parameters may be set to accomodate these situations. A cls command should be given after changing the $ or # numeric parameter. When ZCOMM starts up, the $ numeric parameter (number of columns) is set according to the value returned by the BIOS. ANSI 132 column escape codes are not recognized in windowed operation. Chapter 21 describes these parameters.

27. LOGGING ENTRIES

ZCOMM can be set to keep various logs with the callers, calllog, rcmdlog, rxlog, and txlog string parameters. Entries in the log files include a code in the first column to indicate the conditions of the operation associated with the entry. They are encoded as follows:

* An open file was implicitly closed when another file was opened or as a result of a port or call command, or dialing a number.

C Successful completion of a Compuserve B protocol file transfer.

C Call terminated by loss of carrier detect, bye or off command, or dialing another phone number. Connect time is displayed in tenths of minutes.

c An open file was closed with a close or ALT-C command.

E Operation terminated by error.

F A transmit file was closed as a result of an end of file encountered as it was transmitted by the term function.

g A transmit file was closed as a result of an end of file encountered by the grab command, file received with the fget command.

K Successful Kermit file transfer.

L Log entry of a host state login, connect time in tenths of minutes.

m Message received with the message or private command.

n The file name shown is illegal for the local operationg system, and has been changed to "rename.###". The numeric value of ### is shown in the count field.

R Successful file received with XMODEM family protocol.

Q Questionable filtransfer sent with XMODEM family protocol. On receive: an EOT character was received but could not be verified; the file may be truncated. On Send: All data blocks were acknowledgd, but the EOT was not.

q Partially transmitted file skipped by request.

S Successful file sent with XMODEM or XMODEM BATCH protocol.

t File received with TWX convention (terminated by EOT, ETX, or ^Z).

U An incomplete received file was Unlinked (removed).

X Call terminated by off or x command or by software termination signal.

x A file was closed implicitly when ZCOMM exited to the operating system.

Z Successful file received with ZMODEM protocol.

z Successful file sent with ZMODEM protocol.

27.1 Performance Log

The plog string parameter enables file transfer performance logging. The default empty value disables this function. Performance log keeping does not affect the nolog command.

A sample entry is shown below. The fields are: speed, log code, "L" for loss of carrier detect (otherwise blank), file name, length, average transfer rate (characters per second), transfer time in seconds (file open to file close), number of seconds required to start the transfer, number of errors (retransmissions), flow control transistions, block length/subpacket length (at end of file), measured round trip delay time in hundredths of seconds, the command (or facsimilie thereof), the other program's serial number (-1 if not available), the directory entry or caller's name, and the hardware handshake option.

2400 Z FOO.ARC 153760 186 826 1 20 260 256 234 sz 1171 guess who off

The above example shows 1 second to start the transfer, 20 retransmissions, and 260 times that YAM had to wait for flow control release. This unusual set of figures is the result of a "networked" transfer through the "cu" program on a Unix system to a PC, not a normal connection or PC-Pursuit access.

The count of flow control transitions gives an indication of flow control restraint applied by the modem, network, or receiver. Since it counts the times YAM has entered a wait because of flow control restraint and not the total amount of time spent in that state, it is not an accurate quantitative measure.

The file transfer time and throughput calculation excludes the time required to start the transfer, since that time is often not under the protocol's control.

28. ERROR (and other) MESSAGES

In the following messages, a %s refers to a filename or some other name or string. %d or %ld refers to a decimal number. %x refers to hexadecimal number, usually a character received from the modem.

Error messages referring to the XMODEM protocol and/or XMODEM/CRC protocol also apply to the the YMODEM Batch protocol, which is an extension of the XMODEM protocol. Most of the XMODEM error messages are preceded by the sector and error number.

; not allowed with while The while command does not allow any semicolons to exist on the rest of the line.

Aborting with error from remote: The remote Kermit program has aborted the file transfer with the following message.

Access Password When ZCOMM is in host operation, callers must enter an access password to gain access to the system, unless the string parameter Password is empty.

Awaiting initial NAK When sending a file with the XMODEM protocol, ZCOMM is waiting for the receiver to start the transfer with an initial NAK character.

