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Chuck Forsberg

DSZ Manual Addendum
(Selected Pieces of the Pro-YAM Manual)

Formatted 5-30-91

For DSZ Users ONLY
For DSZ Users ONLY
For DSZ Users ONLY
For DSZ Users ONLY

With
Cybernetic Data Recovery(TM)
and
True YMODEM(TM)

Universal Line Printer Edition

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Omen Technology Incorporated

The High Reliability Software

17505-V Northwest Sauvie Island Road
Portland Oregon 97231
VOICE: 503-621-3406 :VOICE
Modem: 503-621-3746 Speed 1200,2400,9600
Compuserve:70007,2304 GENie:CAF
UUCP: ...!tektronix!reed!omen!caf

1. INTRODUCTION

The chapters included here are taken from the Pro-YAM manual. Some of the features described here do not apply to DSZ.

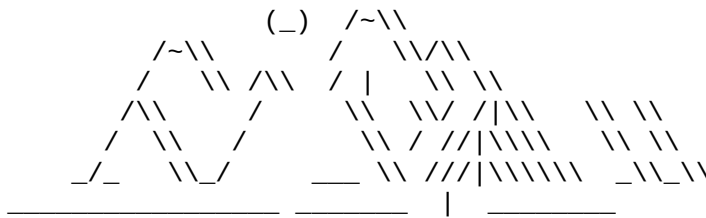
DSZ does not support ZMODEM Command Download, ZMODEM Security Check, Kermit and certain traditional protocols (WXMODEM, *LINK, MODEM7, etc.).

When DSZ is called from a bulletin board or other communications program, automatic ZMODEM file download is not available. ZMODEM AutoDownload is available from DSZ's t command (talk/term function).

EXAMPLE: dsz port 1 speed 2400 t -8g

Chapter numbers refer to chapters in the ZCOMM user's manual.

Welcome to the Rain Forest



-A Usenet Signature

2. PROTOCOL FILE TRANSFERS

With many different ways to transfer files with Professional-YAM, 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).

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

2.1 ZMODEM-90

ZMODEM was developed for the public domain under contract by Telenet, a major packet switched network. ZMODEM-90(TM) is a refinement of ZMODEM with increased performance, reliability and compatibility with a wider variety of environments.

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 can preserve the file date and the exact file contents, unlike traditional protocols that append garbage to files.

Streaming transmission provides full throughput over satellite links 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. ZMODEM-90 allows programs to adjust character encoding for best results with a variety of systems.

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. Other protocols advertising 16 or 32 bit CRC sometimes fail under stress because critical control messages are not CRC protected.

If you've ever been disconnected when a huge file transfer was almost finished, you'll appreciate resuming/recovering the file transfer with ZMODEM Crash Recovery (ZMODEM r option.) Omen Technology Incorporated's Intelligent Crash Recovery(TM) guards against file corruption during Crash Recovery operations.

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`

2.1.1 ZMODEM AutoDownload If Z mode has been enabled (the default), YAM'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 19 for examples and information.

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

2.1.2 Tuning ZMODEM Parameters Chapter 24.2 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.

Professional-YAM 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.

Information about YMODEM and ZMODEM protocol internals is provided in ymodem.doc and zmodem.doc, part of Omen Technology's ZMODEM Developer's Collection.

2.1.3 MobyTurbo Standard ZMODEM escapes network control characters. This causes a slight drop in throughput when sending compressed files. When transferring compressed files over circuits that pass all 256 8 bit codes, Moby Turbo(TM) may be used to optimize speed. MobyTurbo increases transfer speed without sacrificing ZMODEM flexibility or robustness.

MobyTurbo is activated with the m option. The m option may be used with the sz or rz command.

EXAMPLE: sz -m *.zip

MobyTurbo may be used with ZMODEM AutoDownloads by adding the m option to the adlopts string.

EXAMPLE: set adlopts m

2.1.4 Receiver Window Size Override ZMODEM-90(TM) allows the receiver to specify the window size, with the Wn option, overriding the sender's window size.

SEE ALSO: Wn option

2.1.5 Almost 8 bit Environments The e and m options may be used in conjunction with the xmtxesc and zmrxesc string parameters may to specify one or more control characters which cannot be passed over the serial line.

