NOTE TO USER

FOR

ZEUS 3.21

Document Number: 03-0263-02

Zilog, Inc.

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1.1. INTRODUCTION

ZEUS, the Zilog Enhanced UNIX* System, is a multi-tasking, multi-user, interactive operating system that runs on the System 8000. This release supports the Models 11/11 Plus, 20, 21/21 Plus, 30, 31/31 Plus, and the 22/32 series.

2.1. DOCUMENTATION

To support ZEUS 3.21, the following documents are needed:

    ZEUS Reference Manual (03-3255-02)
    ZEUS Utilities Manual (03-3250-02)
    ZEUS Languages/Programming Tools Manual (03-3249-02)
    ZEUS Administrator Manual (03-3246-06)
    Field Upgrade Procedure CPU Rework for ZEUS 3.2
        (03-0317-02). Optional, required only if not
        currently running ZEUS 3.21.

3.1. DESCRIPTION OF SOFTWARE RELEASE

This release contains enhancements and bug fixes for ZEUS 3.2. It is compatible with and replaces ZEUS 3.2.

4.1. CHANGES FROM PREVIOUS RELEASE

Because of requirements for international shipments, the DES two way encryption scheme found in previous releases is no longer included. The documentation changes are reflected in manual pages for "ed" and the library routine "crypt" supplied with this document. The "crypt" command has been removed.

The DES software is available to domestic customers upon request from Zilog. Customers planning international shipments must obtain the proper export documentation.

Scheduling

There are two changes that have been made in the area of scheduling:

◆   performance improvement
◆   scheduling fairness improvement

The performance improvement is in the area of swap scheduling. Occasionally the system must swap processes out to

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free memory for incoming processes. In previous releases,
the kernel swapped out the largest processes available for
swapping until it had enough contiguous free memory for the
incoming processes. The changed code now swaps out the pro-
cess that will result in the most contiguous free space,
rather than swapping the largest process first.

The fairness improvement is in the area of CPU scheduling.
In previous releases, all processes compete equally for CPU
time. If there are two users on the system, and one of them
has 9 processes running and the other has only 1 process (in
this hypothetical case there are no other processes in the
system), then the user with 9 processes will get 90 percent
of the CPU resources (on the average), while the other user
will get only 10 percent. The changed code causes CPU
scheduling to be done by process group, rather than by pro-
cess. In the example above, each user would receive 50 per-
cent of the available CPU resources. This keeps a user from
dominating the CPU by creating extra processes.

Polling Reads

The performance of reads to a "raw" tty device has changed
when both VTIME and VMIN have been set. In previous
releases, the VTIME value did not take effect until the
first character was read. In this release, VTIME goes into
effect immediately. For example, in the following code the
read returns after 1/60 of a second or after one character
is seen. Previously, the read returned only after one char-
acter.

```
    struct termio *arg;

    ioctl(fd, TCGETA, arg)
    arg->c_cc[VTIME] = 1;
    arg->c_cc[VMIN] = 1;
    ioctl(fd, TCSETA, arg);
    read(fd, buffer, nbytes);
```

Terminal Hardware

If using a Zilog vtz3/20 terminal, it will be necessary to
use the "z2" termcap entry in place of the "vz" entry. This
affects the /etc/ttytype file and references to terminal
type in the ZEUS Administrator Manual.

Kernel Parameters

The kernel supplied on the release tape has been built with
the following parameters changed from previous releases:

1. The number of system buffers has been increased from 40
    to 150.   This change was made to improve performance.
    The number of buffers may be altered by changing the
    NBUF[1-5] values. **Sysgen**(M) must be run to accomplish
    this change. See Section 5 of the System 8000 ZEUS
    Administrator Manual for a description of this pro-
    cedure.

2. Each process can now have up to 40 open files.   Previ-
    ous releases allowed only 20.

3. Each disk can be partitioned into a maximum of 16
    filesystems. This value has increased from 10.

4. The number of mounted filesystems has been increased to
    64. This value can be changed by doing a **sysgen**(M) and
    changing the value of NMOUNT.

Drivers

The Intelligent Terminal Handler (ITH) and Intelligent Line
Printer (ILP) drivers have been removed. Support for UNET
has also been removed. All of the routines for the ITH and
ILP will be available in a separate release.

Kernel Creation (sysgen)

The kernel supplied on the release tape is "generic" and
runs on any System 8000 model. All disk drivers and the 9-
track driver are included in the kernel in addition to the
line printer driver and cartridge tape driver.

The disk configuration information is no longer built into
the kernel. Instead, block 0 on each disk contains the lay-
out information for the disk. This means a kernel does not
need to be built every time the disk configuration changes.
A new utility, **wbz**(M) (write block zero), can be used to
read and/or modify the block 0 information. There is also a
stand-alone version on the **wbz** routine, the third file on
the ZEUS 3.21 release tape (see Appendix A for a breakdown
of release tape files). This utility is described in Sub-
section 3.6 of the ZEUS Administrator Manual. If block 0 is
modified on the disk where the root or swap resides, the
system will need to be re-booted so the block 0 changes can
take effect.

The kernel is larger due to the "generic" nature. If a
smaller kernel is desired, run **sysgen**(M) to eliminate the
drivers not needed. The values of NBUF[1-5] can be reduced,
but is not recommended due to possible performance impact.

The user interface to sysgen(M) has also been changed to
request only disk type information. The "-d" option for
default model configuration is still supported. Sysgen
should only be necessary when removing or adding a driver or
if any system tunable parameters in /usr/sys/h/sysparm.h
must be changed. These parameters now include the number of
Intelligent Communication Processor's (ICP's), the system
name, the node name, and the version name.

Secondary Bootstrapper

The new secondary bootstrapper ('boot', by default) is used
by all disk types. This differs from previous releases
which required a special boot for each disk type. It was
delivered in the root file system and moved to /usr
by makenewfs. Because of its generic nature, boot is now
delivered in the /usr filesystem. Versions 3.0 or above of
the System 8000 monitor expect to find stand/boot (for
stand-alone boot), so 'boot' is now linked to 'stand/boot'
to provide compatibility for all versions of the monitor.
Also, the bootstrapper now has the capability to determine
the disk type and root offset from the block 0 information.

Special Device Files (/dev)

The following changes were made to special device files:

1.   The raw zd device (/dev/rzd*) has a major device number
     of 32 instead of 0.

2.   The cartridge tape device files (/dev/*ct*) have new
     minor device numbers. See ct(4) in Section 4 of the
     System 8000 ZEUS Reference Manual for details.

3.   The minor device numbers for all disk special device
     files have changed. Since each disk can have up to 16
     filesystems, the minor device numbers 0-15 refer to
     drive 0, and filesystems on drive 1 have minor device
     numbers 16-31, etc. The following table shows the map-
     ping between drive number and minor device numbers for
     disks.

Drive	Minor Device Number
0	0 - 15
1	16 - 31
2	32 - 47
3	48 - 63

4.   The /dev directory on the release tape contains special
     device files for ALL disk types which are zd, md, and

smd. The System Administrator may choose to remove the
device files for disk types not on the system, or when
executed, **makenewfs** will prompt for removal of device
entries not used. For example, on a Model 31, the "md"
and "zd" device files are not required.   They can be
removed with:

        rm /dev/*zd* /dev/md* /dev/rmd*

System Error Messages

Certain console error messages display the major/minor dev-
ice number of the device having the error. For disk dev-
ices, the minor number is in decimal and the node name is in
hexadecimal.   The following table translates minor device
numbers into special file node names:

Node Name	Minor Device Number	Node Name	Minor Device Number
xxØ	Ø	xx16	22
xx1	1	xx17	23
xx2	2	xx18	24
xx3	3	xx19	25
xx4	4	xx1a	26
xx5	5	xx1b	27
xx6	6	xx1c	28
xx7	7	xx1d	29
xx8	8	xx1e	30
xx9	9	xx1f	31
xxa	10	xx2Ø	32
xxb	11	xx21	33
xxc	12	.	.
xxd	13	.	.
xxe	14	.	.
xxf	15	xx2f	47
xx1Ø	16	xx3Ø	48
xx11	17	xx31	49
xx12	18	.	.
xx13	19	.	.
xx14	20	.	.
xx15	21	xx3f	63

        xx represents the disk type (i.e., zd, md, and smd)

Languages and Assembler

The C pre-processor (/lib/cpp) and C peephole optimizers
(/lib/popt, /lib/spopt) can handle names up to 64 characters
in length. Prior releases truncated names to 8 characters.

The C compiler has a segmented front-end (/lib/cparse, /lib/scparse) which handles larger symbol tables. The compilers cc(1) and scc(1) may run slightly slower because of this segmentation.

PLZ/SYS has been removed from this release. If the ZEUS 2.2 or 3.2 release is presently installed and PLZ/SYS needs to be saved, save the following files and restore them after installing the 3.21 release.

        /usr/bin/plz
        /usr/bin/plzsys
        /usr/bin/plzcg
        /usr/bin/uimage
        /usr/lib/libp.a
        /usr/lib/plzcg2
        /usr/lib/plzcg3
        /usr/lib/plzcg.errs
        /usr/lib/plzcg2d
        /usr/lib/plzcg3d

The PLZ/ASM assembler has been moved into the packages area of the release tape. The file /bin/as may be installed in /z/bin if there is not enough space in the root. However, the other files /lib/as* must be placed in /lib. PLZ/ASM has been replaced by the System 8000 assembler (known as /bin/cas in this release).

Z8000 Assembler and Segmented Loader

The Z8000 assembler, cas(1), and the segmented loader, sld(1), have both been corrected to handle variable names of exactly 7+14*n (where n is greater than zero) characters in length. In previous releases, segmented programs with these variables could not be linked because erroneous symbol table entries were created. It is recommended that any segmented modules with exactly 21, 35, 49, etc. characters in variable names be recompiled and/or reassembled.

Non-Filtering Spooler Backends

The non-filtering backends to the spooler are /usr/lib/lp_nf (for line printers) and /usr/lib/text_nf (for text quality printers). These backends have been changed to allow ALL characters to be passed to the printing device. In previous releases, some processing (or filtering) of special characters (for example, tabs and backspaces) was performed.

Makenewfs

Changes due to the "write block zero" (**wbz**) feature affect
makenewfs(M).   This   script   now   invokes   **model**(M), which
determines the System 8000 model type. Following that, the
appropriate links for:

    /dev/usr   /dev/rusr
    /dev/swap
    /dev/root   /dev/rroot
    /dev/tmp   /dev/rtmp
    /dev/z   /dev/rz

are established. This procedure **MUST** be run when installing
this release; these links are required prior to bringing the
system to the multi-user state.   The appropriate **mkfs**(M)
arguments are also determined based on the model type. In
addition, a user who is only updating ZEUS may now option-
ally remake the /tmp and /z filesystems. See the Installa-
tion Instructions in paragraph 6.1.2 for information con-
cerning this procedure.

Nroff

This release includes the System V version of **nroff**(1) which
supports both the "-me" and "-mm" macro packages and
replaces former versions. In the previous release, two ver-
sions (Bell Version 7, and System III) of nroff were pro-
vided. This was because the System III version supported
the "-mm" macros and Version 7 **nroff** supported the "-me"
macros.

Killall

The System V version of **killall**(M) has been provided in
3.21.   This version is a C program instead of a shell
script, and has the advantage of speed when bringing the
system from multi-user to single-user mode.