Awaiting pathname NAK When sending a file in the the YMODEM Batch protocol, ZCOMM is waiting for the receiver to request transmission of the file name, and length.

Bad CIS ESC request %x ZCOMM has detected an undefined Compuserve Protocol escape request. Usually due to a line hit or an aborted transfer.

Bad CIS request %x ZCOMM has detected an undefined Compuserve Protocol request. Usually due to a line hit or an aborted transfer.

Bad Command Please refer to Chapter 15 for legal commands.

Bad Condition Please refer to Chapter 24 for legal conditions which may be tested by the if or while commands.

Bad CRC=%x An error was detected on the last block received with the XMODEM or the YMODEM Batch protocol. ZCOMM will request retransmission of the block.

Bad Directory The directory given in a cd command does not exist or is unreadable.

Bad Disk A command of the form D: attempted to change the default disk
to one that is not in the string parameter disks.

Bad Mode Please refer to Chapter 18 for a list of legal Modes.

Bad Option Please refer to Chapter 17 for legal Options to the k, r and s commands.

Bad Parameter The p command was given with an unknown parameter letter. The parameters that can be set may be displayed with the p command given without any parameter.

Bad parity Setting The 7{eoms} mode must be be one of e o m s (even, odd, marking, spacing).

Bad SNP A valid and legal serial number-password must be entered with the putsnp program.

Call Terminated An attempt at connecting to a remote system has been abandoned.

Can't allocate buffer ZCOMM was unable to allocate memory for the circular buffer, forcing an immediate exit.

Can't find Directory entry for %s A call or gosub command for name failed because name was not found in the directory.

Can't open %s errno = %d The named file cannot be opened for reading or writing (depending on the application). The common reasons are listed below:

1 No such file or directory.

4 Bad file number.

5 Not enough core.

6 Permission denied.

7 File exists.

8 Cross-device link.

10 Too many open files. (If this error appears when the specified file is accessible, increase the number of available files with a "FILES=20" statement in CONFIG.SYS.)

11 No space left on device.

14 Resource deadlock would occur.

Can't send pathname %s The receiver did not accept the named pathname
in a batch transfer.

Cannot unsqueeze %s An error attempting to unsqueeze a SQueezed file.
A required key file is missing, or the decoding information stored in the beginning of the SQueezed file is corrupted.

No Carrier Detect The Carrier Detect signal from the modem (pin 8 of the RS232 connector) is OFF. This is often caused by a bad modem cable, or improper modem strapping options. Setting d mode prevents ZCOMM from issuing this message.

Changing pathname An illegal pathname has been received. ZCOMM is changing the pathname to one the local operating system will accept.

Checksum Bad rx=%x cx=%x The last block was received with a bad checksum. The received checksum and the calculated checksum are displayed. A retransmission request will be made.

Checksum error in %s A SQueezed file did not UnSQueeze with the expected checksum. Most likely a data error in the SQueezed file, or the Key file (if the file was encrypted). Another possibly is a software error in the program that SQueezed the file.

Closing %s Reception of data for the named file has finished and ZCOMM is closing out the file.

Command not allowed remotely Certain commands may only be given from
the local keyboard as they would sever communications with a remote user in host operation.

Connected to Console Keyboard This message is sent to a caller when the chat command is given in host operation.

*** DISK FULL *** If this message appears, your problems may have just started; DOS has been known to trash the disk file system when the disk is filled up. If the disk has been filled up as a result of receiving data with the term function, use the t, b, w review subcommands to store the unwritten data on disk. The browse command
may be used to free up disk space. The integrity of the disk file system should be checked with chkdsk/f as soon as possible.

Enter message up to 64 lines, type blank line when finished The message or private command allows the user (local, or remote when is host operation) to enter a message which will be appended to the Messages or Private file.

Error Checksum=%x Got %x An error was detected in a record received from Compuserve. ZCOMM will request retransmission.

Error Recovery ZCOMM has detected a protocol error and is waiting for

the line to settle before proceeding.

Exists. Replace/Append/Quit (r/a/q)?? The named file already exists

on the local system. You have three options: Replace the old file with the new data, Append the new data to the end of the old file, or Quit the transfer.

