

SOFTWARE RELEASE GUIDE
FOR
UNIX-DERIVED OPERATING SYSTEM RELEASE 2.0

6/11/84

WARNING
Read section 3.0 through 3.4 carefully
before beginning to install UNIX.

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SPECIFICATIONS SUBJECT TO CHANGE

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Trademark Notice

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1.0 General Description of the Release

This release guide describes the UNIX-derived Operating System for the S6300 product line. The Operating System is derived from UNIX System V under license from Bell Laboratories.

The UNIX-derived Operating System supports demand paging virtual memory. Tools provided with the Operating system include a full C language copiler using the UNIX System V compatible Common Object File Format, and such major UNIX-derived commands as awk, lex, yacc, adb, nroff, vi, lint and SCCS. The file system uses the new System V compatible 1024 byte blocks for improved throughput.

The sections that follow describe the contents of the distribution floppies, detail the software installation procedures and list known omissions and restrictions.

derived Operating System, with other software products.

Printing with the S6300 should be limited to using the serial ports for the printers. The parallel port can be used, but printing is not as stable as with the serial ports.

The hardware configuration for the S6300 system is

- 1-6 terminals
- 1-2 mb of memory
- 40 mb of disk
- PT30 or PT34 connected to the serial port.

The disk requirements for the S6300 UNIX-derived Operating System are:

- 11.8 MB for the full UNIX-derived Operating System
- 6.3 MB for UNIVIEW
 - .11 MB for PASCAL (non-Uniview)
 - .15 MB for PASCAL (Uniview)
 - .15 MB for COBOL (Uniview run-time)
 - .13 MB for COBOL (non-Uniview run-time)
 - .58 MB for COBOL (Uniview/non-Uniview compiler)
- 5.0 MB for ORACLE

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1.1 Minimum Revision Levels for Boards for 2.0 Release

For release 2.0 the following revision level boards and/or proms must be in place.

1. PROM 22 Only
2. If the CPU board is revision D or higher, memory boards revision B must be used.
3. Earlier revision than D on the CPU board, memory boards revision A or B may be used.

2.0 Contents of the Distribution Floppy(s)

The 6300 UNIX-derived Operating System under this release is only available on floppies.

The UNIX-derived Operating System Release 2.0 consists of 3 sets of floppies (total 24 floppies) The first set of floppies are used to install a minimal set of UNIX software onto the winchester. The second and third set of floppies contain the remaining UNIX utilities that comprise the full UNIX system. If the user wishes not to have the full set of UNIX utilities, then the user can install sets 1 and 2. The UNIX distribution floppies are hereafter referred to as UTILSET 1, UTILSET2, and UTILSET 3.

The 3 sets of distribution floppies consists of the following:

UTILSET 1 - (total of 7 floppies)

floppy marked "1 of 7" is the diagnostic disk that is used to format the winchester/floppy and install the UTILSET 1 distribution floppies.

floppy marked "2 of 7" is a copy of partition 0 of the winchester.

floppies "3 of 7" thru "7 of 7" is a copy of partition 1 of the winchester.

UTILSET 2 - (total of 8 floppies)

floppies "1 of 8" thru "8 of 8" contain the next level of UNIX utilities.

UTILSET 3 - (total of 9 floppies)

floppies "1 of 9" thru "9 of 9" contain the remaining UNIX utilities

3.0 Installation Procedures

These installation procedures describe how to backup and restore special system files, how to format the Winchester disk, and how to install and boot the minimal operating system UTILSET 1. Once UTILSET 1 has been installed, all subsequent upgrades of software are executed using the software "upgrade" package. The program "upgrade" is installed as part of UTILSET 1 and is executed by the user "root" to upgrade the system with UTILSET 2, UTILSET 3, and other software products.

See the S6300 Software Installation Guide and the individual product Software Release Notices for specific information on installation.

When you install/upgrade the UNIX-derived Operating System Release 2.0 on your 6300 system you will have to format/reformat the Winchester disk. This is done by using the diagnostic floppy, marked as number 1 of 7 of UTILSET 1. Parameter values for the formatting, such as block sizes etc, are dependent on the hardware and software configuration of your system. The main factors when deciding those values are:

- o The size of the Winchester disk
- o The level of the UNIX-derived OS you want to install
- o The combination of other software products you want to install on your system.

You can find the formatting information pertinent to your system in the table in section 3.2 of this document. Once you have decided what values are appropriate for your system you can start the installation of the new release of the operating system.

However, if you want to upgrade an existing system, then you must be aware that the installation instructions in section 3.2 of this document will cause the entire root partition to be overwritten and will replace the entire file system that currently exists there. Therefore, any system files that you have customized or any files of your own in the root partition you want to preserve should be backed up before the installation procedure begins. In that case you will have to read and follow the instructions in section 3.1 of this document, "Upgrading an Existing System".

To summarize the above: If you are installing a new system from scratch on a blank disk, or if you want to replace an existing system entirely, then you can go directly to the installation procedure starting from section 3.2, "Preparing a Blank Disk for Installation".

If you want to preserve files from an existing system the you need to read section 3.1, "Upgrading an Existing System", before you start the installation.

3.1 Upgrading an Existing System

If you have files on the existing system that you want to save you have to back them up to floppy disks before you start the installation and then restore them after the upgrade of the Operating System is finished. Files in the root partition file system that are likely to be customized are such files as:

/.profile	/etc/unmountable
/etc/passwd	/etc/ttytype
/etc/rc	/etc/inittab
/etc/gettydefs	/usr/lib/uucp/L.sys
/etc/groups	/usr/lib/USERFILE
/etc/profile	/usr/lib/crontab
/etc/checklist	/usr/spool/lp
/etc/mountable	

It must be understood that if these types of customized system files are backed up before an installation and restored after and installation, any new features of the release must still be incorporated into the customized system files. This must be taken care of after the installation is completed to insure system integrity.

3.1.1 How to Find Files that have Changed

In order to save parts of an old system, e.g. user files or customized system files, you might want to find out which files have been changed since a certain date. You can create a list of those by following the instructions give below.

For example, if you want to find out which files on your system have been changed since noon March 31st, 1984, you will have to execute the following UNIX-commands:

- 1 Login to your system as 'root'.
- 2 Execute the following commands to create a file named /tmp/xxxlist containing a list of files changed since 3/31/84.

```
cd /  
touch 0331120084 /tmp/xxxdate  
find . -type f -newer /tmp/xxxdate -print > /tmp/xxxlist
```
- 3 You now have the file /tmp/xxxlist containing the changed files. You can look at this file and edit it via the editor 'ed' or 'vi' removing those files that you don't want to preserve/backup.
- 4 When you are satisfied with the contents of /tmp/xxxlist you can save/backup the files to floppies by executing the cpio-command below. Before you execute this command make sure that the files will

fit on one floppy and that the floppy is formatted and mounted:

```
cpio < /tmp/xxxlist -pdaml /flp
```

3.1.2 How to Find the Size of the Swap Area

Also, if the size of the swap space on your system is to be changed and you want to save the contents of the user area then you need to backup your system's user area before you upgrade the Operating System. To do this just follow the below given instructions.

The swap space is called partition #2 and the user file system is called partition #3 in UNIX. To find out if the swap space will be changed you will have to compare the size of the existing swap space (partition #2) to the new value you find in table in section 3.2. You can find out the size of the existing swap area by doing the following:

- 1 Insert the diagnostic floppy in the disc drive and boot the terminal as a RS-232 terminal.
- 2 After approximately 20 seconds you will get a system message and the following prompt on your screen:

command>

Enter: pm <RETURN> to set the terminal to 'page mode' so that it displays one page at a time and prevents the information from scrolling from the screen before you can see it.

- 3 Enter: .6,12 <RETURN> to present the current values of the home volume block.

Look for the size of partition #2 and compare this value to the new value you have selected from the table in section 3.2.

3.1.3 How to do a Volume Copy

In order to do a volume copy just follow the instructions given in the "6300 Administrator's Guide". However, there are a few precautions you have to be aware of before you execute the /etc/volcopy command to backup a file system. If you volcopy the root file system (partition #1 or /dev/fp001) from single user mode, you must have the stand-alone shell floppy to re-install it onto /dev/fp001.

- 1 Directory /dev/fp020 must exist on your system. If it doesn't,

login as 'root' and execute the following commands.

```
mknod /dev/fp020 b 0 32
chmod 400 /dev/fp020
```

- 2 The file system to be backed up should be labeled and follows:

```
/etc/labelit /dev/rfp003 user Winche
```

- 3 The floppy disks should be formatted and labelled using the following commands:

```
/etc/iv /dev/rfp020 /usr/lib/iv/desc.flpy
/etc/labelit /dev/rmt1 user backup -n
/etc/dismount -f
```

Instead of 'backup' you may use whatever 6-character name you wish.

- 4 The actual backup itself is easy (see page 6-2 in the "6300 Administrator's Guide". Execute the command:

```
/etc/volcopy -a user /dev/rfp003 Winche /dev/rmt1 backup
```

Volcopy will tell you how many floppy disks are needed. If the labelling is inconsistent, volcopy will also ask you to override the wrong labels.

- 5 After filling the first floppy, volcopy prompts for the next floppy:

```
Changing drives? (type RETURN for no, /dev/rmt_ for yes:
```

```
Answer: y <RETURN>
```

You will then be prompted to enter the volume name when it has been mounted.

```
Mount tape nn
Type volume-ID when ready:
```

```
Answer: backup <RETURN>
```

This will be repeated for as many floppy disks as needed.