Df

The System V **df**(1) is supplied in this release and is faster
than the version provided in the previous release. The
super-block fields, tinode and tfree, are now used by **df** to
determine the total inode and free block count.

Streaming 9-Track Support

Streaming 9-track support is provided in the optional
software packages area to enable faster disk back-ups. The
9-track driver has been modified for use with the System V

program, **volcopy**(M), for streaming "image" dumps. This utility can also be used with the cartridge tape for general purpose non-streaming disk-to-tape, tape-to-disk, disk-to-disk, and even tape-to-tape dumps. There is the possibility that a **volcopy** back-up can be slower than a **dump**(M) back-up. This is because **volcopy** archives the entire filesystem (no matter how empty or full), whereas **dump** archives only the files allocated.

Root back-ups should be done with **dump** since there is no stand-alone version of volcopy for recovery. The script /usr/pub/voldump is included in the release to exhibit the procedure for **volcopy** archiving. Two System V utilities, **ff**(M) (which provides listing capability of a filesystem) and **frec**(M) (which allows recovery of files from a **volcopy** back-up) are available with this release. For more information, see paragraph 4.3.2 in the ZEUS Administrator Manual.

Volcopy can produce multi-tape dumps. This is limited by the requirement that the dump of any archive that spans more than one tape **MUST** start at the beginning of the first tape. This format, assumed by **frec**, allows for multiple archives as long as the end of the first archive and all subsequent archives reside on the same tape. As with **dump**, perform **volcopy** dumps on unmounted filesystems.

Dial

A new addition to /lib/libc.a is the System V **dial**(3) routine. This routine is called by software dialing with Automatic Call Units (ACUs) using an RS232 interface. **Dial** has been enhanced with the capability to describe different types of ACUs in the data base files, /usr/acu/acucap and /usr/acu/acutype. This feature is analogous to the use of the file, /etc/termcap by terminal dependent software. A new library, /usr/lib/libacu.a, is used to access the ACU data base files in the manner similar to /usr/lib/libtermlib.a.

WBZ

A new routine, **wbz**(M), has been added. This utility is used to write the filesystem configuration information to block zero of the disk where the filesystem resides. The kernel reads this information when the first read of a disk occurs. This eliminates the need to **sysgen** every time the disk configuration is changed. There is a stand-alone version, file three on the ZEUS 3.21 release tape, that can be used on systems with non-standard configurations.

Crash

This is a new System Administration utility used to analyze
system crash dumps.   It is an interactive program which has
facilities for interpreting and formatting the various
structures in the system.

5.1. SYSTEM REQUIREMENTS

The system requirements for the 3.21 release are the CPU-A
or High Performance CPU (HPCPU) board in a segmented jumper
configuration. The models supported are Models 11 Plus, 21
Plus, 31 Plus, and 22/32, or Models 11, 20, 21, 30, and 31
with Field Upgrade Procedure CPU Rework for ZEUS 3.2
installed.

6.1. INSTALLATION

The following subsections list the materials and instruc-
tions for installation of the ZEUS 3.21 operating system.

6.1.1. Materials Checklist

Cartridge Tape, ZEUS Operating System & Utilities, Version
3.21, Zilog part number 14-0087-02

6.1.2. Installation Instructions

Zilog ships the System 8000 with the ZEUS 3.21 operating
system installed. To confirm, use the 'uname -r' command to
verify the ZEUS release version number is 3.21.   Refer to
Section 2 of the ZEUS Administrator Manual for the start-up
procedure.

To update an existing installation, use the following pro-
cedure to install the ZEUS 3.21 operating system.

CAUTION

    If the system has a non-standard disk layout, the
    System Administrator must execute stand-alone wbz
    to define the disk layout and then install ZEUS
    3.21.   Read the entire installation procedure
    before beginning.

    The System Administrator should do a full back-up
    of all filesystems before starting this procedure.

1.   Bring the system into single-user mode by entering:

         /bin/sync
         /bin/sync
         kill -1 1

      (optionally, **INIT 1** or **init 1** if a System III kernel is
      installed).

2.   When the single-user prompt (#1) appears on the console
      screen, mount the /usr filesystem with the command:

         /etc/mount /dev/usr /usr

3.   Since the root and /usr filesystems will be replaced,
      custom or site-specific files from these filesystems
      should now be saved. These files might include, but
      are not limited to:

         /etc/checklist
         /etc/cshprofile
         /etc/ddate
         /etc/group
         /etc/inittab   (3.2 only)
         /etc/motd
         /etc/passwd
         /etc/profile
         /etc/ttytype
         /usr/spool/mail
         /usr/lib/cronlog
         /usr/lib/crontab
         /etc/rc_csh   (3.2 only)
         /etc/mfs
         /usr/spool/queuer/config
         /.profile
         /.cshrc
         /.login
         /.logout
         /etc/rc
         /etc/termcap

If you wish to keep PLZ/SYS on your system, see the listing
of files to save in Subsection 4.1 of this document.

Put a scratch tape into cartridge tape drive 0, and back-up
the files with the command:

```
/bin/tar cv /etc/checklist /etc/cshprofile /etc/ddate \
            /etc/group /etc/inittab /etc/motd \
            /etc/passwd /etc/profile /etc/ttytype \
            /usr/spool/mail /usr/lib/cronlog
            /usr/lib/crontab /etc/rc_csh /etc/mfs \
            /usr/spool/queuer/config /.profile /.cshrc \
            /.login /.logout /etc/rc /etc/termcap
```

Any additional custom files that are to be saved should be
added to the above command.

4.   Flush the system buffers by issuing the commands:

          /bin/sync
          /bin/sync

5.   Press the RESET button on the front of the system.

6.   At this point, if the CPU board rework is required, the
      hardware modifications should now be made. This is not
      required if the software is being updated from ZEUS
      3.2. When the hardware modifications have been com-
      pleted, continue to step 7.

7.   Systems with standard disk configurations should skip
      this step and continue to step 8. Systems with non-
      standard disk layouts must execute stand-alone **wbz** to
      define the disk layout prior to installing the ZEUS
      3.21 operating system. This should be done now <u>before</u>
      continuing any further with this procedure. See Sub-
      section 3.6 of the ZEUS Administrator Manual.

      Remake the filesystems for root and /usr using stand-
      alone **mkfs**. Load ZEUS 3.21 onto the system from the
      release tape using stand-alone **restor**. The root and
      /usr sizes and offsets entered for stand-alone **mkfs** and
      stand-alone **restor** should be the same as those entered
      when stand-alone **wbz** was run. Refer to Subsection 3.2
      of the System 8000 ZEUS Administrator Manual for the
      instructions and perform steps 5 through 19 only.

At this point, stand-alone **restor** will prompt with:

>   Do you want to use the configuration information
>   in block Ø (y or n)?

Reply "y". Continue with steps 21 through 42. Step 4Ø displays a reminder to run stand-alone **wbz** to update block Ø. Ignore this message since this has already been done. Now skip to step 9 of this procedure.

8.   For systems with a standard configuration remake the filesystems for root and /usr using stand-alone **mkfs**. Load ZEUS 3.21 onto the system from the release tape using stand-alone **restor**. Refer to Subsection 3.2 of the ZEUS Administrator Manual for instructions and perform steps 5 through 19 only.

Stand-alone **restor** will now prompt with:

>   Do you want to use the configuration information
>   in block Ø (y or n)?

Reply "n". Continue with steps 21 through 39 and reply "y" to the question:

>   Do you want the configuration information written
>   to block Ø (y or n)?

Continue through step 42.

9.   The system will now be in single-user mode. In order to establish the links for /dev/usr, /dev/swap, /dev/root, /dev/tmp, /dev/z, /dev/rusr, /dev/rroot, /dev/rtmp, and /dev/rz, the script **makenewfs**(M) must be executed. Type the following commands:

>   **chmod 7ØØ /etc/makenewfs**
>   **/etc/makenewfs**

The **makenewfs** script will request the date, set up the device links, optionally remove unwanted disk nodes, and label the root and /usr filesystems. A query has been added to the script so that the /tmp and /z filesystems are optionally remade (with **mkfs**). The following warning message and question are displayed:

WARNING

**THIS PART OF THE PROGRAM WILL COMPLETELY REMAKE
THE /z AND /tmp FILE SYSTEMS.**

Do you want to proceed? (y or n)

The response to this question should be "n". A "y"
response would destroy any data contained in the /tmp
and /z filesystems.

10. The /usr filesystem should now be mounted and the cus-
tom files saved in step 3 of this procedure re-loaded
onto the system with the commands:

    /etc/mount /dev/usr /usr
    /bin/tar xv

11. If the default timezone on the system needs to be
changed, modify the "PST8PDT" string in /etc/rc_csh.
The TIMEZONE default and DSTFLAG (if Daylight Savings
Time applies) in /usr/sys/h/sysparm.h must also be
changed, and a new kernel must be generated. See Sec-
tion 5 of the ZEUS Administrator Manual for complete
instructions.

12. Any additional termcap entries for terminals not sup-
ported in the default termcap file on the release tape
should be added at this time. Also, if serial printers
need to be set up for the system, refer to the ZEUS
Administrator Manual for instructions.

13. If the system does not have any additional options,
installation of ZEUS 3.21 is now complete. The con-
tents of /tmp, /z, and any other filesystems on this or
any additional drives have not been affected and will
not need to be reloaded. Back-ups of the current root
and /usr filesystems should be made, and saved along
with the back-ups made prior to starting this pro-
cedure. The system can be brought into multi-user mode
with the command:

    INIT 2

14. If the system does have additional options, select them
from the list below. Follow the instructions specified
for that option before bringing the system into multi-
user mode. Some options are:

a.   Additional Disk Drives.

Since this installation procedure modifies only
the root and /usr filesystems, the contents of
/tmp, /z, and any filesystems on additional drives
are unaffected and do not need to be remade and/or
restored.

To set up any additional drives, follow the
instructions in paragraph 4.2.2 of the ZEUS
Administrator Manual, with the exception of step
9, and steps 12 through 16. Step 19 should not be
performed because it will remake the filesystem.
Steps 12 through 16 set up the lost+found direc-
tory in the filesystems specified. These filesys-
tems should already contain the lost+found direc-
tories, so these steps are not necessary.

b.   Additional Serial Ports.

To set up additional serial ports, follow the
instructions in paragraph 7.4.2 of the ZEUS
Administrator Manual. If /etc/inittab and
/etc/ttytype were saved as part of the user-
specific files in step 3 of this procedure above,
it is not necessary to perform steps 1 and 2 of
paragraph 7.4.2.

c.   Additional Cartridge Tape Drives.

Add nodes for additional cartridge tape drives
with the mktape command. See **mktape**(M) in the
ZEUS Reference Manual for the specific command.

d.   Additional Parallel Printers.

To set up nodes for any additional parallel
printers, see the instructions in Subsection 7.1
of the ZEUS Administrator Manual.

e.   9-Track Tape Drive.

To set up the nodes for a 9-track tape drive, see
mkmt(M) in the ZEUS Reference Manual.

6.1.2.1. Optional Software Packages

Several software packages have been taken out of the default
root and /usr dump areas and collected at the end of ZEUS
3.21 release tape. This release includes a script called
/etc/package which is used to extract these files (see
Appendix A for the tape format). These packages use disk
space in /usr and root filesystems. The list of packages
and their required disk allocation is as follows:

Acct   System usage accounting package. 53 blocks in root,
            331 in /usr.