Exit chat with ^Z The remote should type Ctrl-Z to exit from chat back to the ZCOMM prompt.

Falling back to XMODEM/CRC An attempted XMODEM-CRC file receive has
failed because the sender has not responded to CRC Send requests, so Zcomm will now try checksum XMODEM.

FILES OPEN A transmit and/or receive file is open. Files should be closed before executing any commands that would modify data on disk and/or any directories.

Fetching pathname ZCOMM has requested the remote sender to transmit
the name and length of the next file in a the YMODEM Batch protocol transfer.

File is Not SQueezed The USQ command has detected a file which does not have the standard header for SQueezed files. The file is ignored.

found %d %s This informational message is generated when the term function matches a pattern and the v parameter is non zero.

Got %x for record ACK The Compuserve computer rejected the last record
sent.

Got %x for sector ACK In the XMODEM protocol, a transmitted sector elicited a response other than the expected ACK, or a NAK. Perhaps the receiving program has terminated and ZCOMM is trying to send the record to the remote's operating system command prompt.

Got %x for ACK to EOT The XMODEM protocol sends an EOT to terminate each file transfer. The proper response to the EOT is an ACK; anything else is an error. ZCOMM resends the EOT up to ten times if an ACK is not received.

Got %x sector header In the XMODEM protocol, A sector should start with 01 or 02. (02 signifies a 1024 byte block.) An EOT followed by extraneous characters appears as a sector header of 04 (EOT).

Got burst for sector ACK In the XMODEM protocol, sectors are acknowledged with a single ACK (006) character. ZCOMM detects an invalid ACK response by waiting two character times to make sure no noise burst accompanied the ACK. It's far better to retransmit a block which has been received correctly than it is to incorrectly proceed to the next block, causing a synchronization error.

Got record %x expecting %x A synchronization error has been detected in the Compuserve protocol. The file should be deleted as it will

have been truncated.

Got ZRPOS indicates the receiving program has detected a transmission error and has requested retransmission. In other words, ZMODEM is doing its job of detecting and correcting missing and garbled data. Please refer to Chapter 13 for more information.

Goto not in script context The goto command is valid only in a script.

Hit F1 to End When receiving data with the fget command, hit F1 to end data collection. Any regular character is passed to the remote.

Hit any Key to stop When sending a file with the fput command, ZCOMM samples the keyboard every so often to allow the operator to abort the transfer. The keyboard is not scanned continuously because the resulting overhead would impair the throughput available with the fput command.

Incorrect The password entered is not the correct password.

Insufficient DOS FILES=# Add a FILES=20 line to the active CONFIG.SYS file and reboot DOS to get a sufficient number of file handles to support the level of script nesting required for your application.

Internal Stack Failure The number and/or size of DOS 3.2 internal stacks should be increased, or a better operating system should be substituted.

%s Is Illegal Device Device is not one of the legal devices in the string parameter Disks.

Is Restricted Path When ZCOMM is Restricted, only the Home directory and its subdirectories may be accessed.

Key file read error An input error was detected while reading a key file used to decrypt SQueezed files.

Label %s not found A goto label command was given, but label could not be found in the same file as the goto command.

Loc 0 Corrupted An internal error (data stored into location 0 in the data segment) has been detected. If not caused by a hardware problem, please report to Omen.

Local Kermit Timed Out ZCOMM did not receive a Kermit packet from the remote within the timeout specified by the Kermit t parameter.

Modem SR=%x While receiving a file with the XMODEM protocol, a framing, break, overrun, or other such error was detected by the UART. The UART's Line Status Register is displayed in octal. The possible error conditions, 02=Overrun, 04=Parity Error, 08=Framing Error, and

10=Break, may occur singly or or'ed together. A typical value is 63, signifying data ready, overrun, break, and transmitter holding register empty.

Must set top with t command first When using the w subcommand from review, the top of the buffer segment to be written must be set with the t subcommand.

NAK on sector In the XMODEM protocol, the receiver detected a transmission error and has requested retransmission.