- 6 Volcopy dismounts floppies when changing disks, but you have to dismount the last one by yourself. Just enter the following:

```
/etc/dismount -f
```

CAUTIONS:

To restore a total backup, do:

```
/etc/volcopy -a user /dev/rmt1 backup /dev/rfp003 Winche
```

There is an error in the 6300 Administrator's Guide where the two first parameters have been reversed. For individual file restoration, do not use the 'frec' command. It contains a bug.

3.2 Preparing a Blank Disc for Installation.

The fixed hard disc on your system must be configured prior to the installation of the operating system or any other software. In order to accomplish this you activate a utility program that is contained on the diagnostic diskette. The terminal must be booted as a RS-232 terminal. When the utility is executed it begins asking you for information about how you want the fixed hard disc configured. This section provides you with the information necessary to respond to the prompts (questions) that the system asks.

The Winchester disk is divided into several partitions of the installation process. There must be at least three partitions but there are normally not more than four. The partitions are used as follows:

- Partition 0 Information required to initialize the system and describe this disc.
- Partition 1 A UNIX file system that contains essential operating system files.
- Partition 2 Swap space for code and data of running processes.
- Partition 3 A second UNIX file system.

User files may be placed in either UNIX file system (partition 1 or 3). The files in a file system can be completely backed up or restored together. Selected files or changed files may also be backed up or restored individually.

Each file system is divided into two parts when initialized. The first part contains file headers (called 'inodes'). Partition 1 uses 252 blocks for inodes, and other partitions use about 6.3% of the blocks in the partition for inodes. The remainder of each file system is used for file data.

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You must use the size of your disc and your intended software to plan the sizes of the disc partitions for this installation. The size of your Winchester disc is specified as either 10 MegaByte (MB), 20 MB, or 37 MB. If you have a 37 MB disc and intend to run UNIVIEW, then you need a larger swap area (partition 2) to support multiple users and multiple windows. For each case the table on page 12 gives the recommended sizes of partitions 0, 1, and 2, and the amount of disc space available for UNIX files (both operating system and user files). The sizes for the partitions are given in 1024-byte blocks.

The UNIX operating system software has been divided into three subsets. They are called Utility set (Utilset) 1, 2, and 3. The essential files are in Utilset 1, most frequently used files are in Utilset 2, and the rest of the release is in Utilset 3. You may choose to install sets 1, 1+2, or 1+2+3. In addition you should plan to have at least 1500 blocks free for user files after installing the operating system. The tables on page 12 show the remaining user disc file space after installing any of the three combinations.

Study the tables on page 12 carefully before you start formatting the Winchester and installing the operating system according to the following procedure:

1. Hold the space bar on the keyboard down and turn power switch located on the left side of the terminal to the "ON" position. Release the space bar when the red lights on the keyboard go out.

2. The following prompt is displayed:

B,C,E,F,M,R,S,T:

Enter: E

3. Insert the diagnostic floppy, #1 of 7 of UTILSET 1, with the label facing left and close the drive door. Boot the 6300 by pushing the RESET button on the back of the processor unit.

4. Within approx. 20 seconds the following message appears on the terminal.

MINIFRAME MC68010 DIAGNOSTIC DEBUGGER (version)

MINIFRAME DIAGNOSTICS -V (Release #)
Parity interrupts disabled,
memory tests will begin at 2B000, end at FFFC

The following prompt is displayed:

command >

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Enter: i <RETURN> (to format the Winchester)

5. The following question is displayed:

Do you want to format the Winchester?

Answer "y" <RETURN>

6. The fixed disc configuration prompts now begin. In response to each prompt, supply the information in the table below pertinent to the size of the Winchester disk, the level of UNIX-derived Operating System you want to install, and to the combination of other software products you intend to run on your system. After entering each response to a configuration prompt, press RETURN. Where <RET> is indicated, it is only necessary to press RETURN once.

NOTE: During format prompts, the system does not recognize the backspace or left-arrow keys. If you make a mistake typing any response, you must boot the 6300 (using the diagnostic floppy-- step 3 above) and start the format from the beginning.

TABLE FOR CONFIGURATION OF WINCHESTER DISC

PROMPTS	10 MB DISK	20 MB DISK	37 MB DISK WITHOUT UNIVIEW	37 MB DISK WITH UNIVIEW
Give # of cylinders	214	640	645	645
Give # of tracks per cylinder	6	4	7	7
Give # of sectors per track	17	17	17	17
Give pack name (max chars)	<RET>	<RET>	<RET>	<RET>
Does the drive use head select bit 3	n	n	n	n
Give step rate	0	0	0	0
Give size of partition 0	408	480	2448	2448
Give size of partition 1	8364	16000	16000	16000
Give size of partition 2	1500	4000	4000	8000
Give size of partition 3	n/a	n/a	13672	9672
Do you want a Loader	Y	Y	Y	Y
Give start Logical Block	2	2	2	2
Give size in blocks	9	9	9	9
Do you want a Dump Area	Y	Y	Y	Y
Give start Logical Block	400	400	400	400
Give size in blocks	8	80	2048	2048
Do you want a Down Load File	Y	Y	Y	Y
Give start Logical Block	11	11	11	11
Give size in n blocks	300	300	300	300
Do you want a Bootable Program	n	n	n	n

After the last question is answered, the computer will start to format the

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Winchester. You can tell if it is running by looking into the vent at the bottom right corner on the front of the processor unit. A red light on the Winchester should be on or blinking, if it is not press RESET and type i from the command> prompt and begin the procedures again. If this fails contact your Customer Service Representative.

The formatting process takes two to twelve minutes, depending on the size of your disc. The larger the disc, the more time that is required for formatting.

If the format process finds bad blocks, they are displayed on the terminal and entered into the bad block table. The message, "Bad block table contains xx entries", should be displayed on your terminal (xx is typically a number between 0 and 30). The bad block check flags those areas on the fixed disc that may not record information properly. The processor makes a note of these bad areas in the table and then remembers not to write information to them.

If any other message appears, RESET the processor and return to step 3.

The process is complete when the following prompt is displayed on your terminal. (It takes several minutes for it to appear.)

Enter the partition # to install:

Your system is now ready to install software. Proceed to next section "Installing the Minimal Operating System".

3.3 Installing the Minimal Operating System

The procedures that follow install the minimal UNIX-derived operating system. You have 3 sets of diskettes, one for the minimal operating system UTILSET 1, (7 diskettes), and 2 sets of extended utilities UTILSET 2, (8 diskettes), and UTILSET 3, (9 diskettes). UTILSET 2 and 3 are installed after the minimal subset using the software upgrade package.

The software upgrade utility is on your system once the minimal operating system has been installed. You use it to install UTILSETS 2 & 3 and any other software you wish.

1. After the formatting is done, the installation phase will begin, and the following prompt is displayed:

Enter the partition # to install

Enter: 0 <RETURN>

NOTE: As each floppy is installed, place them face down in a single

pile, in order to keep track of where you are in the sequence.

2. The following prompt is displayed:

Insert floppy #2, type RETURN when ready (or ESCAPE to cancel)

Insert floppy #2 of 7 of UTILSET 1 into the drive, close the door, and press RETURN.

The following message is displayed:

Volume Name: Floppy
DISK TEST Winchester

NOTE: If you make a mistake and insert a floppy out of sequence, the system will tell you with the following message: Floppy not in sequence, number xx. It will also tell you the correct one to insert. Place the correct floppy into the drive with the notch (foil label) on the bottom.

3. The following prompt is displayed when floppy #2 is read:

(Subtest 18) Install partition from floppies.
Volume Name: Winche
Enter the partition # to install

Enter: 1 <RETURN>

You will be prompted to insert floppy #3 up to floppy #7 in sequence. The following message is displayed:

Volume Name: Floppy

NOTE: You can get out of this process at any time by hitting the escape key.

4. After all diskettes of UTILSET 1 have been installed, the following prompt is displayed:

command >

Remove floppy #7 and leave the drive door open (this will allow the system to boot from the Winchester).

Proceed to next section, "Booting the Minimal Operating System".

3.4 Booting the Minimal Operating system

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The minimal operating system is now installed. What must be done next is to activate it. To do this the processor and terminal must be rebooted. The terminal must be set up as an RS-422 terminal. By following the procedures below, you bring up the operating system for use.

1. Boot the terminal as an RS-422 terminal by turning the power switch on the left side of the terminal OFF and then ON again.
2. Reboot the system by pushing the RESET button on the back of the processor unit.

The system will run 'fsck' and bring up the system. A number of system messages will appear on the screen. This takes 2 - 3 minutes. When finished, the screen will display:

login:

The system is now ready to install UTILSET 2 & 3 and other software products. Proceed the installation according to the instruction in the S6300 Software Installation Guide.

3.4.1 How to Set Current Date and Time.

After an initial system boot, the current date and time must be manually entered. The user should sign onto the system as "root" and execute the date utility to enter the date/time using the following format:

1. Execute `ps -ef`
2. Find the PID for cron
3. Execute `kill xx`, where `xx` = process id for cron
4. Change the date executing,
`date mmddhhxxyy` where (mm = month, dd = day, hh = hour,
xx = minute, yy = year)
5. Execute `cron`

The S6300 system should never be stopped or re-booted without first running either shutdown or halt.