Gopt   Global optimizer for the C compiler. 296 blocks in
            root.

Learn   Tutorials for new users. 1337 blocks in /usr.

Sccs   Source code control system. Similar to Zilog's ZSC.
            537 blocks in /usr.

Zmenu   Menu generator. 107 blocks in /usr.

Voldump   Filesystem archiving package. 151 blocks in root,
            20 in /usr.

PLZ/ASM   PLZ/ASM assembler. 390 blocks in root.

Games   Computer games. Section 6 of the ZEUS Reference
            Manual. 529 blocks in /usr.

Crash   Kernel crash analyzer. 97 blocks in root.

The following example shows how to extract a file using
/etc/package (the underlined text is the user's response):

Enter the tape drive number or <CR> for default drive Ø: 1

Using tape drive 1.

The following packages are available:
1.) acct
2.) gopt
3.) learn
4.) sccs
5.) zmenu
6.) voldump
7.) plzasm
8.) games
9.) crash
Enter the package number you wish to install (1-9):   2

Installing the gopt package.

The gopt package requires 296 free
blocks on the root filesystem.

There are 315 blocks left on the root filesystem.

Do you wish to proceed? (y/n): y

Positioning the tape, this takes a while.

Taring off the package.

NOTE

Invalid inputs are rejected and re-requested.
/etc/package will not allow a package to be
extracted if it calculates that there is not
enough space on the filesystem.

7.1. KNOWN BUGS AND LIMITATIONS

Known Bugs

1.   Attempting to read an 8ØØ bits per inch (bpi) tape on
     the 9-track magnetic tape drive will cause the reading
     process to hang. To remedy this situation, an inter-
     rupt must be caused by opening the door of the drive.

2.   The global optimizer (provided in the packages section
     of the tape as an option) is still in an experimental

stage. The -Ol and -Or options for cc(1), including
-O, work as defined.

3.   Attempts to recover special device files with **frec**(M)
      result in zero length files.

Space Limitations

Because of the number of utilities available with ZEUS 3.21,
a shortage of available disk space in the root and /usr
filesystems may be experienced. The following suggestions
should help alleviate such a shortage. The following per-
tains to the root filesystem:

1.   Since /zeus is linked to /zeus2_3.21 on the release
      tape, it is possible to inadvertently leave /zeus2_3.21
      in the root when installing a new kernel. All links to
      the old kernel must be removed.

2.   The kernel is now "generic"; all drivers are included.
      To make the kernel file smaller, run **sysgen**.

3.   If the Floating Point Processor (FPP) board set is not
      installed on the system, /fpp.u.code (the file contain-
      ing the microcode) can be removed or moved to a
      filesystem with more space. This will free up 48
      blocks of space.

If more space is desired on the /usr filesystem, the manual
pages in /usr/man may be moved to a different filesystem.
See **man**(1) in the ZEUS Reference Manual for more informa-
tion. This will free up 3184 blocks of space.

Other files that may be removed are:

      /etc/termcap.others   53 blocks   (if not used)
      /o.zeus   ~215 blocks   old kernels (if kept)

      /usr/dict/hlistb   97 blocks   british spelling
                                                  hash list
      /usr/lib/macros/mmt   195 blocks   troff macros

Additional Information

The default tty setting for ZEUS 3.21 is 8 bits per charac-
ter, no parity. This setting differs from other UNIX imple-
mentations.

8.1. ZEUS REFERENCE MANUAL ENTRIES

The following table includes a description of the changed
pages and instructions for incorporating the them into the
System 8000 ZEUS Reference Manual.

The attached pages are valid for subsequent releases of this
manual unless specifically amended by a Document Change
Notice or superseded by a publication reprint.

DATE	RELEASE	TYPE CHANGE	SHEETS AFFECTED
11/21/84	3.21	Replace Remove	CRYPT(3) CRYPT(1)
11/21/84	3.21	Replace	ED(1)

NAME

    crypt, encrypt - a one way hashing encryption algorithm

SYNOPSIS

    char *crypt (key, salt)
    char *key, *salt;

    void encrypt (block)
    char *block;

DESCRIPTION

    Crypt is the password encryption function. It is based on a
    one way hashing encryption algorithm with variations
    intended (among other things) to frustrate use of hardware
    implementations of a key search.

    Key is a user's typed password. Salt is a two-character
    string chosen from the set [a-zA-Z0-9./]; this string is
    used to perturb the hashing algorithm in one of 4096 dif-
    ferent ways, after which the password is used as the key to
    encrypt repeatedly a constant string. The returned value
    points to the encrypted password. The first two characters
    are the salt itself.

    There is a character array of length 64 containing only the
    characters with numerical value 0 and 1. When this string
    is divided into groups of 8, the low-order bit in each group
    is ignored; this gives a 56-bit key which is set into the
    machine by crypt.

    The encrypt entry provides (rather primitive) access to the
    actual hashing algorithm. The argument to the encrypt entry
    is a character array of length 64 containing only the char-
    acters with numerical value of 0 and 1. The argument array
    is modified in place to a similar array representing the
    bits of the argument after having been subjected to the
    hashing algorithm using the key set by crypt.

SEE ALSO

    getpass(3C), passwd(4).
    login(1), passwd(1)

NOTE

    The return value points to static data that are overwritten
    by each call.
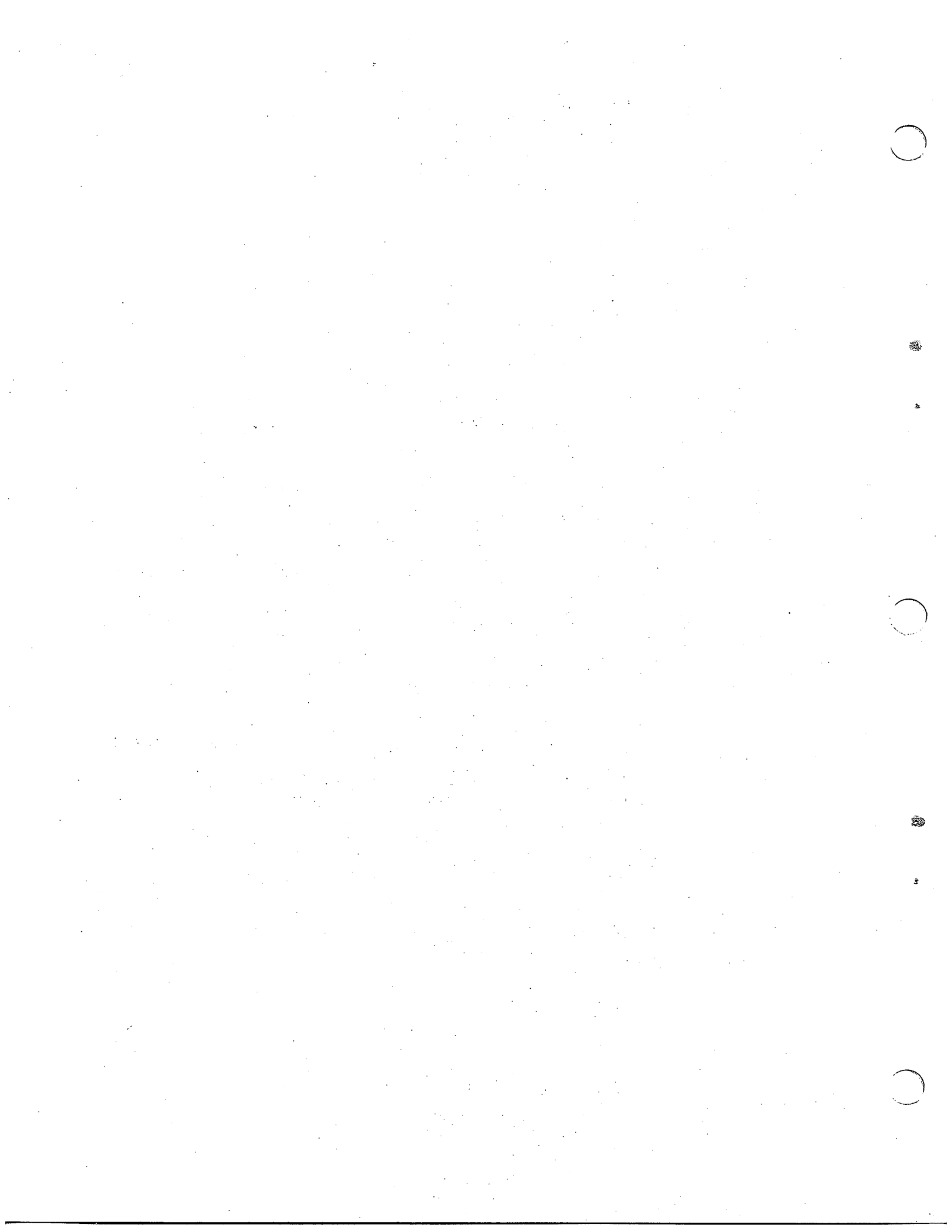
NAME
     ed - text editor

SYNOPSIS
     ed [-] [-p string] [file]

DESCRIPTION
     Ed is the standard text editor. If the file argument is
     given, ed simulates an e command (see below) on the named
     file; that is to say, the file is read into ed's buffer so
     that it can be edited. The optional - suppresses the print-
     ing of character counts by e, r, and w commands, of diagnos-
     tics from e and q commands, and of the ! prompt after a
     !shell command. The -p option allows the user to specify a
     prompt string.   Ed operates on a copy of the file it is
     editing; changes made to the copy have no effect on the file
     until a w (write) command is given. The copy of the text
     being edited resides in a temporary file called the buffer.
     There is only one buffer.

     Ed supports formatting capability. After including a format
     specification as the first line of file and invoking ed with
     your terminal in **stty -tabs** or **stty tab3** mode (see stty(1),
     the specified tab stops will automatically be used when
     scanning file. For example, if the first line of a file
     contained:
          <:t5,1Ø,15 s72:>
     tab stops would be set at columns 5, 1Ø, and 15, and a max-
     imum line length of 72 would be imposed. NOTE: while input-
     ting text, tab characters when typed are expanded to every
     eighth column as is the default.

     Commands to ed have a simple and regular structure: zero,
     one, or two addresses followed by a single-character com-
     mand, possibly followed by parameters to that command.
     These addresses specify one or more lines in the buffer.
     Every command that requires addresses has default addresses,
     so that the addresses can very often be omitted.

     In general, only one command may appear on a line.   Certain
     commands allow the input of text. This text is placed in
     the appropriate place in the buffer. While ed is accepting
     text, it is said to be in input mode. In this mode, no com-
     mands are recognized; all input is merely collected.   Input
     mode is left by typing a period (.) alone at the beginning
     of a line.

     Ed supports a limited form of regular expression notation;
     regular expressions are used in addresses to specify lines
     and in some commands (e.g., s) to specify portions of a line
     that are to be substituted.   A regular expression (RE)
     specifies a set of character strings. A member of this set

of strings is said to be matched by the RE. The REs allowed
by ed are constructed as follows:

The following one-character REs match a single character:

1.1   An ordinary character (not one of those discussed in
        1.2 below) is a one-character RE that matches itself.

1.2   A backslash (\) followed by any special character is
        a one-character RE that matches the special character
        itself. The special characters are:

        a.   ., *, [, and \ (period, asterisk, left square
                bracket, and backslash, respectively), which
                are always special, except when they appear
                within square brackets ([]; see 1.4 below).

        b.   (caret or circumflex), which is special at the
                beginning of an entire RE (see 3.1 and 3.2
                below), or when it immediately follows the left
                of a pair of square brackets ([]) (see 1.4
                below).

        c. $ (currency symbol), which is special at the
                end of an entire RE (see 3.2 below).

        d.   The character used to bound (i.e., delimit) an
                entire RE, which is special for that RE (for
                example, see how slash (/) is used in the g
                command, below.)