No ACK on EOT In the XMODEM protocol, and EOT is sent and acknowledged
after the data blocks have been sent. This message indicates that the EOT has not been acknowledged after 10 attempts.

No ACK on sector The XMODEM transmit protocol has retransmitted the sector 10 times without receiving an acknowledgement from the receiver. This is usually caused by a loss of connection, or by a software or hardware problem that does not allow all characters to pass without error. For example, if the modem cannot pass a character with the 8th bit set, the sector number cannot be sent. Kermit should be used under such conditions.

No Carrier Detect The Carrier Detect signal from the modem (pin 8 of the RS232 connector) is OFF. This is often caused by a bad modem cable, improper modem strapping options, bad port number selection, or a defective or incorrectly configured serial interface. Setting d mode prevents ZCOMM from issuing this message.

No such command The DOS Gateway handler was unable to load the proper
command and/or command.com.

Not allowed to overwrite %s When ZCOMM is restricted, existing files may not be overwritten.

Nothing to read A read command was given and no file is open for reading.

Null Pathname An attempt was made to reference a file with an empty file name. This error sometimes results from a software bug in Compuserve software attempting to download a file with a filename it can't handle correctly, so it just leaves the filename empty.

Obey Recursion = %d The main command parser has been called recursively with too many script levels and/or invocations of the obey command.

Other end no longer in Kermit Other side timed out. The Kermit on the other computer has terminated the file transfer.

Out of Memory ZCOMM has exhausted the memory available to it.

Output Flow Control Restraint RELEASED The network or modem did not release flow control within the time limit set by the S numeric parameter. This message is usually caused by a spurious XOFF character generated by line noise. It may also be caused by missing CTS (Clear To Send) signal on the data port.

OVERRUN: DATA May Be Lost Data has been received from the Remote faster than ZCOMM could process it. Some of it has been rerouted to the proverbial bit bucket.

Pause (grab) Sending of data has been stopped by execution of the grab command.

Pause (handshake)
Pause (XOFF) Sending of data has been suspended by flow control.

Pattern Flags Reset This message is a reminder that any "pattern found" flags are being reset. If this message appears after a phrase has been "found", but before the phrase is expected, or before the wait statement that should have "seen" the phrase, the script needs to be modified.

Port %d (%X) defective The indicated communications port (8250 integrated circuit) failed a simple diagnostic test. Errors in the option board switch or strap settings may prevent the port from being accessible at the expected address.

PRINTER SPOOLER BUSY The print spooler has been enabled with the l mode, and had not finished outputting from the circular buffer to the printer when you exited the term function. To print the rest of the data, return to the term function with F2. You may exit ZCOMM at this time, but the rest of the data you wanted to print will be lost.

Receive:'%s' FILE OPEN The named file has been opened for protocol transfer.

Received dup Sector The last sector was apparently received twice. In the XMODEM protocol, a retransmission is requested in case the sector number was garbled by an otherwise undetected error. The duplicate sector is accepted, discarded, and file transfer proceeds.

Receiving in Batch Mode Files will be received using the error correcting YMODEM Batch protocol.

%s removed A file received in error is removed to allow another attempt at uploading it correctly.

Restricted Command This command is not allowed when ZCOMM is Restricted to protect the system from inadvertent and/or willful tampering.

Resynchronizing When ZCOMM is sending a file to another copy of ZCOMM using CRC-16, recovery from sync errors is possible.

Scripts nested too deep Too many levels of call, gosub, and source commands are active.

Sector number garbled An error has been detected in the sector number of the last received packet. A retransmission will be requested.

If this error persists for all 9 retries, the transmission medium or the remote software may be messing with the 8th bit and/or characters with certain bit patterns. Modems and networks often "eat" control characters, especially XON and XOFF. Switching to ZMODEM or Kermit may solve the problem.

Sender CANcelled The Remote has aborted file transfers by sending a sequence of CAN characters.

Sending in Batch Mode One or more files are being sent in the YMODEM Batch Error correcting protocol.

Serial Input Error: Line Status Register HH indicates a slow device driver, TSR program, or other software is disabling interrupts too long for the program to accept incoming data, and some characters are lost. A slow response to folow control also triggers this message.