SEE ALSO: zmtxesc, zmrxesc string parameters for details

2.1.6 7 Bit Environments ZMODEM-90 automatically detects 7 bit environments and adjusts accordingly. If the environment is known to be 7 bits, use the E option to guarantee 7 bit compatibility in minimum time.

EXAMPLE: sz -E file.doc

When transferring files with a large number of bytes with the 8th bit set, the P ("pack") option may be used to optimize 7 bit encoding.

EXAMPLE: sz -P zipfile.zip

2.1.7 Manual ABORT If a ZMODEM transfer fails abruptly under exceptional conditions the program on the remote machine may be manually terminated by repeatedly typing Ctrl-X characters at it until the program exits.

2.2 XMODEM Family Protocols

2.2.1 TRUE YMODEM(TM) Developed in 1981, YMODEM is finding its way into many communications programs. With Omen Technology'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. Professional-YAM and the Unix(TM) rb and sb programs preserve the file modification date.[1]

2.2.2 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.[2]

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.

Some programs claim to support YMODEM but actually use XMODEM with 1024 byte blocks. These programs do not meet the YMODEM Minimum Requirements defined by the YMODEM protocol.

One can use Pro-YAM's XMODEM sx -k and rc commands with these traditional programs.

2.2.3 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 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

-
1. Controlled by the d and z numeric parameters
 2. YAM switches to 128 byte blocks at the end of a file when the length warrants.

level protocols.

EXAMPLE: rb -o

SEE ALSO: 0 numeric parameter

2.2.4 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 YAM'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[3] garbage characters.

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

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

2.2.5 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 YAM'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

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

3. Some programs (including YAM) limit this padding to 127 bytes.

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`

2.2.7 Relaxed XMODEM Professional-YAM'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 parameters are "relaxed" timings. They 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 10 second pause within a packet before starting error recovery.

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

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

2.2.8 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: 0 numeric parameter

2.2.9 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).

YAM 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.

2.2.10 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.

Use the XMODEM sx-k and rc commands to deal with these nonstandard programs.

In case of questions, please refer to ymodem.doc, part of yzmodem.zoo for for the official YMODEM protocol. (Available in Omen's ZMODEM Developer's Collection.)

2.2.11 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

2.3 Uploading Files to Unix Systems

Files may be uploaded to Unix systems conveniently and quickly with ZMODEM. Unix flavors of Professional-YAM support the full ZMODEM-90(TM) feature set including Intelligent Crash Recovery(TM) and selective transfers with the rz command, a hard link to the /usr/bin/yam program.

The undos program may be used to remove carriage returns files uploaded to Unix machines.

When accessed over a network, some systems require additional control characters to be escaped. The sz command e option may be used to escape all control characters.

SEE ALSO: e option

Individual control characters can be escaped with the zmtxesc string parameter.

SEE ALSO: zmtxesc string parameter

If the Unix system is operating with 7 bits, the sender's zmodem d parameter may have to be increased to allow the rz program time to change Unix to 8 bits for the transfer.

SEE ALSO: zmodem d numeric parameter

Pro-YAM may not be available on a particular system. The rz program supports a subset of Professional-YAM's ZMODEM features.[4]

On Unix systems with Professional-YAM installed, the rzzsz source files and man pages are installed in the /usr/src/command/rzzsz directory.