1.3   A period (.) is a one-character RE that matches any
        character except new-line.

1.4   A non-empty string of characters enclosed in square
        brackets ([]) is a one-character RE that matches any
        one character in that string. If, however, the first
        character of the string is a circumflex (), the one-
        character RE matches any character except new-line
        and the remaining characters in the string. The has
        this special meaning only if it occurs first in the
        string. The minus (-) may be used to indicate a
        range of consecutive ASCII characters; for example,
        [0-9] is equivalent to [0123456789]. The - loses
        this special meaning if it occurs first (after an
        initial , if any) or last in the string. The right
        square bracket (]) does not terminate such a string
        when it is the first character within it (after an
        initial , if any); e.g., []a-f] matches either a
        right square bracket (]) or one of the letters a
        through f inclusive. The four characters listed in
        1.2.a above stand for themselves within such a string

of characters.

The following rules may be used to construct REs from one-character REs:

2.1   A one-character RE is a RE that matches whatever the one-character RE matches.

2.2   A one-character RE followed by an asterisk (*) is a RE that matches zero or more occurrences of the one-character RE. If there is any choice, the longest leftmost string that permits a match is chosen.

2.3   A one-character RE followed by \{m\}, \{m,\}, or \{m,n\} is a RE that matches a range of occurrences of the one-character RE. The values of m and n must be non-negative integers less than 256; \{m\} matches exactly m occurrences; \{m,\} matches at least m occurrences; \{m,n\} matches any number of occurrences between m and n inclusive. Whenever a choice exists, the RE matches as many occurrences as possible.

2.4   The concatenation of REs is a RE that matches the concatenation of the strings matched by each component of the RE.

2.5   A RE enclosed between the character sequences \(and \) is a RE that matches whatever the unadorned RE matches.

2.6   The expression \n matches the same string of characters as was matched by an expression enclosed between \(and \) earlier in the same RE. Here n is a digit; the sub-expression specified is that beginning with the n-th occurrence of \(counting from the left. For example, the expression \(.*\)\1$ matches a line consisting of two repeated appearances of the same string.

Finally, an entire RE may be constrained to match only an initial segment or final segment of a line (or both).

3.1   A circumflex () at the beginning of an entire RE constrains that RE to match an initial segment of a line.

3.2   A currency symbol ($) at the end of an entire RE constrains that RE to match a final segment of a line.

The construction entire RE$ constrains the entire RE to match the entire line.

The null RE (e.g., //) is equivalent to the last RE encountered. See also the last paragraph before **FILES** below.

To understand addressing in ed it is necessary to know that at any time there is a current line. Generally speaking, the current line is the last line affected by a command; the exact effect on the current line is discussed under the description of each command. Addresses are constructed as follows:

1.   The character . addresses the current line.

2.   The character $ addresses the last line of the buffer.

3.   A decimal number n addresses the n-th line of the buffer.

4.   'x addresses the line marked with the mark name character x, which must be a lower-case letter. Lines are marked with the k command described below.

5.   A RE enclosed by slashes (/) addresses the first line found by searching forward from the line following the current line toward the end of the buffer and stopping at the first line containing a string matching the RE. If necessary, the search wraps around to the beginning of the buffer and continues up to and including the current line, so that the entire buffer is searched. See also the last paragraph before **FILES** below.

6.   A RE enclosed in question marks (?) addresses the first line found by searching backward from the line preceding the current line toward the beginning of the buffer and stopping at the first line containing a string matching the RE. If necessary, the search wraps around to the end of the buffer and continues up to and including the current line. See also the last paragraph before **FILES** below.

7.   An address followed by a plus sign (+) or a minus sign (-) followed by a decimal number specifies that address plus (respectively minus) the indicated number of lines. The plus sign may be omitted.

8.   If an address begins with + or -, the addition or subtraction is taken with respect to the current line; e.g, -5 is understood to mean .-5.

9.   If an address ends with + or -, then 1 is added to or subtracted from the address, respectively. As a

consequence of this rule and of rule 8 immediately
above, the address - refers to the line preceding the
current line. (To maintain compatibility with ear-
lier versions of the editor, the character in
addresses is entirely equivalent to -.) Moreover,
trailing + and - characters have a cumulative effect,
so -- refers to the current line less 2.

10.   For convenience, a comma (,) stands for the address
        pair 1,$, while a semicolon (;) stands for the pair
        .,$.

Commands may require zero, one, or two addresses. Commands
that require no addresses regard the presence of an address
as an error. Commands that accept one or two addresses
assume default addresses when an insufficient number of
addresses is given; if more addresses are given than such a
command requires, the last one(s) are used.

Typically, addresses are separated from each other by a
comma (,). They may also be separated by a semicolon (;).
In the latter case, the current line (.) is set to the first
address, and only then is the second address calculated.
This feature can be used to determine the starting line for
forward and backward searches (see rules 5. and 6. above).
The second address of any two-address sequence must
correspond to a line that follows, in the buffer, the line
corresponding to the first address.

In the following list of ed commands, the default addresses
are shown in parentheses. The parentheses are not part of
the address; they show that the given addresses are the
default.

It is generally illegal for more than one command to appear
on a line. However, any command (except e, f, r, or w) may
be suffixed by l, n, or p in which case the current line is
either listed, numbered or printed, respectively, as dis-
cussed below under the l, n, and p commands.

(.)a
<text>
  .

        The append command reads the given text and appends it
        after the addressed line; . is left at the last
        inserted line, or, if there were none, at the addressed
        line. Address 0 is legal for this command: it causes
        the ``appended'' text to be placed at the beginning of
        the buffer. The maximum number of characters that may
        be entered from a terminal is 256 per line (including
        the new-line character).

(.)c
<text>
.

> The change command deletes the addressed lines, then
> accepts input text that replaces these lines; . is left
> at the last line input, or, if there were none, at the
> first line that was not deleted.

(.,.)d
> The delete command deletes the addressed lines from the
> buffer.   The line after the last line deleted becomes
> the current line; if the lines deleted were originally
> at the end of the buffer, the new last line becomes the
> current line.

e file
> The edit command causes the entire contents of the
> buffer to be deleted, and then the named file to be
> read in; . is set to the last line of the buffer.   If
> no file name is given, the currently-remembered file
> name, if any, is used (see the f command).   The number
> of characters read is typed; file is remembered for
> possible use as a default file name in subsequent e, r,
> and w commands.   If file is replaced by !, the rest of
> the line is taken to be a shell (sh(1)) command whose
> output is to be read.   Such a shell command is not
> remembered as the current file name.   See also DIAGNOS-
> TICS below.

E file
> The Edit command is like e, except that the editor does
> not check to see if any changes have been made to the
> buffer since the last w command.

f file
> If file is given, the file-name command changes the
> currently-remembered file name to file; otherwise, it
> prints the currently-remembered file name.

(1,$)g/RE/command list
> In the global command, the first step is to mark every
> line that matches the given RE.   Then, for every such
> line, the given command list is executed with . ini-
> tially set to that line.   A single command or the first
> of a list of commands appears on the same line as the
> global command.   All lines of a multi-line list except
> the last line must be ended with a \; a, i, and c com-
> mands and associated input are permitted.   The . ter-
> minating input mode may be omitted if it would be the
> last line of the command list.   An empty command list
> is equivalent to the p command.   The g, G, v, and V
> commands are not permitted in the command list.   See

also BUGS and the last paragraph before FILES below.

(1,$)G/RE/

In the interactive Global command, the first step is to mark every line that matches the given RE. Then, for every such line, that line is printed, . is changed to that line, and any one command (other than one of the a, c, i, g, G, v, and V commands) may be input and is executed. After the execution of that command, the next marked line is printed, and so on; a new-line acts as a null command; an & causes the re-execution of the most recent command executed within the current invocation of G. Note that the commands input as part of the execution of the G command may address and affect any lines in the buffer. The G command can be terminated by an interrupt signal (ASCII DEL or BREAK).

h

The help command gives a short error message that explains the reason for the most recent ? diagnostic.

H

The Help command causes ed to enter a mode in which error messages are printed for all subsequent ? diagnostics. It will also explain the previous ? if there was one. The H command alternately turns this mode on and off; it is initially off.

(.)i
<text>
.

The insert command inserts the given text before the addressed line; . is left at the last inserted line, or, if there were none, at the addressed line. This command differs from the a command only in the placement of the input text. Address Ø is not legal for this command. The maximum number of characters that may be entered from a terminal is 256 per line (including the new-line character).

(.,.+1)j

The join command joins contiguous lines by removing the appropriate new-line characters. If exactly one address is given, this command does nothing.

(.)kx

The mark command marks the addressed line with name x, which must be a lower-case letter. The address 'x then addresses this line; . is unchanged.

(.,.)l

The list command prints the addressed lines in an

unambiguous way: a few non-printing characters (e.g., tab, backspace) are represented by (hopefully) mnemonic overstrikes. All other non-printing characters are printed in octal, and long lines are folded. An l command may be appended to any other command other than e, f, r, or w.

(.,.)ma
  The move command repositions the addressed line(s) after the line addressed by a. Address 0 is legal for a and causes the addressed line(s) to be moved to the beginning of the file. It is an error if address a falls within the range of moved lines; . is left at the last line moved.

(.,.)n
  The number command prints the addressed lines, preceding each line by its line number and a tab character; . is left at the last line printed. The n command may be appended to any other command other than e, f, r, or w.

(.,.)p
  The print command prints the addressed lines; . is left at the last line printed. The p command may be appended to any other command other than e, f, r, or w. For example, dp deletes the current line and prints the new current line.

P

  The editor will prompt with a * for all subsequent commands. The P command alternately turns this mode on and off; it is initially off.

q

  The quit command causes ed to exit. No automatic write of a file is done (but see DIAGNOSTICS below).

Q

  The editor exits without checking if changes have been made in the buffer since the last w command.

($)r file
  The read command reads in the given file after the addressed line. If no file name is given, the currently-remembered file name, if any, is used (see e and f commands). The currently-remembered file name is not changed unless file is the very first file name mentioned since ed was invoked. Address 0 is legal for r and causes the file to be read at the beginning of the buffer. If the read is successful, the number of characters read is typed; . is set to the last line read in. If file is replaced by !, the rest of the

line is taken to be a shell (sh(1)) command whose out-
put is to be read. For example, "$r !ls" appends
current directory to the end of the file being edited.
Such a shell command is <u>not</u> remembered as the current
file name.