The value of the line status register is displayed in HEX. The following error conditions when present OR into the Line Status Register.

01 The Interrupt level circular buffer has been overrun. The remote did not respond to ZCOMM's XOFF or hardware flow control, and continued to send characters after being told not to. This problem is alleviated by correct modem flow control configuration.

02 An 02 value for the LSR indicates Data Overrun. "Data Overrun" means the computer was not able to respond to an incoming character from the UART (modem) in time to make room for the next incoming character. Data Overruns are caused by poorly designed software (or ROM BIOS "firmware") locking out interrupts for excessive periods. These lockouts prevent the communications program from responding to the incoming characters quickly enough.

To correct Data Overruns, correct the offending condition(s) to allow the communications program to operate properly.

Common causes of excessively long interrupt lockouts ("critical

code regions") are disk drivers (BIOS), window managers, disk caches, TSR programs, EGA/VGA board auto-select.

Some BIOS programs are written without regard to their effect on high speed communications. Sometimes better versions of the offending BIOS programs are made available if enough users complain about poor performance.

Interrupt latency caused by EGA/VGA board auto-select can be often corrected by disabling the board's Auto-Select.

Other chapters in this document give suggestions for working around excessive interrupt latency, primarily the handshake slow command and use of the NS16550AN UART chip. Please refer to the "Brain Damaged UARTS" subchapter.

Please try all the suggestions mentioned here before contacting Omen Technology about data overruns.

08 Framing Error generally caused by line noise or an incorrect transmission speed ("baud rate") or format (number of bits). Most protocols require 8 bits no parity (-8n) for proper operation. This is set automatically by Omen Technology programs, but other programs may not be so smart.

10 Break Interrupt generally caused by line noise or an incorrect transmission speed ("baud rate") or format (number of bits).

18 Framing Error and Break Interrupt (see above) in combination.

Setab: %d %s The displayed string of length %d has been queued to be sent to the remote as a result of a put, or putw command, or an answerback request. Setab is also used in sending entstr in response to typing ENTER.

*** STACK OVERFLOW *** Indicates ZCOMM has run out of memory for the program stack. Do not pass go, do not collect $200. Reboot the system with Ctrl-Alt-Del. If you are using a large number of string variables, or if you have a large DOS enviornment, decreasing the size of ZCOMM's circular buffer with a DOS "set CBSIZE=" command may help.

If this appears to be a ZCOMM software problem, please report it to Omen Technology Inc.

String too long The string would have been longer than the storage

space allocated for it.

Sync Error: got %d In the XMODEM protocol, a sector was received whose sector number does not match the expected sector number modulo 256, or the last sector number received modulo 256. This usually happens when a transmission error causes the sender to receive a false ACK.

Unless the o (OverThruster) or g option was used,[1] ZCOMM will request retransmission in case the invalid sector number was a result of a line hit. If the file is being sent with CRC-16 by another copy of ZCOMM, resynchronization will be attempted after ten retries.

Term Function Recursion = %d The term function has been forced to call itself recursively by f or t commands. Use open or create commands instead.

Timeout The Compuserve computer has not sent any data for a long time. When things get this slow, it is best to disconnect and ask Compurerve to credit you for wasted connect charges.

Timeout on sector ACK In XMODEM protocol, ZCOMM times out waiting for an acknowledgement to a transmitted sector.

Too Few arguments The command needs more operands than were given it.

Transaction ABORTED BY ERROR / successful The message indicates the ending status of the last file transfer or command download. If a file transfer ended in error, the last file may be truncated.

Transfer Aborted: %ld Characters Received The Compuserve protocol has aborted file transfer due to an error.

Transmit Data. When data has been sent, close it by typing ^Z When a remote caller has created a file with the t filename command, ZCOMM indicated readiness to receive data with this message. When the file has been transmitted to ZCOMM, a Ctrl-Z will close the file.

Unknown Machine Type ZCOMM looks at the ROM BIOS location F000:FFFE to determine whether it is running on a PC, XT, PC-jr, or PC-AT. If the byte fetched in not a standard IBM value, ZCOMM complains and assumes the machine is equivalent to a PC or XT with respect to clock speed and i/o overlap. SEE ALSO: o numeric parameter

Unterminated Quoted Token A string token was quoted with a leading " (doublequote) character, but no matching " (doublequote) could be

found on the same line.