If rz is not installed on the Unix system, unpack the rzzsz.zoo file on your MSDOS system with: looz x rzzsz.zoo given from the DOS prompt. 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
```

If the target system does not have a compiler, it may be possible to compile minirb.c locally, strip the executable file for minimum size, uuencode the executable, and transfer the result to the target system. Once minirb is operational on the target system, a uuencoded copy of rz can be uploaded.[5] This requires the target system to have the

uuencode program, and a compiler that supports the target system.

2.4 Downloading Files from Unix Systems

To download files from Unix(TM) systems, use the Unix `sz` command to send the desired files to YAM. To Unix keyboard: `sz file ...`. Professional-YAM'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`. [6] 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 YAM's `read` and `create` commands to pass the data through YAM's capture buffer.

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

5. As written, `minirb` cannot transfer binary files.

6. `/usr/src/cmd/xsq.c` on Unix systems.

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.

As with rz, Unix Professional-YAM is linked to sz to support the full ZMODEM-90(TM) feature set. Otherwise the separate Unix sz program may be obtained as described in the previous subchapter.

2.5 VAX/VMS File Transfers

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

Automatic uploads to VMS may require setting the zmodem d (delay) numeric parameter to give time for the VMS rz program to properly initialize.

SEE ALSO: zmodem d numeric parameter

EXAMPLE: zmodem pd15

2.5.1 Version 4 rz/sz Omen provides VMS flavors of version 4 rz and sz precompiled in rzzsz.tlb, a VMS "text library". Version 4 rz supports most ZMODEM-90 features including Crash Recovery, compression, and MobyTurbo. Binary uploads write files with a default VMS 512 byte fixed length record format.

EXAMPLE: sz biglib.tlb

Sending to VMS with the i option selects the VMS Stream_LF record format. Stream_LF preserves the exact file length and data contents when read by C programs.

EXAMPLE: sz -i vmsemacs.exe

Sending to VMS with the I option causes the VMS receiver to use variable length binary records. VMS Kermit-32 and some other programs understand this record format.

Text files uploaded with the a option are written in variable length records with CR carriage control.

EXAMPLE: sz -a emacs*.c

Version 4 VMS sz supports standard VMS wild card and directory

recursion syntax.

EXAMPLE: `$ sz -qa [...]*.prn` sends all accessible .prn files on the system in ASCII mode. The VMS `sz q` option suppresses the initial tally of the number of files and their lengths. This tally can take some time when a large number of files and directories are involved. The `f` option may be added to send directory names as well.

If you use Kermit to upload the `rzszt.tlb` file to VMS, command the receiving Kermit program to `SET FILE FIXED`. Otherwise Kermit will garble the data.

2.6 GENie File Transfers

The General Electric Consumer Information Service service (GENie) uses ZMODEM-90(TM) for efficient downloads. GENie's ZMODEM server selects ZMODEM RLE Compression or MobyTurbo(TM) for optimum download speed on each file.

GENie uses a large network to provide callers with local access numbers. This requires technical tradeoffs to control data flow in the network. If you are using an MNP modem, download speeds can be improved by increasing GENie's ZMODEM window size.

EXAMPLE: `C> set dszopt=W16384`

The `sx file.exe` command is used for XMODEM-CRC uploads to GENie. When uploading with XMODEM-CRC, wait for GENie's "READY FOR INPUT, start your XMODEM upload." message, and then wait for the XMODEM-CRC `C` to appear before issuing the `sx` command. Issuing the `sx` command before the `C` appears may corrupt the uploaded file.

A number of GENie access scripts are provided in `scripts.zoo` with filenames starting with `ge`. The main GENie login script is provided

in phones2.t witin scripts.zoo.