(.,.)s/<u>RE</u>/<u>replacement</u>/   or
(.,.)s/<u>RE</u>/<u>replacement</u>/g   or
(.,.)s/<u>RE</u>/<u>replacement</u>/n   n = 1-512
The <u>substitute</u> command searches each addressed line for
an occurrence of the specified RE. In each line in
which a match is found, all (non-overlapped) matched
strings are replaced by the <u>replacement</u> if the global
replacement indicator g appears after the command. If
the global indicator does not appear, only the first
occurrence of the matched string is replaced. If a
number n appears after the command, only the n th
occurrence of the matched string on each addressed line
is replaced. It is an error for the substitution to
fail on <u>all</u> addressed lines. Any character other than
space or new-line may be used instead of / to delimit
the RE and the <u>replacement</u>; . is left at the last line
on which a <u>substitution</u> occurred. See also the last
paragraph before <u>FILES</u> below.

An ampersand (&) appearing in the <u>replacement</u> is
replaced by the string matching the RE on the current
line. The special meaning of & in this context may be
suppressed by preceding it by \. As a more general
feature, the characters \n, where <u>n</u> is a digit, are
replaced by the text matched by the n-th regular subex-
pression of the specified RE enclosed between \(and
\). When nested parenthesized subexpressions are
present, <u>n</u> is determined by counting occurrences of \(
starting from the left. When the character % is the
only character in the <u>replacement</u>, the <u>replacement</u> used
in the most recent <u>substitute</u> command is used as the
<u>replacement</u> in the current substitute command. The %
loses its special meaning when it is in a replacement
string of more than one character or is preceded by a
\.

A line may be split by substituting a new-line charac-
ter into it. The new-line in the <u>replacement</u> must be
escaped by preceding it by \. Such <u>substitution</u> cannot
be done as part of a <u>g</u> or <u>v</u> command list.

(.,.)t<u>a</u>
This command acts just like the <u>m</u> command, except that
a <u>copy</u> of the addressed lines is placed after address <u>a</u>
(which may be 0); . is left at the last line of the
copy.

u

    The undo command nullifies the effect of the most
    recent command that modified anything in the buffer,
    namely the most recent a, c, d, g, i, j, m, r, s, t, v,
    G, or V command.

(1,$)v/RE/command list

    This command is the same as the global command g except
    that the command list is executed with . initially set
    to every line that does not match the RE.

(1,$)V/RE/

    This command is the same as the interactive global com-
    mand G except that the lines that are marked during the
    first step are those that do not match the RE.

(1,$)w file

    The write command writes the addressed lines into the
    named file. If the file does not exist, it is created
    with mode 666 (readable and writable by everyone),
    unless your umask setting (see sh(1)) dictates other-
    wise. The currently-remembered file name is not
    changed unless file is the very first file name men-
    tioned since ed was invoked. If no file name is given,
    the currently-remembered file name, if any, is used
    (see e and f commands); . is unchanged. If the command
    is successful, the number of characters written is
    typed. If file is replaced by !, the rest of the line
    is taken to be a shell (sh(1)) command whose standard
    input is the addressed lines. Such a shell command is
    not remembered as the current file name.

($)=

    The line number of the addressed line is typed; . is
    unchanged by this command.

!shell command

    The remainder of the line after the ! is sent to the
    ZEUS system shell (sh(1)) to be interpreted as a com-
    mand. Within the text of that command, the unescaped
    character % is replaced with the remembered file name;
    if a ! appears as the first character of the shell com-
    mand, it is replaced with the text of the previous
    shell command. Thus, !! will repeat the last shell
    command. If any expansion is performed, the expanded
    line is echoed; . is unchanged.

        (.+1)<new-line>
                An address alone on a line causes the addressed line to
                be printed. A new-line alone is equivalent to .+1p; it
                is useful for stepping forward through the buffer.

        If an interrupt signal (ASCII DEL, or BREAK) is sent, <u>ed</u>
        prints a ? and returns to <u>its</u> command level.

        Some size limitations: 512 characters per line, 256 charac-
        ters per global command list, 64 characters per file name,
        and 128K characters in the buffer. The limit on the number
        of lines depends on the amount of user memory: each line
        takes 1 word.

        When reading a file, <u>ed</u> discards ASCII NUL characters and
        all characters after the last new-line. Files (e.g., a.out)
        that contain characters not in the ASCII set (bit 8 on) can-
        not be edited by <u>ed</u>.

        If the closing delimiter of a RE or of a replacement string
        (e.g., /) would be the last character before a new-line,
        that delimiter may be omitted, in which case the addressed
        line is printed.   The following pairs of commands are
        equivalent:
                s/s1/s2   s/s1/s2/p
                g/s1   g/s1/p
                ?s1   ?s1?

FILES
        /tmp/e#   temporary; # is the process number.
        ed.hup   work is saved here if the terminal is hung up.
DIAGNOSTICS
        ?   for command errors.
        ?<u>file</u>   for an inaccessible file.
                    (use the <u>h</u>elp and <u>H</u>elp commands for detailed
                    explanations).

        If changes have been made in the buffer since the last <u>w</u>
        command that wrote the entire buffer, <u>ed</u> warns the user i<u>f</u>
        an attempt is made to destroy <u>ed</u>'s buffer via the <u>e</u> or <u>q</u>
        commands.   It prints ? and allows one to continue editin<u>g</u>.
        A second <u>e</u> or <u>q</u> command at this point will take effect. The
        - command-line option inhibits this feature.

SEE ALSO
        grep(1), sed(1), sh(1), stty(1), regexp(7) in the <u>ZEUS</u>
        <u>Reference</u> <u>Manual</u>

        <u>EX</u> <u>Reference</u> <u>Manual</u> <u>in</u> <u>the</u> <u>ZEUS</u> <u>Utilities</u> <u>Manual</u>.

CAVEATS AND BUGS

A ! command cannot be subject to a g or a v command.
The ! command and the ! escape from the e, r, and w commands
cannot be used if the the editor is invoked from a res-
tricted shell (see sh(1)).
The sequence \n in a RE does not match a new-line character.
The l command mishandles DEL.
Characters are masked to 7 bits on input.
If the editor input is coming from a command file (i.e., ed
file < ed-cmd-file), the editor will exit at the first
failure of a command that is in the command file.

APPENDIX A
ZEUS 3.21 RELEASE TAPE FORMAT

The 3.21 release tape consists of 18 files. The first 5 files are in dd format, the next 4 files are in dump format, and the last 9 are tar format. To extract the last 9 files, which make up the optional packages area, use the C shell script **/etc/package** (see paragraph 6.1.2.1). The tape format is as follows:

file 0:   tb.image (primary bootstrapper)

file 1:   boot.image (secondary bootstrapper)

file 2:   stand-alone wbz (write block zero)

file 3:   stand-alone mkfs (make filesystem)

file 4:   stand-alone restor

file 5:   common root files

file 6:   special root files

file 7:   common /usr files

file 8:   special /usr files

file 9:   acct files (accounting package - tar format)

file 10:   gopt (global optimizer package - tar format)

file 11:   learn files (tar format)

file 12:   sccs files (source code control system - tar format)

file 13:   zmenu files (menu generator - tar format)

file 14:   voldump files (filesystem archiving package - tar format)

file 15:   plzasm (plz/asm assembler - tar format)

file 16:   games (computer games - tar format)

file 17:   crash (kernel crash analyzer - tar format)