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1. These options prevent error recovery.

Waiting for call %d ZCOMM is in host operation and is awaiting call N. If n is greater than 1, then n-1 calls have been received since ZCOMM was invoked.

Warning: Old dport=%x ier=%x out2=%x mask=%x isr=%08lX When selecting a port, ZCOMM has discovered that the port's interrupt enable bit was already set. Some programs use modem interrupts for their operation but then fail to reset the interrupt enables when they exit. When another program overlays the old program's interrupt service routine, an interrupt from the modem will transfer control to the overwritten memory locations, with unpredicatable results. If the interrupt was set up by a memory resident program or device driver, this message may be ignored. This information might be useful in the event of difficulties caused by such programs. This message may be suppressed by defining the DOS environment variable HOTPORT.

EXAMPLE: C>set HOTPORT=1

SEE ALSO: port, portx commands

Wrong number of arguments The set command accepts 0 arguments (display current values) or two arguments, the parameter name and the new value for it.

XON Timeout The Kermit protocol (with the x option set) has timed out waiting for an XON character.

ZMODEM Garbage count exceeded The reciever has detected a CRC or other error and signalled the sender, but the sender apparently has not received and responded to the retransmission request in a timely manner. Usually caused by transmission line noise corrupting the retransmission request as well as the file data, or by an excessive number of characters stored in the modems and networks.

29. HARDWARE/SOFTWARE COMPATABILITY

29.1 Hardware Compatibility Notes

IBM PS/2 Model 50Z Early samples of this machine have a design error on the motherboard that causes comms programs to lock up the machine. Replacing the motherboard with a correctly functioning unit from current production corrects the problem. The part number of the replacement PS2/50 Z motherboard is 35F5928. (Information provided by John M. Choma 73047,3566) In the U.S. IBM has stonewalled on this issue, but in December 1988 agreed to replace the defective motherboards under warranty.

NEC Multispeed The NEC Multispeed computer locks up unless STACKS is set in CONFIG.SYS. In addition, one should disable floppy disk power save mode, and set popup program memory allocation to 0. For best results, use the latest NEC software patches to the NEC MSDOS, and/or use an IBM PC-DOS instead of the DOS supplied by NEC.

EGA/VGA Multimode Boards Some multimode EGA and VGA boards include an "auto select" feature designed to configure the board to various display standards using software trickery. In the case of Paradise VGA and others, this feature causes excessive interrupt latency and loss of data at high speeds. Disabling the auto select on the display board corrects this problem.

EGA Wonder The BIOS in the ATI EGA Wonder has been observed to increase interrupt latency to the dismay of 9600 bps operation on an 8 mHz no wait state AT clone. There has also been a report (unexplained) that an EGA board has induced line noise in one instance.

Tecmar Graphics Master To use ZCOMM with this display board, give a mode mono command before running ZCOMM.

Leading Edge MODEMS and I/O BOARDS Some Leading Edge modems and interface boards use 8250 UART devices that do not respond correctly when the software turns the transmitter interrupts on and off. High performance communications programs such as ZCOMM require properly functioning UART chips, such as the National Semiconductor 16450 or 16550A.

29.2 Brain Damaged UARTS

Omen Technology has received reports of problems with buggy 8250 type

UART integrated circuits in Leading Edge modem boards, serial port interfaces, and computers. The defective chip logic affects high performance software. Replacing the buggy chip with a newer chip (16450 or NS16550AN) corrects the problem.

The UM82450 chip in the Zoom 2400HC also appears to cause problems.

The NS16550AN is a pin compatible plug in replacement for 8250 and 16450 serial chips. Omen Technology software enables the FIFO buffer in the NS16550AN to prevents loss of data from poorly written device drivers, TSR programs, etc.

The NS16550AN has better electrical characteristics than the older UART chips. 386 and fast 286 machines should use the NS16550AN for best results. Omen Technology software has been written to allow time for the older UART chips to operate. However, there is a limit to how much the software can rearrange chip accesses without resorting to performance robbing wait loops. Some other software is not as forgiving of slow chips.