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In instances where fsck requires manual intervention to correct file system problems, the system should be in single user mode before fsck is executed manually. The user should sign onto the system as root and execute "telinit S" to bring the system in single user mode. Then execute "fsck" to correct the problems.

3.5 Installing UNIX Print Spooling System

There are two UNIX commands that may be used to print UNIX files. They are `lp(1)` and `lpr(1)`. It is possible to set up a system so that both of these commands can be used, but most likely one or the other would be used. The advantages/disadvantages of each command are listed below.

`lpr(1)` advantages:

- There is very little that has to be done to the system before this command can be used.

`lpr(1)` disadvantage:

- You can only reference one printer using the `lpr` command

`lp(1)` advantages:

- Multiple printers may be configured.
- A system default printer may be specified.
- The cancel command may be used to cancel requests that were made by the `lp(1)` command.
- `lpstat(1)` prints information about the current status of the printers connected to the system.

`lp(1)` disadvantages:

- There are more steps to execute and more potential for something to go wrong.

To check the UNIX Spooling system status, execute:
`/usr/bin/lpstat -t`

Something similar to the following should display:
scheduler is running
system default destination: ppr
device for ppr: /dev/lp
ppr accepting requests since Feb 7 14:01
printer ppr is idle. enable since Feb 27 14:03

The PT34 (Centronics 353) printer needs to be configured for either serial or parallel selection before printing. For complete details, reference the Centronics 353 User Manual.

The following sections contain the installation procedures for setting up the two UNIX printcommands, `lp(1)` and `lpr(1)`. For the `lp(1)` command, printer name "spr" is used here for a serial printer and "ppr"

for a parallel printer. There must not be a getty running on tty001 if a printer is connected to that port.

3.5.1 Procedures to install UNIX LP(1) Command under stand alone UNIX 2.0

3.5.1.1 PT30xx (Diablo 630) Serial Printer connected to tty001

Before you make the software installation please make sure the following cable part numbers and printer switch settings are correct:

Cable Part Numbers:

- o 82030601
- o 82030621
- o 82030631

Printer Rotary Switches:

- o Left: 7
- o Right: 1

Printer Dip Switches:

- o Left: all switches off
- o Right: switches 3 and 5 on all others off.

Software installation:

Login in S6300 as root and execute the following commands:

1. cd /usr/spool/lp/model
2. cp pprx FP.pr

Replace the line in FP.pr that look like:

```
) | /usr/lib/pprx
```

with

```
) | awk '{printf "%s^M\n", $0}'
```

where^M is generated in 'vi' by entering CNTRL V CNTRL M.

3. /usr/lib/lpadmin -pspr -v/dev/tty001 -i/usr/spool/lp/model/FP.pr
4. /usr/lib/lpadmin -dspr
5. /usr/lib/accept spr
6. /usr/bin/enable spr
7. rm -f /usr/spool/lp/SCHEDLOCK

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8. /usr/lib/lpsched
9. nohup sh -c "exec sleep 2000000 > /dev/tty001" &
10. stty 1200 oddp ignpar cread ixon ixany < /dev/tty001
11. To print, type: lp -dspr filename

3.5.1.2 PT34xx (Centronics 353) Serial Printer connected to tty001

Before you make the software installation please make sure the following cable part numbers and printer switch settings are correct:

Cable Part Numbers:

- o 82030561
- o 82030792
- o 82030802

Printer Switch Setting Procedure:

1. Press MODE to display "HOR TAB"
2. Press OVRD TEST to display "CONFIG"
3. Verify each of the following, pressing MODE to step through each setting. Use STEP and ENTER to change a setting.
 - o 960 (baud rate 9600)
 - o 1 1 (serial interface)
 - o 2 2 (seven data bits)
 - o 3 0 (no parity)
 - o 4 3 (x-on/x-off buffer status)
 - o 5 3 (x-on/x-off printer status)
 - o 6 1 (reverse channel active high)
 - o 9 0 (data strobe normal)
 - o 10 0 (normal data bit 8)
 - o 11 1 (normal bit 8 control)
 - o 12 0 (703 control)
 - o 13 0 (prime on select disabled)
 - o 14 0 (prime on delete disabled)
 - o 15 1 (paper motion cause print with CR)
 - o 16 1 (page mode enabled)
4. When all settings have been verified press MODE until "MEMORY" appears. Press ENTER to save the selections.
5. The printer may now be put on-line.

Software Installation:

Configure the printer for serial interface.

Login in S6300 as root and execute the following commands:

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1. `cd /usr/spool/lp/model`
2. `cp pprx FP.pr`

Replace the line in FP.pr that look like:
 `) | /usr/lib/pprx`
with
 `) | awk '{printf "%s^M\n", $0}'`

where ^M is generated in 'vi' by entering CNTRL V CNTRL M.
3. `/usr/lib/lpadmin -pspr -v/dev/tty001 -i/usr/spool/lp/model/FP.pr`
4. `/usr/lib/lpadmin -dspr`
5. `/usr/lib/accept spr`
6. `/usr/bin/enable spr`
7. `rm -f /usr/spool/lp/SCHEDLOCK`
8. `/usr/lib/lpsched`
9. `nohup sh -c "exec sleep 2000000 > /dev/tty001" &`
10. `stty 9600 -parenb -parodd cs7 ignpar cread ixon ixany < /dev/tty001`
11. To print, type: `lp -dspr filename`

3.5.1.3 PT30xx (Diablo 630) Parallel Printer connected to parallel port

Before you make the software installation please make sure the following cable part number and printer switch settings are correct:

Cable Part Number:

- o 82030641

Printer Rotary Switches:

- o Left: 7
- o Right: 1

Printer Dip Switches:

- o Left: all switches off
- o Right: all switches off.

Software Installation:

Login in S6300 as root and execute the following commands:

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1. cd /usr/spool/lp/model

2. cp pprx FP.pr

Replace the line in FP.pr that look like:

```
    ) | /usr/lib/pprx
```

with

```
    ) | awk '{printf "%s^M\n", $0}'
```

where^M is generated in 'vi' by entering CNTRL V CNTRL M.

3. /usr/lib/lpadmin -pppr -v/dev/lp -i/usr/spool/lp/model/FP.pr

4. /usr/lib/lpadmin -dppr

5. /usr/lib/accept ppr

6. /usr/bin/enable ppr

7. rm -f /usr/spool/lp/SCHEDLOCK

8. /usr/lib/lpsched

9. To print, type: lp -dppr filename

3.5.1.4 PT34xx (Centronics 353) Parallel Printer connected to parallel port.

Before you make the software installation please make sure the following cable part number and printer switch settings are correct:

Cable Part Number:

- o 82030661

Printer Switch Setting Procedure:

1. Press MODE to display "HOR TAB"
2. Press OVRD TEST to display "CONFIG"
3. Verify each of the following, pressing MODE to step through each setting. Use STEP and ENTER to change a setting.
 - o 960 (baud rate 9600)
 - o 1 0 (parallel interface)
 - o 2 2 (seven data bits)
 - o 3 0 (no parity)
 - o 4 3 (x-on/x-off buffer status)
 - o 5 3 (x-on/x-off printer status)
 - o 6 1 (reverse channel active high)
 - o 9 0 (data strobe normal)
 - o 10 0 (normal data bit 8)

- o 11 1 (normal bit 8 control)
 - o 12 0 (703 control)
 - o 13 0 (prime on select disabled)
 - o 14 0 (prime on delete disabled)
 - o 15 1 (paper motion cause print with CR)
 - o 16 1 (page mode enabled)
4. When all settings have been verified press MODE until "MEMORY" appears. Press ENTER to save the selections.
 5. The printer may now be put on-line.

Software Installation:

Configure the printer for parallel interface.
Login in as root and execute the following commands:

1. cd /usr/spool/lp/model
2. cp pprx FP.pr
Replace the line in FP.pr that look like:
) | /usr/lib/pprx
with
) | awk '{printf "%s^M\n", \$0}'
where ^M is generated in 'vi' by entering CNTRL V CNTRL M.
3. /usr/lib/lpadmin -pppr -v/dev/lp -i/usr/spool/lp/model/FP.pr
4. /usr/lib/lpadmin -dppr
5. /usr/lib/accept ppr
6. /usr/bin/enable ppr
7. rm -f /usr/spool/lp/SCHEDLOCK
8. /usr/lib/lpsched
9. To print, type: lp -dppr filename

3.5.2 Procedures to install UNIX LPR(1) Command under stand alone UNIX 2.0

3.5.2.1 PT30xx (Diablo 630) Serial Printer connected to tty001

Before you make the software installation please make sure the following cable part numbers and printer switch settings are correct:

Cable Part Numbers:

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- o 82030601
- o 82030621
- o 82030631

Printer Rotary Switches:

- o Left: 7
- o Right: 1

Printer Dip Switches:

- o Left: all switches off
- o Right: switches 3 and 5 on all others off.

Software installation:

Login in as root and execute the following commands:

1. ln /dev/tty001 /dev/lp
2. nohup sh -c "exec sleep 2000000 > /dev/tty001" &
3. stty 1200 oddp opost onlcr ignpar cread ixon ixany <
/dev/tty001
4. To print, type: lpr filename

3.5.2.2 PT34xx (Centronics 353) Serial Printer connected to tty001

Before you make the software installation please make sure the following cable part numbers and printer switch settings are correct:

Cable Part Numbers:

- o 82030561
- o 82030792
- o 82030802

Printer Switch Setting Procedure: Refer to paragraph 3.5.1.2

Software Installation:

Configure the printer for serial interface.