```
          //-n-\\
=====\\  /...  /\\  /=====
//      ---\\_0_/---      \\
\\_\\                                /_\\
```

Enterprise... Surrender or we'll
send back your *&^\$% tribbles !!!
-A Usenet Signature

3. 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 the receiving Pro-YAM complains about Garbled Data Subpacket or Line Status Register 01 you should suspect a flow control problem.

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, you 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 protocols.

YAM, 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 Emacs editors, 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

-
1. The PC DOS 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

sent when the buffer has emptied. Otherwise, the network should neither generate nor eat XON or XOFF characters.

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.

ZMODEM-90(TM) allows the receiver to specify the window size with the -Wn option where n is the desired window size.

EXAMPLE: set adlopts W8192 requests an 8193 byte window size.

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	YES(2)

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

(2) Requires ZMODEM-90(TM) 7-bit support

4. SELECTED COMMANDS

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

estimate length speed Use the specified length and specified effective speed for the next receive file to be created. 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: "speed 19200; estimate 0 2400" Use an effective transmission speed of 2400 for transmission time estimates instead of the 19200 bps interface speed.

Handshake {off|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 off).

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. In addition, handshake slow drops the RTS output signal while writing to disk when receiving with XMODEM, YMODEM, 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 command releases flow control (allows data to flow if it had been stopped by handshaking).

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.

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.

Standard Ports (PCDOS):

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	2E8 IRQ5 (Alternate "COM3")
COM8	3E8 IRQ5 (Alternate "COM4")

COM9 Uses the port address and interrupt vector previously 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 YAM 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 YAM begins with COM1 unless overridden 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 Pro-YAM 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. The status line and s command will indicate COM9. 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.

rb [-options] Receives with options 1 or more files using YMODEM batch protocol. The rb command also receives files sent with SEALink protocol. Chapter 20 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 YAM's `sx -k`, `rx` and `rx -g` XMODEM commands with these mutants.

SEE ALSO: YMODEM protocol, Chapter 13.

`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. YAM signals the sending program that CRC-16 is to be used. After four errors while attempting to receive the first sector, YAM 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 Incorporated Recommends use of the 16 bit CRC to maintain data integrity at professional levels. Chapter 20 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 13.

`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 0 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: 0 numeric parameter

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 20 describes the available options. If Restricted, a file received in error will be unlinked (erased).

EXAMPLE: rx foo.com

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 13.

rz [-options] Receives with options 1 or more files using ZMODEM batch protocol. Chapter 20 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 Restricted 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 13.

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.

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.

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 13, SEALink protocol, Chapter 13.

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

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 13.

sz [-options] [PREFIX=p | ONAME=x] pathspec Send the files specified in pathspec using ZMODEM Protocol.[1] 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

1. The receiver may use the sz command to send files by uploading an sz command with the zcommand command.

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.

Each skipped file is counted as an error as indicated by the e test condition and e numeric parameter. If the q option is used, files skipped as a result of selective file transfers are not counted as errors.

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.

EXAMPLE: zcommand "sz -fn /bin /wp"
commands a remote YAM 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 13, Options, Chapter 20.

5. 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. With ZMODEM, 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. Specifying these options to the receiver overrides the ZMODEM sender's specification of these options.

- + 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 YAM 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.

NOTE: Append (+) is not the same as crash recovery (-r). Append is used to concatenate (add) new data to an existing file. The resulting file contains both old and new data.

NOTE: If an append (+) file transfer is interrupted and restarted, data may be duplicated.

SEE ALSO: r option

- 7 Strip data to 7 bits for file transfers with the Kermit protocol. Program executables and other 8 bit binary files cannot be sent this way. In the absence of the 7 option YAM transfers all 8 bits of each byte. If the communications line is set to 8 bits no parity, the 8th bit is transmitted, otherwise YAM 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. When sending to VAX/VMS RZ this selects CR carriage control variable length record format.

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 Normally, ZMODEM senders escape XON, XOFF, Ctrl-P, CR-@-CR, and Ctrl-X, and ZMODEM receivers ignore XON and XOFF. The e option escape all control characters when sending files with the ZMODEM protocol. In 7-bit environments, the e option also escapes RUBOUT (7F).[1] This option is useful when operating with brain damaged data PBX systems and other types of "front ends".

SEE ALSO: zmtxesc, zmrxesc string parameters

- E With ZMODEM-90, force 8th bit encoding even if the transmission medium appears to support 8 bits.[2]
- 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.

-
1. In 7-bit environments, ZMODEM always escapes FF.
 2. Not featured in DSZ.COM.

- 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,[3] the user must insure the receiver is not overrun. YAM 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.[4]

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.

- i With YMODEM or ZMODEM, instructs the receiver to write file(s) in stream oriented Image format. When sending to the VAX/VMS version of rz, the i option selects Stream_LF record format. Stream_LF preserves the exact contents of binary files read by VMS C programs. Stream_LF is useful for file servers and archives that service PCs, as well as C programs on VMS itself. (Without the i option, the VMS rz default is 512 byte fixed length record format.)

3. X.PC automatically enforces end to end flow control.

4. Provided no memory resident programs or special drivers hog CPU cycles.

- I With YMODEM or ZMODEM, instructs the receiver to write file(s) in variable length binary record Image format. When sending to the VAX/VMS version of rz, the i option selects Variable length (mrs=510) binary record format. Certain programs such as Kermit32 understand this binary record format better than Stream_LF.