Jameco Electronics at 415-592-8097 sells National NS16550AN chips mail order (credit card) in small quantities. Another source is Arrow Electronics at 800-932-7769 (516-467-1000). Be sure to ask for the NS16550AN. It's important to get the "AN" part, other versions won't do.

PC BRAND at 800-722-7263 (in Illinois 312-226-5200) is selling I/O cards in which both UARTs are socketed, allowing them to be replaced by NS16550AN devices. Shipping and handling is included in their $45 price. (From Roger E. Hough)

29.3 Software Compatibility

Some programs and device drivers affecting the operation of PC-DOS may interfere with ZCOMM, especially when ZCOMM is operating at high baud rates. Historically, loss and corruption of data have been caused by memory resident programs. Some of these programs increase interrupt latency preventing ZCOMM from reading a character from the UART holding register before the next character comes in on top of it. In other cases, programs do not properly restore the state of the machine when they exit from interrupts.

If such a problem is suspected, run ZCOMM without any memory resident programs or special drivers to locate the source of the problem. Once the offending program is identified, a call to the program's vendor may obtain a corrected version.

The design of memory resident programs is a little known black art. Subtle bugs, non reproducible interactions, and magic combinations are commonplace results of attempts to impose various aspects of multitasking on top of an operating system that was not properly designed to permit such extensions. Omen Technology Inc may be able

to help identify these interactions if provided with the source code of the offending programs.

Some of the known troublemakers are mentioned below.

TOPDOS TOPDOS, ver 2.00i by Frontrunner Development Corp., has caused ZCOMM and other programs to lock up. Disabling TOPDOS restores normal operation.

DOS 3.2 DOS 3.2 introduces the concept of a fixed number of interrupt stacks. The default value chosen is not always sufficient, and DOS 3.2 sometimes prints the infamous Internal Stack Failure message and cheerfully halts the computer. Adding the line STACKS=20,128 to the CONFIG.SYS file should correct the problem.

Extended Memory RAMDISKS Extended Memory electronic disks (ramdisks) require the 80286 chip to switch in and out of protected mode during block transfers. A hardware reset pulse is used to switch back to the "real mode" required for DOS. This causes loss of modem data at high speeds.

It may be possible to reduce excessive interrupt latency by reducing the length of protected mode block transfers to 128 or less. In one instance, replacing the ROM BIOS with a newer version increased the maximum transmission speed without losing characters to 9600 bps.

This problem has not been observed with expanded memory (Intel/Lotus/AST/etc.) ramdisks.

The new generation NS16550AN or 82510 serial interface circuits should be used instead of 8250's for best results at high speed. The NS16550AN allows extended memory operation at a communications speed of 115200 bps compared to 9600 bps for the 8250 and 16450.

Disk Drivers Disk drivers, especially hard disk drivers for 80286 machines, lock out interrupts for varying periods of time. The actual interrupt latency depends on the speed of the computer and the particular BIOS code used. In one case, upgrading to a newer BIOS allowed operation at 38400 bps, compared to 4800 bps previously. Such an improvement is well worth the small ($25 typical) cost of a new set of ROM BIOS chips.

DOS 3.x Each new version of PC-DOS adds new features and eats up more of the 8088's meager resources. DOS 3.2 increases interrupt latency enough to interfere with ZCOMM's operation at 19200 bps on an IBM PC. If this is a problem, switching to DOS 2.1 will reduce the interrupt latency. Replacing 8250 and 16450 serial interface chips with the new NS16550AN chip allows ZCOMM to operate smoothly at high speeds.

PKARC 3.6 It has been reported that PK36 grabs some interrupts and doesn't restore them on exit in an attempt to prevent hacks of the program. Since eliminating that newer version and cleaning up memory, high speed xfers even with 8250 UARTS work properly again.

The problem with PK 3.6 appears to be most severe if a BBS operator has doorware, etc that accesses the PK programs from a shell of some sort. This info may be helpful to users who are having otherwise inexplicable file xfer problems.