Login in as root and execute the following commands:

1. ln /dev/tty001 /dev/lp
2. nohup sh -c "exec sleep 2000000 > /dev/tty001" &
3. stty 9600 -parenb -parodd cs7 opost onlcr ignpar cread ixon
ixany < /dev/tty001

4. To print, type: `lpr filename`

3.5.2.3 PT34xx (Centronics 353) Parallel Printer connected to parallel port.

Before you make the software installation please make sure the following cable part number and printer switch settings are correct:

Cable Part Number:
o 82030661

Printer Switch Setting Procedure: Refer to paragraph 3.5.1.4

Software Installation:

Configure the printer for parallel interface.

Login in as root and execute the following commands:

1. `ln /dev/plp /dev/lp`
2. To print, type: `lpr filename`

4.0 Performance

Performance information is not included in this release.

5.0 UNIX Information

5.1 Changes From the Previous Release

5.1.1 New Features

- o Berkeley "libcurses" is now supported.
- o The ps command -l option now prints the resident set size and total size of a process in 4096 byte quantities.
- o The /etc/issue(4) file usage has been added to getty(1M)
- o The fuser command is provided.
- o A reboot command is provided.
- o Process accounting (see acct(1)) is provided.
- o System measurement tools sag(1), sar(1M), and timex(1) are provided.
- o The commands uucp(1), cu(1), and now supported, both for direct and dialup lines.
- o Modem and auto-dialer support are included. The new file "/usr/lib/uucp/modemcap" is used by a revised dial(3C) function and by uucp to use various smart modem/autodialers. Using a syntax like that of "termcap", it describes several autodialers, and offers an easy way to add more descriptions. See the "modemcap" file itself for more detail.
- o The standard C compiler (cc, /lib/ccom) now generates 10 - 20% less code than the cc of release 1.09. Release 2.0 cc is derived from 1.09 ncc plus some additional bug fixes.
- o Performance is equal or better on 2.0 than on 1.09. Specifically, CPU performance is improved on both kernel and user programs via use of the new C compiler. Programs are smaller, and hence load faster and use less space on disc and in memory, and require less paging. The shell's data space has been reduced, so that shell forks run much faster.
- o Crash(1M) is provided.
- o Volcopy and cpio will dismount the floppy between floppies in a multi-volume backup to the raw device.

5.1.2 Bug Fixes

- o The C compiler used to fail with the message "no table entry for op REG" when a shift of more than 8 occurred and all six data registers were declared, this is now fixed.
- o Some floating point conversion used to generate incorrect code that often led to a floating point trap.
- o The C compiler now generates correct code to use "short" variables as subscripts in multi-dimensional arrays.
- o Attaching shared memory and then forking used to cause either immediate crashes or lingering problems. These are fixed.
- o It used to be possible to crash the system by presenting exactly the wrong arguments to some system calls. For example, reading 4 bytes into location -1 caused a crash. These loopholes have been fixed.
- o uucp now works with other machines. As shipped in 1.09, UNIX systems worked with other UNIX systems (and some other MC68000-based systems), but not with DEC VAX's or PDP-11's, or various others. This was due to a machine-dependency bug in the original Bell code, which has been fixed in the same way as Bell is doing. Thus UNIX 2.0 systems communicate with most other machines, except, possibly those MC68000 systems that still face the same problem. UNIX 2.0 systems do not communicate with standard UNIX 1.09 systems.
- o The only module that must be changed is /usr/lib/uucp/uucico, so it can be copied into a 1.09 systems without changing anything else. (Make sure that its owner is uucp and that its mode is 4111, i.e., setuid uucp). If you have a remote machine (or a 6600) that can only be updated via uucp, do the following: first, make a copy of the new uucico on a 1.09 machine. Then, use the old uucico to copy the new one to the other machine. Install the new one in both places.
- o Full demand paging is now reliable.
- o iv now works under the UNIX-derived Operating System, and may be used to format floppies and for updating slice 0 on the Winchester.
- o ps now works on swapped out processes.
- o The sticky-bit now works.
- o The format of the volume home block has been changed. 2.0 software works with either old or new format. The diagnostic can convert from old to new or vice-versa (V28 and above diagnostics).

- o Messages and semaphores now work when user data has been paged out. This was responsible for the panic "bad rmfree". SER # CTMIN013

5.2 Compatibility with Unix System V

5.2.1 Omitted Features

As shipped by Western Electric, System V is a huge system. Not all parts of it are needed in any particular installation, and not all parts of it have been included in this UNIX-derived Operating System release. Most of these portions are either not relevant to the S6300 hardware, or are scheduled for later releases. These portions include; device error logging, powerfail recovery, support for synchronous terminal drivers, and troff.

Future releases of the UNIX-derived Operating System will include support for troff and full shared memory.

5.2.2 Modified Features

The UNIX-derived Operating System is System V compatible with a very modest number of adjustments for the S6300 environment.

The default terminal speed has been changed from 300 to 9600 baud.

The names of character special devices for terminals have been changed from having 2 digits to having 3 digits. Thus special terminal files are named /dev/tty000 instead of /dev/tty00.

The default erase character for line editing has been changed from '#' to backspace.

The names of the special device files for disks start with fp for blocked devices and rfp for the character device. The first digit is zero, the second digit identifies the disk, (0 = Winchester, 2 = Floppy). The third digit specifies the partition (0 to F). The minor device number is similar: multiply the second digit by 16 and add the partition number.

All S6300 disks use partition 0 as a reserved area holding volume home blocks, bad block tables etc.

Partition 1 of the Winchester contains the root file system.

Partition 2 of the Winchester contains the swap area.

The node name in /etc/rc has been modified to S6300.

Added setuname -r 2.0 to /etc/rc

5.2.3 Additional UNIX-derived OS Features

Additional commands not in the standard System V distribution have been added to the UNIX-derived OS. See the manual entries for more(1), head(1), path(1), in the Series 6000 Operating System Reference Manual.

A multiple output column option has been added to the ls(1) command. See the -c option of that command.

The UNIX-derived Operating System supports record locking

fsck does not output the message "BOOT UNIX -- DON'T SYNC" and the extra boot/fsck sequence is not required.

fsck returns a non-zero status if it cannot fix up the file system without manual intervention.

The setuname(1) command, and setuname(2) system call set the parameters displayed by uname(1). Of special use is "setuname -n NAME", which sets "nodenames".

The command /etc/devnm identifies the special file associated with a named mounted file system. Its primary use is in the /etc/rc startup script to discover that the file system "/" is associated with the special file "/dev/fp001".

The "hd" command is a hexadecimal dump program that outputs both hex and character representation of the named files.

The "halt" command (/etc/halt) is an alternative to the /etc/shutdown command. Shutdown is described in the Operating System Manual entry for shutdown(1M). Shutdown is intended for use on a system that is actively supporting many users, and it deliberately pauses for 30 seconds between major steps. "halt" is a faster version of shutdown that takes the system to single user without delays. It is intended for systems with just one or two active users, where less warning is desired. Both commands kill off all user processing except for that of the administrator executing the shutdown or halt.

5.3 Customizable UNIX-derived Operating System Files

After the release is installed, the UNIX system administrator will want to customize several UNIX-derived Operating System administration files. This customization process will probably include the following actions:

Add mount commands to the file /etc/mountable for each partition in use; /etc/mountable is executed from /etc/rc. A list of the special files to be checked at boot time by fsck should be placed into the file /etc/checklist. See Series 6000 Operating System Reference Manual entry checklist(4) for a description of this file.

The timezone variable TZ in the file /etc/TZ as shipped is set to the Pacific timezone. See the Series 6000 Operating System Reference Manual entry ctime(3C) for a description of this variable.

5.4 Known Problems and Deficiencies in UNIX-derived OS System Software.

The shared memory implementation in this release locks the shared data in memory.

System calls cannot be single stepped with adb.

The handling of /dev/console, /dev/syscon, and /dev/systty by the init(1M) process is not yet finalized.

The Operating System Manual entry issue(4) for the file /etc/issue should not be used. As shipped with System V and UNIX-derived OS, this file is not used.

The -f option of ps command does not display command line arguments.

The commands sadp(1M), dcopy(1M), and ct(1) are not yet implemented.

The shell sh(1) has its data area fixed at 36K bytes.

User processes cannot catch signals such as those caused by an invalid memory reference during a partially completed instruction and then expect to restart the interrupted instruction.

The factor(1) command will crash if fed a long line of input.

Vfork is not supported in this release.

The tar pipeline to move a directory hierarchy will hang if run in background.

Sort on a large file containing a single word causes sort to core dump.

The file(1) command has a performance bug that causes a couple of seconds pause on the first line of output.

5.5 System V errors as well as UNIX-derived OS

The egrep, fgrep, and file commands send errors to stdout, not stderr.

The ps command does not work properly if stderr is redirected.

The "du -r" option has trouble with the 33-rd file in a directory.

The "h" command in "sed" works incorrectly.

There is an ancient and still existent bug in the passwd(1) program that replaces blank lines in /etc/passwd with the line "::0:0:::" which allows anyone to obtain root privileges without knowing the root password. Avoid placing blank or invalid lines in /etc/passwd, and use the program /etc/pwck (see manual entry pwck(1M)) to check the format of the passwd file.