- 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 YAM, 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.
- m (ZMODEM-90) Activate MobyTurbo(TM) for maximum throughput on compressed files sent over completely transparent connections. MobyTurbo can be used over links that support YMODEM-g. Moby Turbo can not be used with most forms of software flow control or over networks that reserve control characters.
- M Locks out Moby Turbo even if the other program has given the m option. This option is useful if the transmission path does not support complete transparency.
- 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 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.
- P (ZMODEM-90) When transferring files over 7 bit paths, pack 4 8-bit bytes into 5 7-bit bytes for transmission instead of quoting the 8th bit.[5] This increases transmission speed on compressed files.
- q (Quiet) suppresses block by block status line update during Kermit and X/YMODEM file transfers. Also prevents skipped files from incrementing the e numeric parameter and e test condition.
- 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. This option is not allowed if the receiver is Restricted.

EXAMPLE: sz -r hugefile.lst

SEE ALSO: zmodem c numeric parameter

For convenience, the r option can be specified on all files if desired, even those that have not been interrupted during a transfer. However, if you do make the r option the default with adlopts you could inadvertently overwrite valuable data with unrelated data from a random file with the same file name.

The "ZMODEM Crash Recovery at NNNN" message may not appear when performing Crash Recovery on very short files.

5. Not supported in DSZ.COM.

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 comparison 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 subdirectories (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 program 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.

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 YAM is in Host Operation.

When invoking Unix Pro-YAM as xyam, rz, sz, rb, sb, rx, or sx, creates a logging file with information useful for debugging purposes. More v's create more detailed debugging information.

SEE ALSO: v numeric parameter, LOGFILE environment variable

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 4096 bytes.

SEE ALSO: Flow Control Chapter 14, zmodem w numeric parameter

WN Request the sending program to use a window size of N bytes, overriding the sender's window size setting, 4096 bytes if N is missing.[6]

y Yes it is OK to replace a file already on disk when receiving 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 YAM 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 YAM 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.

6. The W option is supported when receiving files from ZMODEM-90(TM) program versions after Jan 21 1990.

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.

6. NUMERIC PARAMETERS

- 0 Controls OverThruster(TM) operation with the ro command (XMODEM, XMODEM-1k, and YMODEM) downloads. This parameter should be set as follows:

CompuServe XMODEM Negative numbers control the number of bytes added to the window on XMODEM downloads from the CompuServe Information Service. Larger numbers increase throughput, but cause improperly interfaced MNP modems on CIS nodes to drop characters under stress, disrupting the file transfer.

EXAMPLE: dsz p0-512 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. 30 to 60 gives 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. Performance improvement with high 0 parameter values is greater with sluggish networks.

EXAMPLE: dsz p060 ro file1.ext

EXAMPLE: dsz p01000 rb -o (EXEC-BBS, MNP 5, 9600 bps)

6.1 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 YAM.

EXAMPLE: z pl16384

Forces ZMODEM packet length of 16384 (default packet length is infinite).

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). !=2 .li 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.

Setting this parameter to -1 disables the quick file compare provided by the r option.

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. .li 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. If both RTS and CTS flow control work properly (rare!) you can use a value of -1 to enable both bits.

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" ("block 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 packet 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 streaming ZMODEM has no direct equivalent to

XMODEM/YMODEM/JMODEM block length unless the zmodem l parameter is set non zero. 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. Pro-YAM 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 100).
- 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). This parameter is given to the receiving program.

EXAMPLE: z pR30000

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).

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"I don't know what this thing does,
but it's pointing in your direction."
-Dr. Who, from A Usenet Signature

7. HARDWARE/SOFTWARE COMPATABILITY

7.1 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 YAM with this display board, give a mode mono command before running Pro-YAM.

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 Professional-YAM require properly functioning UART chips, such as the National Semiconductor 16450 or 16550A.

7.2 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. Zoom Telephonics advises that this problem is limited to their old model. The old model is inentifiable by an external volume control.

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.

Be sure to ask for the NS16550AN. It is VITAL to get the National Semiconductor "AFN" or "AN" chip. Other vendors' chips won't do. Current Western Digital WD16C550 chips do not function properly at low speeds. As of this writing, the National NS16550AN and NS16550FAN are the only plug compatible chips that are known to work.

The Hayes ESP board comes with two serial ports with NS16550A devices. The ESP definitions for COM3 and COM4 agree with the industry standard definitions used by Omen Technology.

The following information comes from a number of people:

"I have located a small dealer in New York who has the cards with or without the 16550. I believe the price is around \$50.00. The company is RJK Consulting and the number is 718-968-9167. The gentleman to speak to is a Mr. RJ Kulman. ... I got this information off the "Interlink" BBS system." Fm: Nick Braak [TRICON] 75156,1254

Fry's - 415-770-FRYS. This is a Silicon Valley electronic department store.

Jameco Electronics at 415-592-8097 sells National NS16550AN chips mail order (credit card) in small quantities. Unfortunately, we have received a number of reports that their serial i/o card is now supplied with the infamous WD16C550 soldered in, even when ordered with specific instructions to include 16550AN chips.

Microprocessors Unlimited, 24000 South Peoria, Beggs, OK. (918) 267-4961. The price for the chip is \$13.50 plus shipping costs. No minimum purchase is required.

Consolidated Computers 4 Shoppers Lane Suite 121 Turnersville, NJ
08012 (609)751-9595(voice) (609)751-3843(bbs) (609)751-3840(fax)

Arrow Electronics at 800-932-7769 (516-467-1000).

Willies Computer Software Company: 800/835-4832.

N.B.: Current Western Digital WD16C550 chips do not function properly at low speeds. This has been confirmed with samples received directly from Western Digital. WD is aware of this problem, but has not informed us of a corrected chip. For what it is worth, I located a source for the NS16550AFN from Hamilton Express (wholesale/mailorder electronics supply house in Orlando, FL). They have plenty in stock and they go for \$9.95/chip! Minimum \$20 order. The lady I spoke with was Monica and she was quite helpful. I ordered 7 and should get them in the morning.

BTW, they have an 800 number: 1-800-332-2367.

Mark.