APPENDIX B
FILE DEPENDENCY LIST

This appendix describes file dependencies (indented files
are the dependencies). Refer to this list when removing
unwanted files to determine if other files are affected.

```
/bin/adb
        /bin/csh
        /bin/sh
bin/acctcom
        /usr/adm/pacct
        /etc/group
        /etc/passwd
        /dev
        /dev/null
/bin/ar
/bin/as
        /lib/as2
        /lib/as2d
        /lib/asz2
        /lib/asz2d
/bin/bc
        /bin/dc
        /usr/lib/lib.b
/bin/cas
/bin/cat
/bin/cc
        /bin/cas
        /bin/ld
        /bin/mv
        /bin/sh
        /lib/clist
        /lib/popt
        /lib/cparse
        /lib/codgen
        /lib/cpp
        /lib/crt0.o
        /lib/libc.a
        /lib/mcrt0.o
/bin/chkdiff
        /bin/chkout
        /bin/diff
        /bin/rm
        /usr/bin/expr
```

```
/bin/chkin
        /bin/sh
        /bin/diff
        /etc/passwd
/bin/chkout
        /etc/passwd
/bin/chkwhat
/bin/chmod
/bin/cmp
/bin/cp
/bin/csh
        /bin/login
        /bin/newgrp
        /bin/sh
        /dev/null
        /etc/cshprofile
        /etc/passwd
/bin/date
/bin/dc
        /bin/csh
        /bin/sh
/bin/dd
/bin/df
/bin/diff
        /usr/lib/diffh
/bin/dog
/bin/du
/bin/echo
/bin/echo2
/bin/ed
        /bin/csh
        /bin/sh
        /usr/lib/makekey
/bin/edit  (linked to /bin/vi)
        /bin/csh
        /bin/sh
        /dev/null
        /dev/tty
        /etc/termcap
        /lib/ex2.13strings
        /usr/lib/ex2.13preserve
        /usr/lib/ex2.13recover
        /usr/preserve/
/bin/egrep
/bin/ex  (linked to /bin/vi)
        /bin/edit
/bin/fgrep
/bin/file
/bin/find
        /bin/csh
        /bin/pwd
```

```
                /bin/sh
                /dev/tty
                /etc/group
                /etc/passwd
        /bin/getfile
        /bin/gets
        /bin/gpasswd
                /bin/mail
                /bin/sh
                /dev/tty
                /etc/group
        /bin/grep
        /bin/hd    (linked to /bin/od)
        /bin/kill
        /bin/last
                /etc/passwd
                /usr/adm/wtmp
        /bin/ld
        /bin/ln
                /bin/cp
        /bin/local
        /bin/login   (linked to /etc/login)
                /usr/adm/wtmp
                /dev/
                /usr/spool/mail
                /etc/ttytype
                /dev/tty??
                /bin/login
                /bin/csh
                /bin/passwd
                /etc/motd
                /etc/passwd
                /bin/sh
        /bin/ls
                /etc/group
                /etc/passwd
        /bin/mail
                /bin/csh
                /bin/sh
                /bin/uux
                /etc/passwd
                /usr/spool/mail/
        /bin/make
                /bin/ar
                /bin/as
                /bin/cc
                /bin/chkout
                /bin/cp
                /bin/csh
                /bin/ld
                /bin/mv
```

```
                    /bin/rm
                    /bin/sh
        /bin/mkdir
        /bin/more
                    /bin/csh
                    /bin/sh
                    /bin/vi
                    /etc/termcap
                    /usr/lib/more.help
        /bin/mv
                    /bin/cp
        /bin/newgrp
                    /bin/sh
                    /dev/tty
                    /etc/group
                    /etc/passwd
        /bin/nice
                    /bin/csh
                    /bin/sh
        /bin/nl
        /bin/nm
        /bin/nohup
                    /bin/csh
                    /bin/sh
                    /dev/tty
        /bin/od
                    /bin/hd
        /bin/page   (linked to /bin/more)
        /bin/passwd
                    /dev/tty
                    /etc/passwd
        /bin/pr
                    /dev/tty
        /bin/printenv
        /bin/ps
                    /dev/kmem
                    /dev/mem
                    /dev/swap
                    /zeus
        /bin/pstat
                    /dev/kmem
                    /dev/mem
                    /zeus
        /bin/putfile
        /bin/pwd
        /bin/regcmp
        /bin/remote
        /bin/rm
                    /bin/rmdir
        /bin/rmail  (linked to /bin/mail)
        /bin/rmdir
```

```
      /bin/rsh   (linked to /bin/sh)
      /bin/scc
              /bin/cas
              /bin/sld
              /bin/sh
              /bin/mv
              /lib/cpp
              /lib/scparse
              /lib/scodgen
              /lib/spopt
              /lib/clist
              /lib/scrt0.o
              /lib/slibc.a
              /lib/smcrt0.o
              /z/bin/lib/
      /bin/sh
              /bin/csh
              /dev/null
              /etc/profile
      /bin/size
      /bin/sld
      /bin/sleep
      /bin/sort
      /bin/stty
      /bin/su
              /bin/sh
              /dev/tty
              /etc/passwd
      /bin/sum
      /bin/sync
      /bin/tail
      /bin/tar
              /bin/csh
              /bin/sh
              /bin/mkdir
              /bin/pwd
              /usr/bin/awk
              /usr/bin/sed
              /dev/ct0
              /dev/rct0
      /bin/tee
      /bin/test
      /bin/time
              /bin/csh
              /bin/sh
      /bin/touch
      /bin/tr
      /bin/uname
```

```
/bin/uucp
        /bin/mkdir
        /bin/sh
        /dev/null
        /etc/passwd
        /usr/lib/uucp/OLD-devices
        /usr/lib/uucp/L-dialcodes
        /usr/lib/uucp/L.sys
        /usr/lib/uucp/MYNAME
        /usr/lib/uucp/R_stat
        /usr/lib/uucp/SEQF
        /usr/lib/uucp/USERFILE
        /usr/lib/uucp/uucico
        /usr/lib/uucp/uuxqt
        /usr/spool/uucp/
/bin/uulog
        /bin/sh
        /dev/null
        /usr/lib/uucp/OLD-devices
        /usr/lib/uucp/L-dialcodes
        /usr/lib/uucp/L.sys
        /usr/lib/uucp/uucico
        /usr/lib/uucp/uuxqt
        /usr/spool/uucp/
/bin/uuname
        /usr/lib/uucp/L.sys
        /usr/lib/uucp/
        /usr/spool/uucp/
/bin/uupick
/bin/uustat
        /etc/passwd
        /usr/lib/uucp/
        /usr/spool/uucp/
/bin/uuto
/bin/uux
        /bin/sh
        /dev/null
        /etc/passwd
        /usr/lib/uucp/OLD-devices
        /usr/lib/uucp/L-dialcodes
        /usr/lib/uucp/L.sys
        /usr/lib/uucp/MYNAME
        /usr/lib/uucp/USERFILE
        /usr/lib/uucp/uucico
        /usr/lib/uucp/uuxqt
        /usr/spool/uucp/
/bin/vi
        /bin/edit
/bin/view    (linked to /bin/vi)
        /bin/edit
/bin/whereis
```

```
        /bin/who
                /etc/group
                /etc/passwd
        /bin/whodo
                /bin/date
                /bin/ed
                /bin/ps
                /bin/rm
                /bin/sort
                /bin/who
        /bin/write
                /bin/csh
                /bin/sh
        /bin/xargs
                /bin/echo
                /dev/tty
                /bin/sh
                /bin/csh
        /dev/dumpdev
                /etc/dump
                /etc/restor
        /dev/resdev
                /usr/bin/reserv
        /dev/tardev
                /bin/tar
        /etc/adduser
                /bin/cat
                /bin/chmod
                /bin/echo
                /bin/egrep
                /bin/gets
                /bin/mkdir
                /bin/mv
                /bin/passwd
                /bin/rm
                /bin/rmdir
                /bin/sort
                /bin/tail
                /dev/null
                /etc/chmog
                /etc/group
                /etc/passwd
                /usr/bin/expr
                /usr/bin/sed
        /etc/checklist
        /etc/chgrp
                /etc/group
        /etc/chmog
                /etc/group
                /etc/passwd
        /etc/chroot
```

```
                    /dev/tty
        /etc/chog
                    /etc/chmog
        /etc/chown
                    /etc/passwd
        /etc/clri
        /etc/crash
                    /bin/csh
                    /bin/sh
                    /dev/kmem
                    /dev/mem
                    /zeus
        /etc/cron
                    /bin/sh
                    /dev/null
                    /usr/lib/crontab
        /etc/datem
                    /bin/date
        /etc/cshprofile
        /etc/dcheck
        /etc/ddate
        /etc/devnm
                    /dev
        /etc/down
                    /bin/cp
                    /bin/echo
                    /bin/rm
                    /etc/halt
                    /etc/shut
        /etc/dqueuer
                    /bin/mail
                    /bin/sh
                    /etc/passwd
                    /usr/lib/lp
                    /usr/lib/lp_ban
                    /usr/lib/lp_nf
                    /usr/lib/text
                    /usr/spool/queuer/config
                    /usr/spool/queuer/
        /etc/dump
                    /dev/rct0
                    /dev/zd4
                    /etc/ddate
        /etc/dumpdir
                    /bin/echo2
        /etc/ff
                    /etc/passwd
        /etc/frec
                    /bin/mkdir
                    /dev/tty
        /etc/fsck
```

```
                        /etc/checklist
                        /etc/passwd
        /etc/fsdb
        /etc/GETTY
                        /dev/
                        /etc/login
                        /etc/utmp
                        /usr/adm/wtmp
                        /etc/ttytype
                        /etc/termcap
        /etc/getty  (linked to /etc/GETTY)
                        /dev/
                        /etc/login
                        /etc/utmp
                        /usr/adm/wtmp
                        /etc/ttytype
                        /etc/termcap
        /etc/group
        /etc/halt
                        /bin/cp
                        /bin/date
                        /bin/echo
                        /bin/kill
                        /bin/rm
                        /bin/sleep
                        /bin/sync
                        /etc/wall
        /etc/icheck
        /etc/icpload
                        /etc/
                        /dev/
        /etc/inittab
        /etc/INIT
                        /dev/console
                        /bin/sh
                        /bin/csh
                        /etc/rc
                        /etc/inittab
                        /etc/ttytype
                        /etc/termcap
                        /etc/getty
        /etc/init  (linked to /etc/INIT)
                        /dev/console
                        /bin/sh
                        /bin/csh
                        /etc/rc
                        /etc/inittab
                        /etc/ttytype
                        /etc/termcap
                        /etc/getty
        /etc/install
```

```
                /bin/sh
                /bin/echo
                /bin/chmod
                /bin/mv
                /bin/cp
                /etc/chgrp
                /etc/chown
                /bin/find
                /usr/bin/expr
                /bin/cd
                /bin/sed
                /dev/null
        /etc/labelit
                /dev/rmt
                /dev/rct
        /etc/link
        /etc/login