5.6 SERs Not Fixed in this Release

CTMIN001

awk does not get the nf variable to the number of fields in the input line. The variable nf always equals 0.

CTMIN004

ls -i does not display the i-nodes numbers. The -i option only works with -l -o or -g listings.

CTMIN009

The utility "who am i" gives no response on /dev/tty020 when /dev/syscon is linked to it.

CTMIN024

fscanf ("%D", & (PTR > x.y)) does not work.

CTMIN027

uustat -k will result in a memory fault.

CTMIN028

A uux call that is queued does not display when you execute a

uustat request.

CTMIN030

pr of a file that contained 28 entries produced a file that contained two pages with the last 8 lines of the file appearing on the second page.

CTMIN033

If the first instruction of a "for" loop is an "if" instruction of certain type only the last iteration is executed.

CTMIN034

A file that contains long strings of data preceded by escape sequences to set graphics mode and VMI (Diablo 630) is not printed correctly if the parallel port is used. Data lines are truncated and form feeds are sent to the printer without being requested. The same file prints perfectly when the printer is attached to the serial port.

CTMIN036

Using the Unix-derived OS 2.0 pre-release with following C-code:

```
main()
  printf("TRYING TO EXECUTE A RETURN.../N");
  return (0);
  printf("RETURN FAILED.../N");
```

Execution of a.out prints out:

Trying to execute a return...return failed...

The return code is never executed. Upon further investigation, the assembly code generated by the compiler shows no rts after the first call to printf.

CTMIN037

Any 6300 system when using ipc messages, if both the send and receive message buffer is dynamically allocated, and the size "mtext" is a multiple of 4 bytes or $(N * 4 \text{ bytes}) - 1$, then the receive process will hang inside a malloc() call after receiving a message.

CTMIN040

System does not check status of dsr & cts before transmitting data on RS-232 port. If the attached RS-232 device is disconnected after open (), data is lost with no indication given to program.

CTMIN041

If the system is rebooted when dtr & rts are asserted, the signals are not reset. Data is lost because the attached device continues to transmit to the S6300.

CTMIN042

The program 'bsccp' communicates to a protocol converter via an RS-232 port. The converter uses x-on/x-off protocol. If the converter issues x-off, then an attempt is made to terminate the program. The program hangs until x-on is received from

the converter. In a single terminal configuration, if the converter cannot be forced to send x-on, the S6300 must be rebooted to regain use of the terminal.

CTMIN044

The sleeping process that is started by /etc/rc dies when a user logs on as root and then logs off.

CTMIN045

vi, more, and iap (Oracle) all have problems with cursor control sequences not working correctly on TM30 terminals. Typically the top line of the screen is lost.

CTMIN046

System sometimes stops during the boot procedure. One or more machine resets clears the problem.

CTMIN055

Executing mklost+found on a floppy disk gives an error message as follows:

```
TEE : CANNOT OPEN 9D.  
TEE : CANNOT OPEN 9F.  
.  
.  
.  
TEE : CANNOT OPEN F0.
```

CTMIN057

The dismount -f command was issued with the floppy door left open. The system crashed but re-booted successfully.

CTMIN058

The maximum size of a UNIX-derived OS file is 1MB (ulimit is 2048). Currently the Release 2.0d system is distributed with the system wide file size limit set to 1 MB. Sysgen is required to change the system wide limit. An alternative method is allowed for super user processes. The Oracle 3.1.4 distribution supplies a program osh which must be inserted in their .profile. osh increases the ulimit to the maximum legal value.

CTMIN061

Spurious processes are created when a ps -ef command is performed. There sometimes are non useful and unrelated processes created for tty000 and tty001.

CTMIN061

On some 6300 systems the mode of /dev/tty001 (the uucp line) will mysteriously change. The mode should be set to 666 for communications, but it will change, sometimes back to 444 which will not work for communications. It cannot presently be determined what events lead to the change.

FE03001

Change directories to /user/uniview/release/pro/usp ... then try and execute VIT (by entering vit)... The following error message appears on the screen: MDINIT ERROR:4 From a user's point of view, this error message is not very friendly ... are all user's supplied with error message manuals beside their terminals ... or should we make the error message more intellegible to the user?

FE03002

Manuals and .profiles refer to pt terminal type instead of the Four-Phase TM terminal.

FE03003

Administrators Guide does not mention setting up uucp. No mention of getty changing the mode of the /dev/tty00x file to 0644. For uucp to work the mode must be manually changed to 0666.

FE03004

Oracle .profile has different stty kill and erase characters than the root .profile. The difference was not documented.

FE03005

As distributed release 2.0 of the UNIX-derived OS has crontab entries that start up uucp on an hourly/daily/weekly basis. These entries were starting uucp even though the customer was not using uucp.

FE03006

There is no stand-alone shell floppy in the distribution. The customer has no mechanism for restoring the root file system without using the distribution floppies.

FE03007

The termcap file entry for the TM30 terminal is missing an entry to define the keyboard "home" key.

FE03008

The distribution of UNIX-derived OS 2.0 supplies no shell scripts to perform formats and mkfs of floppies. The customer had to report to calculating the size of the file system by hand.

FE03009

There is no documentation on the type of floppies that the customer can buy.

FE03010

There is no documentation supplied for connecting non Four-Phase printers serial/parallel to the system.

FE03011

The maximum size of all UNIX-derived OS shared memory is

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64K. Currently Unix-derived OS 2.0d is delivered with the shared memory limit set to 64K. Sysgen is the only method to change this limit. The maximum number of Oracle user is limited by this size. Files necessary to do a sysgen to increase this limit exist. We must decide whether or not we want customers doing sysgens.

FE03012

Four-Phase keyboard layout has no numeric key pad. TM30 keyboards uses the numeric keypad to send numbers, the Four-Phase version sends esc sequences. Four-Phase keypad is useless for non-vit applications. (E.Q. IAP (Oracle), vi(Unix-derived OS) and customer programs.

FE03013

The banner at sign on states:

CTIX 2.00D Release 2.0

The "2.0" does not correspond to the release ID (FE03.03) or to the system release (1.01). What is it?

6.0 C Compiler Information

6.1 Known C Compiler Problems

Items prefixed with (n) are fixed in ncc.

The -g option of the C compiler cc, used to request additional debugging information, should not be used. It generates pseudo operation codes not understood by the assembler pass.

The optimizer option of the C compiler cc is a no-op.

The C compiler is known to generate incorrect code in the following cases:

Signed bit fields of type char that are seven or fewer bits wide, and signed short bit fields that are fifteen or fewer bits wide, behave like unsigned bit fields (no sign extension).

References to bit fields in structures of such fields that are wider than 16 bits, may generate code that generates a usually harmless read of the two bytes beyond the structure.

If all six data registers are declared, and an assignment of a constant is made to a float, then the compiler will fail with the error message "no table entry for op REG." This error can be avoided by reducing the number of data registers declared.

Comparing the address of an array with a constant causes the compiler to generate an invalid assembly instruction requesting the comparison of two absolute values.

If all six data registers and four address registers are declared, and the bit mask OR and AND assignment operator is requested on a structure member, then the compiler can fail with the message "expression too complex". This error can be avoided by taking something out of registers or by simplifying the expression.

Consecutively declared local variables of type char and type array of four characters result in the array being placed on an odd byte boundary. If the following code then requests loading the array as if it were a single integer, the compiler will generate a move long to an odd address, which will cause a run time failure of the program. This error can be avoided for now by rearranging the local declarations or by loading the array a character at a time, as it was declared. (This usage is a misuse of C, but a warning should be generated).

The following generates 'operands of = have incompatible types':

```
void (*f)()
void fred ();

main()
{
    f + fred;
}
```

This may be avoided by using 'int' in place of 'void' i
preceding.

7.0 Terminal Information

7.1 Enhancements

LINE FEED/NEW LINE MODE (LNM)

LNM Modifies the interpretation of the Line Feed (0/10) character by the Terminal. The reset state causes the interpretation of the Line Feed character to imply only vertical movement of the cursor (as was always the case in earlier Terminal releases). The set state causes Line Feed to imply movement to the first character of the following line. The set state of this mode allows operation of the Terminal with the UNIX terminal mode -opost mode which defeats processing of output characters by the UNIX terminal I/O system resulting in decreased CPU load per terminal.

The escape sequence CSI 20 h causes the mode to be set, the escape sequence CSI 30 l LNM to be reset. LNM is reset for newly created windows.

7.2 Known Terminal Problems and Restrictions

In the RS-232 environment during periods of high-volume output, the Terminal does not forward keystrokes to the host. The keystrokes are buffered until the output subsides.

If the host is connected in via RS-422, it cannot access the RS-232 port on the Terminal. The Terminal's RS-232 port, intended for local printers, etc., is not supported in 2.0.

When connected to the S6300 via RS422, large quantities of output can cause the TM30 terminal to leave the last line undisplayed.

7.3 Terminal RS-232 Download

Release 2.0 contains support for downloading software to the terminals at power up over RS-232 lines in addition to the standard method of download using the RS-422 Cluster. The program /usr/local/bin/ptdl perform the RS-232 download function from the host computer. This program requires one argument which is the name of the file containing the software to be downloaded to the terminal. On the 6300, this file is located in /usr/lib/iv and is called ws101.232.