```
-- Mark J. Bailey, N4XHX
_____/====X11====_ USMAIL: 511 Memorial Blvd., Murfreesboro,
TN 37129 |          JobSoft          | VOICE: +1 615 893 0098
| Design & Development Co.| UUCP:   ...!uunet!mjbtn!mjb,
...!raider!mjbtn!mjb | Murfreesboro, TN USA | DOMAIN:
mjb@mjbtn.JOBSOFT.COM      CIS: 76314,160 -----
<KA9Q-UNIX-USERS Mailing List-Subscribe: ka9q-unix-
requests@mjbtn.jobsoft.com> JDR Microdevices also sells them. They
charge $14.95 per chip, but the minimum order's only $10 with them.
Toll free order line:800-538-5000.
```

```
Andy Silverman ---- +-----
-----+-----+-----+ | Andy
Silverman      | Internet:  asilver@grad1.cis.upenn.edu | | "Grrr."
| CompuServe: 72261,531  Prodigy: JCSB27A | +-----
-----+-----+-----+ |
```

7.3 Software Compatibility

Some programs and device drivers affecting the operation of PC-DOS may interfere with YAM, especially when YAM 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 YAM 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 YAM 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 Incorporated 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. Lacking any useful documentation from Microsoft, you may wish to experiment with different values.

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 YAM'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 YAM to operate smoothly at high speeds.

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 YAM 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 Pro-YAM 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 YAM is restricted, since that security is based on restricting access to directories. In general, sensitive files should not be made global when YAM is made accessible to outside callers.

Pro-YAM 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 YAM cannot respond in time to accept characters from the remote, even at 1200 baud.

Concurrent PC-DOS YAM 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 YAM 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 YAM's operation. It is possible to program some of the keys to call YAM 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;"YAM call -200 cbbs-r";13p  
$[0;35;"YAM call host";13p  
$[0;47;"cd \tmp";13;"YAM call cissig";13p
```

YAM 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 YAM ...

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 YAM 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, YAM's "!~subprogram" command will redirect the printer output to the remote and thus should be avoided.

SWITCHAR = - YAM will work properly when the switch character is set to "-", allowing Unix style pathnames. The - numeric parameter must be set non zero to allow YAM 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. C'est la vie. A short program, DASH, will set switchar to -. It prevents many oaths.

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