                /usr/adm/wtmp
                /dev/
                /usr/spool/mail
                /etc/ttytype
                /dev/tty??
                /bin/login
                /bin/csh
                /bin/passwd
                /etc/motd
                /etc/passwd
                /bin/sh
        /etc/makenewfs
                /bin/echo
                /bin/gets
                /bin/ln
                /bin/mkdir
                /bin/rm
                /etc/chmog
                /etc/labelit
                /etc/mfs
                /etc/mkfs
                /etc/model
                /ets/umfs
        /etc/makewhatis
                /bin/ed
                /bin/rm
                /bin/sort
                /etc/chmog
                /usr/bin/expand
                /usr/bin/getNAME
                /usr/man
```

```
        /etc/man.dbmgr
                /bin/chmod
                /bin/df
                /bin/du
                /bin/find
                /bin/mkdir
                /bin/rm
                /dev/tmp
        /etc/mfs
                /bin/cat
                /bin/echo
                /dev/null
                /dev/tmp
                /dev/usr
                /dev/z
                /etc/mount
                /tmp/
                /usr/
                /z/
        /etc/mkfs
        /etc/mkmt
                /etc/mknod
                /etc/chmog
        /etc/mknod
        /etc/mktape
        /etc/model
                /dev/
        /etc/motd
        /etc/mount
        /etc/mvdir
                /bin/echo
                /usr/bin/basename
                /usr/bin/expr
                /etc/link
                /etc/unlink
        /etc/ncheck
                /etc/checklist
        /etc/passwd
        /etc/profile
        /etc/rc
                /bin/echo
                /etc/umfs
                /bin/uname
                /etc/rc_csh
        /etc/rc_csh
                /bin/cat
                /bin/date
                /bin/echo
                /bin/rm
                /bin/sleep
                /bin/sync
```

```
                /dev/console
                /dev/null
                /dev/root
                /dev/rtmp
                /dev/rz
                /etc/cron
                /etc/datem
                /etc/dqueuer
                /etc/fsck
                /etc/mfs
                /etc/ttyconfig
                /etc/umfs
                /etc/update
        /etc/reservrc
                /bin/mkdir
                /bin/rm
                /bin/rmdir
                /etc/chmog
        /etc/restor
                /bin/mkdir
                /dev/rct0
        /etc/rmuser
                /bin/chmod
                /bin/egrep
                /bin/find
                /bin/ls
                /bin/mv
                /bin/passwd
                /bin/rm
                /usr/bin/sed
                /dev/null
                /etc/group
                /etc/passwd
        /etc/setlp
                /dev/lp
        /etc/setmnt
                /zeus
                /dev/kmem
                /bin/mkdir
        /etc/shut
                /dev/console
        /etc/sysgen
                /bin/chmod
                /bin/csh
                /bin/make
                /bin/scc
                /bin/sh
                /bin/size
                /bin/sld
                /bin/vi
                /usr/sys/fpe/fpe.o
```

```
        /usr/sys/conf/mch.o
        /usr/sys/conf/ver.c+
        /usr/sys/conf/z.c
        /usr/sys/dev/LIB2
        /usr/sys/dev/ct.d.o
        /usr/sys/dev/ct.o
        /usr/sys/dev/lpr.d.o
        /usr/sys/dev/lpr.o
        /usr/sys/dev/md.d.o
        /usr/sys/dev/md.o
        /usr/sys/dev/mt.d.o
        /usr/sys/dev/mt.o
        /usr/sys/dev/smd.d.o
        /usr/sys/dev/smd.o
        /usr/sys/dev/zd.d.o
        /usr/sys/dev/zd.o
        /usr/sys/h/sysparm.h
        /usr/sys/icp/zpd/acu/acu.d.o
        /usr/sys/icp/zpd/acu/acu.o
        /usr/sys/icp/zpd/apt/apt.d.o
        /usr/sys/icp/zpd/apt/apt.o
        /usr/sys/icp/zpd/bs3/bs3.d.o
        /usr/sys/icp/zpd/bs3/bs3.o
        /usr/sys/icp/zpd/bsc/bsc.d.o
        /usr/sys/icp/zpd/bsc/bsc.o
        /usr/sys/icp/zpd/icp.d.o
        /usr/sys/icp/zpd/icp.o
        /usr/sys/icp/zpd/icp.o
        /usr/sys/icp/zpd/ilp/ilp.d.o
        /usr/sys/icp/zpd/ilp/ilp.o
        /usr/sys/icp/zpd/itty/itty.d.o
        /usr/sys/icp/zpd/itty/itty.o
        /usr/sys/icp/zpd/oly/oly.d.o
        /usr/sys/icp/zpd/oly/oly.o
        /usr/sys/icp/zpd/sna/sna.d.o
        /usr/sys/icp/zpd/sna/sna.o
        /usr/sys/icp/zpd/x25/x25.d.o
        /usr/sys/icp/zpd/x25/x25.o
        /usr/sys/sys/LIB1
/etc/taperrc   (linked to /etc/reservrc)
/etc/termcap
/etc/termcap.others
/etc/ttyconfig
        /dev/kmem
        /zeus
/etc/ttytype
/etc/umfs   (linked to /etc/mfs)
/etc/umount
/etc/unlink
/etc/update
/etc/upkeep
```

```
/etc/volcopy
        /bin/csh
        /bin/sh
        /dev/fnrmt
        /dev/frmt
        /dev/fsnrmt
        /dev/fsrmt
        /dev/nrct
        /dev/rct
        /dev/rmt
        /dev/srmt
        /dev/tty
        /etc/log/filesave.log
/etc/wall
/lib/as2
/lib/asz2
/lib/cpp
/lib/clist
/lib/codgen
/lib/cparse
/lib/gopt
/lib/cnvt.o
/lib/doprnt.o
/lib/ex2.13strings
/lib/libc.a
/lib/libl.a
        /lib/libc.a
        /usr/include/math.h
/lib/liby.a
        /lib/libc.a
/lib/popt
/lib/scodgen
/lib/scparse
/lib/slibc.a
/lib/slibl.a
/lib/slibm.a
        /lib/libc.a
        /usr/include/math.h
/lib/smcrt0.o
/lib/spopt
/lib/sliby.a
/usr/acu/acucap
/usr/acu/acutype
/usr/adm/acct/fiscal
/usr/adm/acct/nite
/usr/adm/acct/sum
/usr/bin/300
/usr/bin/300s
/usr/bin/450
/usr/bin/LOAD
        /usr/bin/SYS
```

```
/usr/bin/SEND
/usr/bin/SYS
/usr/bin/admin
        /bin/csh
        /bin/sh
        /etc/passwd
/usr/bin/apropos
        /usr/lib/whatis
/usr/bin/arswap
/usr/bin/at
        /bin/sh
        /usr/lib/atrun
        /usr/spool/at/
/usr/bin/awk
        /bin/sh
/usr/bin/banner
/usr/bin/basename
        /bin/test
        /usr/bin/expr
/usr/bin/bdiff
        /bin/diff
/usr/bin/cal
/usr/bin/calendar
        /bin/egrep
        /bin/mail
        /bin/rm
        /bin/test
        /dev/null
        /etc/cron
        /etc/passwd
        /usr/bin/sed
        /usr/lib/calprog
/usr/bin/cb
/usr/bin/cdc
        /etc/passwd
        /bin/sh
        /bin/csh
/usr/bin/checkcw
/usr/bin/checkeq
/usr/bin/code
/usr/bin/col
/usr/bin/comb
        /usr/bin/admin
        /bin/rm
        /usr/bin/get
        /usr/bin/delta
        /usr/bin/sed
```

```
                    /bin/ed
                    /usr/bin/prs
                    /bin/echo
                    /bin/mv
                    /etc/passwd
        /usr/bin/comm
        /usr/bin/cpio
                    /bin/mkdir
                    /dec/tty
        /usr/bin/cref
                    /bin/sort
                    /usr/lib/cref/cign
                    /usr/lib/cref/crpost
                    /usr/lib/cref/ctab
                    /usr/lib/cref/upost
        /usr/bin/crypt
                    /dev/tty
                    /usr/lib/makekey
        /usr/bin/csplit
        /usr/bin/ct
                    /usr/adm/ctlog
                    /etc/getty
                    /etc/passwd
                    /usr/spool/uucp
                    /usr/lib/uucp
        /usr/bin/ctags
                    /bin/mv
                    /bin/rm
                    /bin/sort
                    /usr/bin/fgrep
        /usr/bin/cu
                    /bin/sh
                    /dev/null
                    /usr/lib/uucp/L-devices
                    /usr/spool/uucp/
        /usr/bin/cut
        /usr/bin/cw
                    /usr/lib/font/ftCW
        /usr/bin/cxref
                    /bin/ex
                    /bin/grep
                    /bin/rm
                    /bin/sort
        /usr/bin/daytime
        /usr/bin/delta
                    /bin/csh
                    /bin/sh
                    /etc/passwd
                    /usr/bin/bdiff
        /usr/bin/deroff
```

```
/usr/bin/diff3
        /bin/diff
        /bin/rm
        /bin/test
        /usr/lib/diff3prog
/usr/bin/diffmk
        /bin/diff
        /bin/ed
        /bin/test
/usr/bin/dircmp
        /bin/cat
        /bin/cmp
        /bin/diff
        /bin/find
        /bin/pr
        /bin/rm
        /bin/sort
        /usr/bin/comm
        /usr/bin/sed
/usr/bin/dirname
        (linked to /usr/bin/basename)
/usr/bin/env
/usr/bin/eqn
        /usr/pub/eqnchar
/usr/bin/error
        /dev/tty
        /etc/passwd
/usr/bin/expand
/usr/bin/expr
/usr/bin/false
/usr/bin/fgrep
/usr/bin/flow
        /bin/sh
        /bin/sort
        /bin/sort
        /dev/null
        /lib/cparse
        /lib/cpp
        /usr/bin/col
        /usr/bin/nroff
        /usr/bin/tbl
/usr/bin/get
        /etc/mtab
        /etc/passwd
/usr/bin/getNAME
/usr/bin/getopt
/usr/bin/grpck
        /etc/group
        /etc/passwd
/usr/bin/head
```

```
/usr/bin/help
        /usr/lib/help/
/usr/bin/hyphen
/usr/bin/id                  -
        /etc/group
        /etc/passwd
/usr/bin/isrio
/usr/bin/join
/usr/bin/learn
        /bin/mkdir
        /bin/rm
        /bin/sh
        /usr/lib/learn/
/usr/bin/leave
        /dev/
        /etc/utmp
/usr/bin/lex
        /lib/libl.a
        /usr/lib/lex/ncform
/usr/bin/line
/usr/bin/lint
        /bin/rm
        /bin/sort
        /lib/cpp
        /usr/include/setrer.h
        /usr/include/sgtty.h
        /usr/include/stdio.h
        /usr/include/sys/stat.h
        /usr/include/sys/types.h
        /usr/include/time.h
        /usr/lib/lint1
        /usr/lib/lint2
        /usr/lib/llib_lc
        /usr/lib/llib_lm
        /usr/lib/llib_port
/usr/bin/logname
/usr/bin/lorder
        /bin/nm
        /bin/rm
        /bin/sort
        /usr/bin/join
        /usr/bin/sed
/usr/bin/lpr
        (linked to /usr/bin/nq)
/usr/bin/m4
        /bin/csh
        /bin/sh
/usr/bin/man
        /bin/cat
        /bin/mkdir
        /bin/more
```

```
                    /bin/view
                    /etc/chmog
                    /usr/bin/neqn
                    /usr/bin/nroff
                    /usr/lib/tmac/tmac.an
                    /usr/man/
        /usr/bin/mesg
                    /dev/tty
        /usr/bin/mkmenu
        /usr/bin/mkstr
        /usr/bin/mm
        /usr/bin/mmt
        /usr/bin/mvt
        /usr/bin/mmchek
        /usr/bin/neqn
                    /usr/pub/eqnchar
        /usr/bin/news
                    /etc/passwd
                    /usr/lib/news/
        /usr/bin/nq
                    /bin/mkdir
                    /bin/pwd
                    /bin/sh
                    /etc/passwd
                    /usr/spool/queuer/
        /usr/bin/nroff
                    /usr/lib/term/
                    /usr/lib/tmac/
                    /usr/lib/suftab
                    /usr/lib/macros/cmp.n.d.
                    /usr/lib/macros/ucmp.n.
        /usr/bin/objdu
        /usr/bin/objhdr
        /usr/bin/objsu
        /usr/bin/pack
        /usr/bin/paste
        /usr/bin/pcat
        /usr/bin/prof
        /usr/bin/prom
                    /dev/tty
        /usr/bin/prs
                    /etc/mtab
                    /etc/passwd
                    /bin/csh
                    /bin/sh
        /usr/bin/ptx