8.0 Miscellaneous Information

8.1 LED Light Display

The LED's at the back of the S6300 processor unit are used to display the state of the system when CTIX is running.

- 1- The top LED toggles every 2 seconds
- 2- The upper yellow LED is lit when the system is idle
- 3- The green LED is a power indicator
- 4- The lower yellow LED is lit when switching between processes
- 5- The bottom red LED is lit when user mode code is running.

APPENDIX A

Contents of Utilset 1:

/	/dev	/dev/rfp000	/dev/tty000
/.profile	/dev/console	/dev/rfp001	/dev/tty001
/bin	/dev/error	/dev/rfp002	/dev/tty002
/bin/adb	/dev/fp001	/dev/rfp003	/dev/tty003
/bin/basename	/dev/fp003	/dev/rfp004	/dev/tty004
/bin/cat	/dev/fp004	/dev/rfp005	/dev/tty005
/bin/chgrp	/dev/fp005	/dev/rfp006	/dev/tty006
/bin/chmod	/dev/fp006	/dev/rfp007	/dev/tty007
/bin/chown	/dev/fp007	/dev/rfp008	/dev/tty008
/bin/cp	/dev/fp008	/dev/rfp009	/dev/tty009
/bin/cpio	/dev/fp009	/dev/rfp00a	/dev/tty010
/bin/date	/dev/fp00a	/dev/rfp00b	/dev/tty020
/bin/dd	/dev/fp00b	/dev/rfp00c	/dev/tty021
/bin/df	/dev/fp00c	/dev/rfp00d	/dev/tty022
/bin/diff	/dev/fp00d	/dev/rfp00e	/dev/tty023
/bin/dirname	/dev/fp00e	/dev/rfp00f	/dev/tty024
/bin/du	/dev/fp00f	/dev/rfp010	/dev/tty025
/bin/echo	/dev/fp011	/dev/rfp011	/dev/tty026
/bin/ed	/dev/fp012	/dev/rfp012	/dev/tty027
/bin/expr	/dev/fp013	/dev/rfp013	/etc
/bin/false	/dev/fp014	/dev/rfp014	/etc/TZ
/bin/file	/dev/fp015	/dev/rfp015	/etc/auto.setup
/bin/find	/dev/fp016	/dev/rfp016	/etc/bcheckrc
/bin/grep	/dev/fp017	/dev/rfp017	/etc/brc
/bin/kill	/dev/fp018	/dev/rfp018	/etc/checkall
/bin/ln	/dev/fp019	/dev/rfp019	/etc/checklist
/bin/login	/dev/fp01a	/dev/rfp01a	/etc/clri
/bin/ls	/dev/fp01b	/dev/rfp01b	/etc/cprofile
/bin/mkdir	/dev/fp01c	/dev/rfp01c	/etc/cron
/bin/mv	/dev/fp01d	/dev/rfp01d	/etc/devnm
/bin/od	/dev/fp01e	/dev/rfp01e	/etc/dfsc
/bin/passwd	/dev/fp01f	/dev/rfp01f	/etc/dismount
/bin/ps	/dev/fp021	/dev/rfp020	/etc/fsc
/bin/pwd	/dev/fp022	/dev/rfp021	/etc/fsdb
/bin/rm	/dev/fp023	/dev/rfp022	/etc/getty
/bin/rmdir	/dev/fp024	/dev/rfp023	/etc/gettydefs
/bin/sed	/dev/fp025	/dev/rfp024	/etc/group
/bin/su	/dev/fp026	/dev/rfp025	/etc/grpck
/bin/sleep	/dev/fp027	/dev/rfp026	/etc/halt
/bin/sort	/dev/fp028	/dev/rfp027	/etc/init
/bin/stty	/dev/fp029	/dev/rfp028	/etc/inittab
/bin/su	/dev/fp02a	/dev/rfp029	/etc/ioctl.syscon
/bin/sum	/dev/fp02b	/dev/rfp02a	/etc/iv
/bin/sync	/dev/fp02c	/dev/rfp02b	/etc/killall
/bin/tail	/dev/fp02d	/dev/rfp02c	/etc/link
/bin/tee	/dev/fp02e	/dev/rfp02d	/etc/magic
/bin/telinit	/dev/fp02f	/dev/rfp02e	/etc/master
/bin/touch	/dev/kmem	/dev/rfp02f	/etc/mkfs
/bin/true	/dev/lp	/dev/rmt0	/etc/mknod
/bin/tty	/dev/lmem	/dev/rmt1	/etc/mnttab
/bin/uname	/dev/mtd	/dev/swap	/etc/motd
/bin/wc	/dev/mtd1	/dev/syscon	/etc/mount
/bin/who	/dev/null	/dev/systty	/etc/mountable
/bin/write	/dev/plp	/dev/tty	/etc/mvdir

APPENDIX A

Contents of Utilset 1: (Continued)

```
/etc/ncheck /usr/local/bin/ptdl
/etc/passwd /usr/local/bin/setterm
/etc/ptdownload /usr/local/bin/suser
/etc/pwck /usr/local/bin/term_type
/etc/rc /usr/local/bin/upgrade
/etc/setmnt /usr/local/data/Firev4
/etc/shutdown /usr/local/data/Firev5
/etc/termcap /usr/local/data/cset.fps1
/etc/umount /usr/local/data/show.font
/etc/unlink /usr/spool
/etc/unmountable /usr/spool/lpd
/etc/update /usr/sys/CTIX2.00d
/etc/utmp /usr/ucb
/etc/wall /usr/ucb/clear
/etc/who do /usr/ucb/more
/etc/wump
/etc/wtmpclean
/flp
/lib
/lost+found
/tmp
/unix
/user.profile
/usr
/usr/adm
/usr/bin
/usr/bin/awk
/usr/bin/id
/usr/bin/lpr
/usr/bin/path
/usr/bin/setuname
/usr/lib
/usr/lib/ex3.7preserve
/usr/lib/iv
/usr/lib/iv/desc.100
/usr/lib/iv/desc.200
/usr/lib/iv/desc.40A
/usr/lib/iv/desc.40:
/usr/lib/iv/desc.flpy
/usr/lib/iv/desc.fpdia
/usr/lib/iv/desc.sydiag
/usr/lib/iv/desc.syq
/usr/lib/iv/ws100.422
/usr/lib/iv/ws101.232
/usr/lib/iv/ws101.232.200
/usr/lib/lpd
/usr/local
/usr/local/bin
/usr/local/bin/csload
/usr/local/bin/csloadx
/usr/local/bin/ft.norm
/usr/local/bin/ft.tall
/usr/local/bin/ft.wide
/usr/local/bin/ftload
```

APPENDIX A

Contents of Utilset 2:

/bin/ar	/usr/adm/acct/sum	/usr/bin/uupick
/bin/as	/usr/adm/sa	/usr/bin/uustat
/bin/cc	/usr/bin/apnum	/usr/bin/uto
/bin/cmp	/usr/bin/banner	/usr/bin/uux
/bin/env	/usr/bin/cal	/usr/bin/vi
/bin/ld	/usr/bin/calendar	/usr/bin/what
/bin/line	/usr/bin/cb	/usr/bin/xargs
/bin/lorder	/usr/bin/comm	/usr/include
/bin/mail	/usr/bin/cu	/usr/include/a.out.h
/bin/make	/usr/bin/cut	/usr/include/alarm.h
/bin/mesg	/usr/bin/cxref	/usr/include/aouthdr.h
/bin/newgrp	/usr/bin/dc	/usr/include/ar.h
/bin/nice	/usr/bin/diff3	/usr/include/assert.h
/bin/nm	/usr/bin/diffmk	/usr/include/core.h
/bin/nohup	/usr/bin/dircmp	/usr/include/ctype.h
/bin/pr	/usr/bin/disable	/usr/include/dial.h
/bin/size	/usr/bin/egrep	/usr/include/dumprestor.h
/bin/strip	/usr/bin/enable	/usr/include/errno.h
/bin/time	/usr/bin/ex	/usr/include/exch.h
/etc/bcopy	/usr/bin/factor	/usr/include/execargs.h
/etc/chroot	/usr/bin/fgrep	/usr/include/fatal.h
/etc/crash	/usr/bin/fsplit	/usr/include/fcntl.h
/etc/dcopy	/usr/bin/getopt	/usr/include/filehdr.h
/etc/ff	/usr/bin/hyphen	/usr/include/ftw.h
/etc/filesave.u	/usr/bin/ipcrm	/usr/include/gdioctl.h
/etc/frec	/usr/bin/ipcs	/usr/include/grp.h
/etc/fuser	/usr/bin/join	/usr/include/ldfcn.h
/etc/issue	/usr/bin/lint	/usr/include/linenum.h
/etc/labelit	/usr/bin/logname	/usr/include/macros.h
/etc/log	/usr/bin/lp	/usr/include/math.h
/etc/log/filesave.log	/usr/bin/newform	/usr/include/memory.h
/etc/mklost+found	/usr/bin/news	/usr/include/mnttab.h
/etc/profile	/usr/bin/nl	/usr/include/mon.h
/etc/reboot	/usr/bin/pack	/usr/include/nan.h
/etc/ttytype	/usr/bin/paste	/usr/include/pwd.h
/install	/usr/bin/pcat	/usr/include/regex.h
/install/filelist2	/usr/bin/print	/usr/include/reloc.h
/lib/c2	/usr/bin/prof	/usr/include/rje.h
/lib/ccom	/usr/bin/ptx	/usr/include/scnhdr.h
/lib/cpp	/usr/bin/regcmp	/usr/include/search.h
/lib/crt0.o	/usr/bin/sdiff	/usr/include/setjmp.h
/lib/ifile.0407	/usr/bin/spell	/usr/include/sgtty.h
/lib/ifile.0410	/usr/bin/split	/usr/include/signal.h
/lib/ifile.0413	/usr/bin/tabs	/usr/include/stand.h
/lib/libPw.a	/usr/bin/tar	/usr/include/stdio.h
/lib/libc.a	/usr/bin/timex	/usr/include/storclass.h
/lib/libm.a	/usr/bin/tr	/usr/include/string.h
/lib/libp	/usr/bin/tsort	/usr/include/symbol.h
/lib/libp/libc.a	/usr/bin/uniq	/usr/include/syms.h
/lib/libp/libm.a	/usr/bin/units	/usr/include/sys
/lib/mert0.o	/usr/bin/unpack	/usr/include/sys/acct.h
/usr/adm/acct	/usr/bin/uucp	/usr/include/sys/buf.h
/usr/adm/acct/fiscal	/usr/bin/uulog	/usr/include/sys/callo.h
/usr/adm/acct/nite	/usr/bin/uuname	/usr/include/sys/cl.h