ProKey Some versions of ProKey disable interrupts for excessive periods of time, causing incoming modem characters to be lost.

FANSI-Console Versions of this program before 1.07 did not maintain the pointer to the active display board in the IBM documented memory location. A DOS mode command may cause ZCOMM to reference the wrong display adapter address. This caused incorrect sync signals and possible damage to certain monitors.

Current versions (2.X) increase interrupt latency enough that the serial line drops characters when the keyboard is touched.

Seaware Batch Versions of this program has been known to cause loss of data.

Spotlight/Lotus Metro This TSR program has been reported to cause ZCOMM to lock up.

Pathname Modifiers Programs such as FILEPATH and GLOBALS allow files to be visible in more than one directory at a time. Such programs may interfere with security when ZCOMM is restricted, since that security is based on restricting access to directories. In general, sensitive files should not be made global when ZCOMM is made accessible to outside callers.

ZCOMM may not recognize file names generated by such programs unless the program traps the DOS FINDFIRST calls as well as the file open calls.

We have received various reports of strange behavior which have been traced to filesystem modifications caused by such programs, including damaged file systems. We recommend such programs be phased out as soon as possible, as they may not operate at all with future versions of DOS or distributed file systems.

BRKBOX This program locks out interrupts up to 17 milliseconds while waiting for the vertical retrace. For a communications program, 17 milliseconds is a very long time, and data will be lost at speeds above 300 bps.

CGCLOCK Programs such as CGCLOCK.COM use clock interrupts to update a time display on the screen. Some increase interrupt latency so much that ZCOMM cannot respond in time to accept characters from the

remote, even at 1200 baud.

Concurrent PC-DOS ZCOMM runs under Version 4.1 of Digital Research Concurrent PC-DOS (CPCDOS). The - numeric parameter must be set to 0. The CPCDOS "addmem" command should be used to allocate extra memory if DOS Gateway are to be used.

ANSI.SYS ZCOMM uses direct keyboard input from the ROM BIOS because the DOS keyboard input calls do not handle Ctrl-BREAK properly. As a side effect, keyboard keys redefined by ANSI.SYS have no effect on ZCOMM's operation. It is possible to program some of the keys to call ZCOMM with arguments. The following file, reassigns ALT-C, ALT-H, and ALT-V to execute the commands shown below. The $ character represents ESCAPE.

```
$[0;46;"cd \tmp";13;"ZCOMM call -200 cbbs-r";13p
$[0;35;"ZCOMM call host";13p
$[0;47;"cd \tmp";13;"ZCOMM call cissig";13p
```

ZCOMM uses the ROM BIOS CRT functions and direct output to the display, bypassing any processing provided by ANSI.SYS. Perhaps someday Microsoft will enhance ANSI.SYS to make it useful for programs like ZCOMM ...

PRINT.COM Once the DOS PRINT program is memory resident, file downloads at high speeds (38kb on a PC) suffer from interference, even if a file is not currently being printed.

With certain printers, the DOS PRINT command will preempt the running program for several seconds at a time. These "swapouts" can be confusing when you are accessing an interactive application. They may interfere with file transfers, especially if the remote program uses "tight" timing. If this happens, PRINT should be suspended during file transfers. Operation of the PRINT command does not appear to cause loss of data downloaded from timesharing services at 1200 bps, as long as the interruptions last less than ten seconds. Perhaps IBM or Microsoft will someday fix this bug in the DOS PRINT command. PRINT should not be invoked from ZCOMM for the first time as DOS memory allocation will become fragmented.

If PRINT or some other spooler is outputting to a serial port using the BIOS INT 14h serial port driver, ZCOMM's "!~subprogram" command will redirect the printer output to the remote and thus should be avoided.

SWITCHAR = - ZCOMM will work properly when the switch character is set to "-", allowing Unix style pathnames. The - numeric parameter must be set non zero to allow ZCOMM DOS Gateway to use / to delimit directories.

It may be necessary to remove this line from CONFIG.SYS and reboot DOS before using the IBM dump and restore commands.
N.B.: DOS 3.0 does not support SWITCHAR in the config.sys file.

39. CROSS REFERENCE INDEX

Cross Reference starts here