                    /bin/sort
                    /usr/lib/cref/eign
        /usr/bin/pwck
                    /etc/passwd
        /usr/bin/quot
```

```
            /etc/passwd
/usr/bin/ranlib
        /bin/ar
        /bin/sh
/usr/bin/reserv
        /dev/rct0
        /etc/passwd
/usr/bin/reset
/usr/bin/rev
/usr/bin/rmdel
        /etc/passwd
        /bin/sh
        /bin/csh
/usr/bin/sact
        /etc/passwd
/usr/bin/sccsdiff
        /usr/bin/sed
        /bin/echo
        /usr/bin/bdiff
        /bin/cat
        /bin/rm
        /bin/pr
        /usr/bin/get
/usr/bin/script
        /bin/csh
        /bin/sh
        /etc/passwd
/usr/bin/sdiff
        /bin/diff
        /bin/ed
/usr/bin/sed
/usr/bin/slink
        /bin/ld
/usr/bin/spell
        /bin/rm
        /bin/sort
        /bin/tee
        /bin/who
        /dev/null
        /usr/bin/deroff
        /usr/bin/sed
        /usr/dict/hlista
        /usr/dict/hlistb
        /usr/dict/hstop
        /usr/dict/spellhist
        /usr/lib/spell
/usr/bin/spellin
/usr/bin/spellout
/usr/bin/split
/usr/bin/sprof
/usr/bin/str
```

```
                    /usr/bin/lpr
                    /bin/vi
                    /usr/lib/problems/scrb_date
                    /usr/lib/problems/seqno
                    /usr/lib/problems/strfile
        /usr/bin/strings
        /usr/bin/strip
        /usr/bin/strprint
                    /usr/bin/lpr
                    /bin/pr
                    /bin/rm
                    /usr/lib/problems/
        /usr/bin/tabs
        /usr/bin/talk
        /usr/bin/taper
                    (linked to /usr/bin/reserv)
        /usr/bin/tbl
        /usr/bin/timex
                    /dev/kmem
                    /zeus
        /usr/bin/troff
                    /usr/lib/tmac/
                    /usr/lib/suftab
                    /usr/lib/font/ft
                    /usr/lib/macros/cmp.t.d.
                    /usr/lib/macros/ucmp.t.
        /usr/bin/true
        /usr/bin/tsort
        /usr/bin/tty
        /usr/bin/uimage
        /usr/bin/uniq
        /usr/bin/units
                    /usr/lib/units
        /usr/bin/unget
                    /etc/passwd
        /usr/bin/unpack
        /usr/bin/users
        /usr/bin/val
        /usr/bin/vls
                    /etc/passwd
                    /etc/termcap
                    /usr/lib/screen/vlshelp
        /usr/bin/vnews
                    /etc/passwd
                    /etc/termcap
                    /usr/lib/news
                    /usr/lib/screen/vnewshelp
        /usr/bin/vtzset
        /usr/bin/wc
        /usr/bin/what
        /usr/bin/whatis
```

```
                    /usr/lib/whatis
/usr/bin/whoami
            /etc/passwd
/usr/bin/whois
            /etc/passwd
/usr/bin/xargs
            /bin/csh
            /bin/echo
            /bin/sh
            /dev/tty
/usr/bin/xq
            /etc/passwd
            /usr/spool/queuer/logfile
            /usr/spool/queuer/
/usr/bin/xstr
/usr/bin/yacc
            /lib/liby.a
            /usr/lib/yaccpar
/usr/bin/zmenu
            /bin/sh
            /bin/csh
            /etc/termcap
            /etc/utmp
            /etc/ttys
            /dev/
/usr/bin/zmprint
            /bin/sh
            /bin/csh
            /etc/utmp
            /etc/ttys
            /dev/
/usr/games/adventure
            /usr/games/lib/adventure
/usr/games/arithmetic
/usr/games/backgammon
/usr/games/craps
/usr/games/fortune
            /usr/games/lib/fortunes
/usr/games/hangman
            /usr/dict/words
/usr/games/lib/adventure
            /bin/cat
            /etc/passwd
            /usr/games/lib/advheader
            /usr/games/lib/advsaver
/usr/games/quiz
            /usr/games/quiz.k/
/usr/games/vhm
            /etc/termcap
            /usr/dict/words
/usr/games/wump
```

```
/usr/include/alarm.h
/usr/include/ar.h
/usr/include/assert.h
/usr/include/core.h
/usr/include/ct.h
/usr/include/ctype.h
/usr/include/curses.h
        /usr/include/stdio.h
        /usr/include/sgtty.h
/usr/include/disasm.h
/usr/include/dumprestor.h
/usr/include/errno.h
/usr/include/execargs.h
/usr/include/fatal.h
        /usr/include/setret.h
/usr/include/fcntl.h
/usr/include/ff.h
        /usr/include/stdio.h
        /usr/include/sys/types.h
/usr/include/grp.h
/usr/include/iocalls.h
/usr/include/local/uparm.h
/usr/include/macros.h
        /usr/include/sys/stat.h
/usr/include/math.h
/usr/include/misc.h
/usr/include/mnttab.h
/usr/include/mp.h
        /usr/include/stdio.h
/usr/include/nlist.h
/usr/include/pwd.h
/usr/include/regexp.h
/usr/include/s.out.h
/usr/include/saio.h
/usr/include/screen.h
/usr/include/segio.h
/usr/include/setret.h
/usr/include/sgtty.h
/usr/include/signal.h
        /usr/include/sys/signal.h
/usr/include/spool.h
/usr/include/ssignal.h
/usr/include/stdio.h
/usr/include/sys/acct.h
/usr/include/sys/block0.h
/usr/include/sys/buf.h
/usr/include/sys/callo.h
/usr/include/sys/cio.h
/usr/include/sys/conf.h
/usr/include/sys/ct.h
/usr/include/sys/dir.h
```

```
/usr/include/sys/fblk.h
/usr/include/sys/file.h
/usr/include/sys/filesys.h
/usr/include/sys/ino.h
/usr/include/sys/inode.h
/usr/include/sys/iobuf.h
/usr/include/sys/ioctl.h
/usr/include/sys/kcore.h
/usr/include/sys/lockblk.h
/usr/include/sys/lpio.h
/usr/include/sys/map.h
/usr/include/sys/mmu.h
/usr/include/sys/mount.h
/usr/include/sys/param.h
/usr/include/sys/pk.h
/usr/include/sys/prim.h
/usr/include/sys/proc.h
/usr/include/sys/s.out.h
/usr/include/sys/scc.h
/usr/include/sys/sched.h
/usr/include/sys/signal.h
/usr/include/sys/stat.h
/usr/include/sys/state.h
/usr/include/sys/sysinfo.h
/usr/include/sys/sysparm.h
/usr/include/sys/systm.h
/usr/include/sys/termio.h
/usr/include/sys/text.h
/usr/include/sys/timeb.h
/usr/include/sys/times.h
/usr/include/sys/ttold.h
/usr/include/sys/tty.h
/usr/include/sys/types.h
/usr/include/sys/user.h
/usr/include/sys/utsname.h
/usr/include/time.h
/usr/include/tp_defs.h
/usr/include/types.h
/usr/include/ustat.h
/usr/include/utmp.h
/usr/include/uucp.h
/usr/include/uucpdefs.h
/usr/include/varargs.h
/usr/include/whoami.h
/usr/lib/acct/acctcms
/usr/lib/acct/acctcon1
        /usr/lib/acct/holidays
/usr/lib/acct/acctcon2
/usr/lib/acct/accctdisk
/usr/lib/acct/acctdusg
/usr/lib/acct/acctmerg
```

```
/usr/lib/acct/accton
        /usr/lib/acct/pacct
/usr/lib/acct/acctprc1
        /etc/passwd
/usr/lib/acct/acctprc2
/usr/lib/acct/acctwtmp
/usr/lib/acct/chargefee
        /bin/echo
        /etc/passwd
        /bin/test
        /usr/lib/acct/nulladm
        /bin/cd
/usr/lib/acct/ckpacct
        /bin/cp
        /bin/cd
        /bin/chmod
        /bin/ln
        /bin/rm
/usr/lib/acct/dodisk
        /bin/date
        /bin/find
        /bin/sort
        /usr/lib/acct/acctdisk
        /bin/chmod
        /etc/chown
        /bin/mv
/usr/lib/acct/fwtmp
/usr/lib/acct/holidays
/usr/lib/acct/lastlogin
        /bin/cd
        /usr/lib/acct/nulladm
        /bin/cat
        /bin/sort
        /usr/bin/sed
        /bin/rm
/usr/lib/acct/monacct
        /bin/mv
        /bin/rm
        /usr/lib/acct/nulladm
        /usr/lib/acct/prtacct
        /bin/pr
/usr/lib/acct/nulladm
        /bin/chmod
        /bin/cp
        /dev/null
/usr/lib/acct/prctmp
        /bin/cat
/usr/lib/acct/prdaily
        /bin/cd
        /bin/pr
```

```
/usr/lib/acct/prtacct
        /bin/cat
        /usr/lib/acct/acctmerg
        /bin/pr
/usr/lib/acct/remove
        /bin/rm
/usr/lib/acct/runacct
        /bin/date
        /bin/chmod
        /bin/ln
        /bin/cd
        /bin/mail
        /bin/rm
        /bin/mv
        /usr/lib/acct/
/usr/lib/acct/sdisk
        /bin/cd
/usr/lib/acct/shutacct
        /usr/lib/acct/acctwtmp
        /usr/lib/acct/turnacct
/usr/lib/acct/startup
        /usr/lib/acct/acctwtmp
        /usr/lib/acct/turnacct
/usr/lib/acct/turnacct
        /usr/lib/acct/nulladm
        /usr/lib/accton
        /bin/mv
        /bin/rm
/usr/lib/acct/wtmpfix
/usr/lib/atrun
        /bin/csh
        /bin/mv
        /bin/sh
        /dev/null
        /etc/cron
        /usr/spool/at/
/usr/lib/crontab
/usr/lib/calprog
/usr/lib/cref/crpost
/usr/lib/cref/upost
/usr/lib/diff3prog
/usr/lib/diffh
/usr/lib/ex2.13preserve
        /bin/sh
        /etc/passwd
        /usr/preserve/
/usr/lib/ex2.13recover
        /usr/preserve/
/usr/lib/help/cb
/usr/lib/help/cm
/usr/lib/help/co
```

```
/usr/lib/help/prs
/usr/lib/help/rc
/usr/lib/help/un
/usr/lib/help/ut
/usr/lib/learn/C/
/usr/lib/learn/editor/
/usr/lib/learn/eqn/
/usr/lib/learn/files/
/usr/lib/learn/ftuser/
/usr/lib/learn/macros/
/usr/lib/learn/morefiles/
/usr/lib/learn/play/
/usr/lib/learn/Linfo
/usr/lib/learn/Xinfo
/usr/lib/learn/ftuser/count
/usr/lib/learn/ftuser/fetch
/usr/lib/learn/tee
/usr/lib/libacu.a
        /usr/acu/acucap
        /usr/acu/acutype
/usr/lib/libcisam.a
/usr/lib/libcurses.a
        /lib/libc.a
        /usr/include/curses.h
        /usr/lib/libtermlib.a
/usr/lib/libdm.a
        /lib/libc.a
/usr/lib/libmp.a
        /lib/libc.a
        /usr/include/mp.h
/usr/lib/libp.a
        /lib/libc.a
/usr/lib/libPW.a
        /lib/libc.a
/usr/lib/libscreen.a
        /lib/libc.a
        /usr/lib/libcurses.a
        /usr/include/screen.h
/usr/lib/libtermlib.a
        /lib/libc.a
/usr/lib/libz8000.a
        /lib/libc.a
        /usr/include/disasm.h
/usr/lib/lint1
/usr/lib/lint2
/usr/lib/lp
/usr/lib/lp_ban
/usr/lib/lp_nf
/usr/lib/macros/
/usr/lib/makekey
/usr/lib/more.help
```

```
/usr/lib/slibacu.a
        /usr/acu/acucap
        /usr/acu/acutype
/usr/lib/slibcurses.a
        /lib/slibc.a
        /usr/include/curses.h
        /usr/lib/slibtermlib.a
/usr/lib/slibdm.a
        /lib/slibc.a
/usr/lib/slibmp.a
        /lib/slibc.a
        /usr/include/mp.h
/usr/lib/slibscreen.a
        /lib/slibc.a
/usr/lib/slibtermlib.a
        /lib/slibc.a
/usr/lib/slibz8000.a
        /lib/slibc.a
        /usr/include/disasm.h
/usr/lib/spell
/usr/lib/text
        /bin/stty
        /dev/null
/usr/lib/tmac
/usr/lib/tmac/tmac.e
/usr/lib/uucp/L-devices
/usr/lib/uucp/L-dialcodes
/usr/lib/uucp/MYNAME
/usr/lib/uucp/USERFILE
/usr/lib/uucp/uucico
        /bin/sh
        /dev/null
        /etc/passwd
        /usr/lib/uucp
        /usr/lib/uucp/L-devices
        /usr/lib/uucp/L-dialcodes
        /usr/lib/uucp/L.sys
        /usr/lib/uucp/MYNAME
        /usr/lib/uucp/USERFILE
        /usr/lib/uucp/uuxqt
        /usr/spool/uucp
/usr/lib/uucp/uuclean
        /bin/sh
        /etc/passwd
        /usr/lib/uucp/L-dialcodes
        /usr/lib/uucp/L.sys
```

```
/usr/lib/uucp/uuclear
        /bin/echo
        /bin/rm
        /usr/lib/uucp/uuclean
/usr/lib/uucp/uustart
        /bin/uulog
        /usr/lib/uucp/uucico
/usr/lib/uucp/uuxqt
        /bin/diff
        /bin/mail
        /bin/mkdir
        /bin/rmail
        /bin/sh
        /dev/null
        /etc/passwd
        /usr/lib/uucp/L-dialcodes
        /usr/lib/uucp/L.sys
        /usr/lib/uucp/MYNAME
        /usr/lib/uucp/uucico
/usr/pub/ascii
/usr/pub/dmalias
/usr/pub/greek
/usr/pub/termlist
/usr/pub/voldump
        /dev/fnrmt0
        /dev/frmt0
        /etc/voldump
/usr/pub/voldump.run
        /bin/ls
        /bin/rm
        /etc/ff
        /etc/volcopy
/usr/spool/uucp/LOGFILE
/usr/spool/uucp/SEQF
/usr/src/Makefile
/usr/src/getfile.c
/usr/src/local.c
/usr/src/putfile.c
/usr/src/remote.c
/usr/sys/h/sysparm.h
/usr/tmp
```