APPENDIX A

Contents of Utilset 2: (Continued)

/usr/include/sys/amap.h	/usr/include/sys/trace.h	/usr/lib/font/ftLI
/usr/include/sys/conf.h	/usr/include/sys/trap.h	/usr/lib/font/ftPA
/usr/include/sys/ertctl.h	/usr/include/sys/ttold.h	/usr/lib/font/ftPL
/usr/include/sys/dir.h	/usr/include/sys/tty.h	/usr/lib/font/ftPI
/usr/include/sys/dmap.h	/usr/include/sys/types.h	/usr/lib/font/ftR
/usr/include/sys/elog.h	/usr/include/sys/user.h	/usr/lib/font/ftS
/usr/include/sys/erec.h	/usr/include/sys/utsname.h	/usr/lib/font/ftSL
/usr/include/sys/errno	/usr/include/sys/vadvise.h	/usr/lib/font/ftSL
/usr/include/sys/errno.h	/usr/include/sys/var.h	/usr/lib/font/ftSL
/usr/include/sys/fblk.h	/usr/include/sys/vlimit.h	/usr/lib/font/ftUD
/usr/include/sys/file.h	/usr/include/sys/vm.h	/usr/lib/help
/usr/include/sys/filsys.h	/usr/include/sys/vmnaac.h	/usr/lib/help/ad
/usr/include/sys/gdioctl.h	/usr/include/sys/vmometer.h	/usr/lib/help/bd
/usr/include/sys/gdisk.h	/usr/include/sys/vmparam.h	/usr/lib/help/cb
/usr/include/sys/gdisk.m	/usr/include/sys/vmsystem.h	/usr/lib/help/cm
/usr/include/sys/hardware.h	/usr/include/sys/vtimes.h	/usr/lib/help/cmds
/usr/include/sys/hardware.m	/usr/include/sys/wait.h	/usr/lib/help/cc
/usr/include/sys/i8259.h	/usr/include/sys/window.h	/usr/lib/help/de
/usr/include/sys/i8274.h	/usr/include/termio.h	/usr/lib/help/default
/usr/include/sys/init.h	/usr/include/time.h	/usr/lib/help/ge
/usr/include/sys/ino.h	/usr/include/tp_defs.h	/usr/lib/help/he
/usr/include/sys/inode.h	/usr/include/ustat.h	/usr/lib/help/prs
/usr/include/sys/iobuf.h	/usr/include/utmp.h	/usr/lib/help/rc
/usr/include/sys/ioctl.h	/usr/include/values.h	/usr/lib/help/term
/usr/include/sys/iohw.h	/usr/include/varargs.h	/usr/lib/help/text
/usr/include/sys/iohw.m	/usr/lib/accept	/usr/lib/help/un
/usr/include/sys/ipc.h	/usr/lib/calprog	/usr/lib/help/ut
/usr/include/sys/lapbtr.h	/usr/lib/crontab	/usr/lib/help/vc
/usr/include/sys/lock.h	/usr/lib/dag	/usr/lib/lib.b
/usr/include/sys/lprio.h	/usr/lib/diff3prog	/usr/lib/libl.a
/usr/include/sys/inap.h	/usr/lib/diffh	/usr/lib/libld.a
/usr/include/sys/mount.h	/usr/lib/eign	/usr/lib/libtermcap.a
/usr/include/sys/msg.h	/usr/lib/ex3.7recover	/usr/lib/libterm.lib.a
/usr/include/sys/opt.h	/usr/lib/ex3.7strings	/usr/lib/libvt0.a
/usr/include/sys/param.h	/usr/lib/flip	/usr/lib/liby.a
/usr/include/sys/proc.h	/usr/lib/font	/usr/lib/lint1
/usr/include/sys/pt422.h	/usr/lib/font/ftB	/usr/lib/lint2
/usr/include/sys/pte.h	/usr/lib/font/ftBC	/usr/lib/llib-1c
/usr/include/sys/reg.h	/usr/lib/font/ftC	/usr/lib/llib-1c.ln
/usr/include/sys/s2652.h	/usr/lib/font/ftCE	/usr/lib/llib-1m
/usr/include/sys/sem.h	/usr/lib/font/ftCI	/usr/lib/llib-1m.ln
/usr/include/sys/shm.h	/usr/lib/font/ftCK	/usr/lib/llib-port
/usr/include/sys/signal.h	/usr/lib/font/ftCS	/usr/lib/llib-port.ln
/usr/include/sys/space.h	/usr/lib/font/ftCw	/usr/lib/lpadmin
/usr/include/sys/st.h	/usr/lib/font/ftD	/usr/lib/lpfx
/usr/include/sys/stat.h	/usr/lib/font/ftG	/usr/lib/lpmove
/usr/include/sys/stermio.h	/usr/lib/font/ftGI	/usr/lib/lpsched
/usr/include/sys/sysinfo.h	/usr/lib/font/ftGM	/usr/lib/lpshut
/usr/include/sys/sysmacros.h	/usr/lib/font/ftGR	/usr/lib/macros
/usr/include/sys/system.h	/usr/lib/font/ftH	/usr/lib/makekey
/usr/include/sys/target.h	/usr/lib/font/ftHI	/usr/lib/manprog
/usr/include/sys/termio.h	/usr/lib/font/ftHI	/usr/lib/more.help
/usr/include/sys/text.h	/usr/lib/font/ftI	/usr/lib/nmf
/usr/include/sys/times.h	/usr/lib/font/ftL	/usr/lib/pprx

APPENDIX A

Contents of Utilset 2: (Continued)

```
/usr/lib/prx
/usr/lib/reject
/usr/lib/spell
/usr/lib/spell/nashcheck
/usr/lib/spell/nashmake
/usr/lib/spell/hlista
/usr/lib/spell/hlistb
/usr/lib/spell/hstop
/usr/lib/spell/spellhist
/usr/lib/spell/spellin
/usr/lib/spell/spellprog
/usr/lib/suftab
/usr/lib/tabset
/usr/lib/tabset/3101
/usr/lib/tabset/bee hive
/usr/lib/tabset/diablo
/usr/lib/tabset/std
/usr/lib/tabset/teleray
/usr/lib/tabset/vt100
/usr/lib/tabset/xerox1720
/usr/lib/term
/usr/lib/term/tab2631
/usr/lib/term/tab2631-c
/usr/lib/term/tab2631-e
/usr/lib/term/tab300
/usr/lib/term/tab300-12
/usr/lib/term/tab300S
/usr/lib/term/tab300S-12
/usr/lib/term/tab300s
/usr/lib/term/tab300s-12
/usr/lib/term/tab37
/usr/lib/term/tab382
/usr/lib/term/tab4000A
/usr/lib/term/tab4000a
/usr/lib/term/tab450
/usr/lib/term/tab450-12
/usr/lib/term/tab532
/usr/lib/term/tabX
/usr/lib/term/ta ba 1
/usr/lib/term/tablp
/usr/lib/term/tabtn300
/usr/lib/tmac
/usr/lib/tmac/tmac.an
/usr/lib/tmac/tmac.m
/usr/lib/tmac/tmac.org
/usr/lib/tmac/tmac.osd
/usr/lib/tmac/tmac.ptx
/usr/lib/tmac/tmac.v
/usr/lib/unittab
/usr/lib/uucp
/usr/lib/uucp/.OLD
/usr/lib/uucp/.XGDIR
/usr/lib/uucp/L-devices
/usr/lib/uucp/L-dialcodes
/usr/lib/uucp/L.cmds
/usr/lib/uucp/L.sys
/usr/lib/uucp/L_stat
/usr/lib/uucp/L_sub
/usr/lib/uucp/R_stat
/usr/lib/uucp/R_sub
/usr/lib/uucp/US&R FILE
/usr/lib/uucp/uucico
/usr/lib/uucp/uuclean
/usr/lib/uucp/uudem on .day
/usr/lib/uucp/uudem on .hr
/usr/lib/uucp/uudem on .wk
/usr/lib/uucp/uusub
/usr/lib/uucp/uuxqt
/usr/lib/w2006
/usr/lib/xcpp
/usr/lib/xpass
/usr/local/bin/cksum
/usr/local/bin/csh
/usr/local/bin/ctags
/usr/local/bin/ee
/usr/local/bin/fold
/usr/local/bin/gen sum
/usr/local/bin/gtdl
/usr/local/bin/inkstr
/usr/local/bin/wm
/usr/local/bin/xstr
/usr/mail
/usr/news
/usr/spool/lp
/usr/spool/lp/class
/usr/spool/lp/interface
/usr/spool/lp/member
/usr/spool/lp/model
/usr/spool/lp/model/1640
/usr/spool/lp/model/dumb
/usr/spool/lp/model/f450
/usr/spool/lp/model/hp
/usr/spool/lp/model/pprx
/usr/spool/lp/model/prx
/usr/spool/lp/outputq
/usr/spool/lp/pstatus
/usr/spool/lp/qstatus
/usr/spool/lp/request
/usr/spool/pkg
/usr/spool/uucp
/usr/spool/uucp/AUDIT
/usr/spool/uucp/ERRLOG
/usr/spool/uucp/LCGFILE
/usr/spool/uucppublic
/usr/spool/uucppublic/receive
/usr/ucb/csh
/usr/ucb/head
/usr/ucb/page
/usr/ucb/script
/usr/ucb/tset
```

APPENDIX A

Contents of Utilset 3:

<ul style="list-style-type: none"> /bin/Su11 /bin/acctcom /bin/crypt /bin/dump /bin/mc53k /bin/ncc /bin/pdp11 /bin/rea /bin/rmail /bin/rsh /bin/tset /bin/u370 /bin/u3b /bin/u3b5 /bin/vax /etc/config /etc/finc /etc/install /etc/prfdc /etc/prfld /etc/prfpr /etc/prfsnap /etc/prfstat /etc/volcopy /lib/nccom /mnt /mnt/exch0 /mnt/exch1 /mnt/exch2 /mnt/exch3 /mnt/exch4 /mnt/exch5 /mnt/exch6 /mnt/exch7 /mnt/exch8 /mnt/exch9 /mnt/excna /mnt/exchb /mnt/exche /mnt/exchd /mnt/exche /mnt/exchf /usr/adm/OLDeronlog /usr/adm/OLDsulog /usr/adm/cronlog /usr/adm/errfile /usr/adm/fee /usr/adm/pacct /usr/adm/wtmp /usr/bin/300 /usr/bin/3003 /usr/bin/3005 /usr/bin/4014 /usr/bin/450 	<ul style="list-style-type: none"> /usr/bin/admin /usr/bin/asa /usr/bin/bc /usr/bin/bdiff /usr/bin/bfs /usr/bin/cancel /usr/bin/cdc /usr/bin/cflow /usr/bin/cnckcw /usr/bin/checkeq /usr/bin/checkmm /usr/bin/col /usr/bin/comb /usr/bin/csplit /usr/bin/ct /usr/bin/cw /usr/bin/delta /usr/bin/deroff /usr/bin/dl /usr/bin/dlc /usr/bin/edit /usr/bin/eqn /usr/bin/get /usr/bin/graph /usr/bin/greek /usr/bin/help /usr/bin/hp /usr/bin/keyprompt /usr/bin/lex /usr/bin/lpstat /usr/bin/m4 /usr/bin/man /usr/bin/mm /usr/bin/mmt /usr/bin/mvt /usr/bin/neqn /usr/bin/nroff /usr/bin/osdd /usr/bin/prs /usr/bin/rmdel /usr/bin/sact /usr/bin/sadp /usr/bin/sag /usr/bin/sar /usr/bin/secdiff /usr/bin/spline /usr/bin/tbl /usr/bin/tc /usr/bin/tplot /usr/bin/troff /usr/bin/unget /usr/bin/val /usr/bin/vc /usr/bin/view 	<ul style="list-style-type: none"> /usr/bin/yacc /usr/games /usr/games/advent /usr/games/arithmetic /usr/games/back /usr/games/bj /usr/games/craps /usr/games/fish /usr/games/fortune /usr/games/hangman /usr/games/lib /usr/games/lib/backrules /usr/games/lib/fortunes /usr/games/lib/gt /usr/games/lib/gt/babyjane.bits /usr/games/lib/gt/bessel.bits /usr/games/lib/gt/bessel2.bits /usr/games/lib/gt/bestfriend.bit /usr/games/lib/gt/chess.bits /usr/games/lib/gt/churchill.bits /usr/games/lib/gt/dipchips.bits /usr/games/lib/gt/fonts.bits /usr/games/lib/gt/hopalong.bits /usr/games/lib/gt/interference1. /usr/games/lib/gt/interference5. /usr/games/lib/gt/interference6. /usr/games/lib/gt/interference7. /usr/games/lib/gt/lady1.bits /usr/games/lib/gt/lady2.bits /usr/games/lib/gt/logo.bits /usr/games/lib/gt/macrometer.bit /usr/games/lib/gt/map.bits /usr/games/lib/gt/mickey.bits /usr/games/lib/gt/schematic.bits /usr/games/lib/gt/sesame.bits /usr/games/lib/gt/squeeze.bits /usr/games/lib/gt/tex.bits /usr/games/lib/gt/watch.bits /usr/games/mastermind /usr/games/maze /usr/games/nunhow /usr/games/moo /usr/games/number /usr/games/petal /usr/games/petal2 /usr/games/pic /usr/games/quiz /usr/games/random /usr/games/trk /usr/games/ttt /usr/games/turnoff /usr/games/turnon /usr/games/wump /usr/include/curses.h
---	---	---

APPENDIX A

Contents of Utilset 3: (Continued)

```

/usr/include/oa
/usr/include/oa/sysforms.h
/usr/include/oa/win.h
/usr/include/sys/enet.h
/usr/include/sys/exch.h
/usr/lib/acct
/usr/lib/acct/acctcms
/usr/lib/acct/acctcon1
/usr/lib/acct/acctcon2
/usr/lib/acct/acctdisk
/usr/lib/acct/acctdusg
/usr/lib/acct/acctmerg
/usr/lib/acct/accton
/usr/lib/acct/acctpre1
/usr/lib/acct/acctpre2
/usr/lib/acct/acctwtmp
/usr/lib/acct/chargefee
/usr/lib/acct/ckpacct
/usr/lib/acct/dodisk
/usr/lib/acct/fwtmp
/usr/lib/acct/holidays
/usr/lib/acct/lastlogin
/usr/lib/acct/monacct
/usr/lib/acct/nulladm
/usr/lib/acct/pretmp
/usr/lib/acct/prdaily
/usr/lib/acct/prtaacct
/usr/lib/acct/remove
/usr/lib/acct/runacct
/usr/lib/acct/shutacct
/usr/lib/acct/startup
/usr/lib/acct/turnacct
/usr/lib/acct/wtmpfix
/usr/lib/ee
/usr/lib/ee/errfile
/usr/lib/ee/helpfile
/usr/lib/ee/terminals
/usr/lib/ee/terminals/freedom
/usr/lib/ee/terminals/tvi950b
/usr/lib/hp2631a
/usr/lib/iv/loader
/usr/lib/iv/loader14cust
/usr/lib/iv/ws100.422.200
/usr/lib/iv/ws200.422
/usr/lib/iv/ws200.422.200
/usr/lib/iv/ws201.232
/usr/lib/iv/ws201.232.200
/usr/lib/lex
/usr/lib/lex/nrform
/usr/lib/lex/nrform
/usr/lib/lib300.a
/usr/lib/lib300S.a
/usr/lib/lib300s.a
/usr/lib/lib4014.a
usr/lib/lib450.a
usr/lib/libcurses.a
usr/lib/libplot.a
usr/lib/libwm.a
usr/lib/macros/an
usr/lib/macros/cmp.n.d.an
usr/lib/macros/cmp.n.d.in
usr/lib/macros/cmp.n.t.an
usr/lib/macros/cmp.n.t.m
usr/lib/macros/cmp.t.d.an
usr/lib/macros/cmp.t.d.m
usr/lib/macros/cmp.t.t.an
usr/lib/macros/cmp.t.t.in
usr/lib/macros/mxn
usr/lib/macros/unt
usr/lib/macros/osdd
usr/lib/macros/ptx
usr/lib/macros/ucmp.n.an
usr/lib/macros/ucmp.n.in
usr/lib/macros/ucmp.t.an
usr/lib/macros/ucmp.t.m
usr/lib/macros/vmca
usr/lib/sa
usr/lib/sa/sa1
usr/lib/sa/sa2
usr/lib/sa/sadc
usr/lib/t300
usr/lib/t300s
usr/lib/t4014
usr/lib/t450
usr/lib/uucp/modemcap
usr/lib/yaccpar
usr/local/bin/demo.profile
usr/local/bin/hd
usr/local/bin/keyprompt
usr/local/bin/keypromptmenu
usr/man
usr/preserve
usr/pub
usr/pub/ascii
usr/pub/eqnchar
usr/pub/greek
usr/pub/tabs
usr/sys
usr/sys/cf
usr/sys/cf/conf.c
usr/sys/cf/dfile
usr/sys/cf/ifile.0410
usr/sys/cf/linesw.c
usr/sys/cf/low.s
usr/sys/cf/makefile
usr/sys/cf/name.c
usr/sys/lib0
usr/sys/lib1
/usr/sys/lib2
/usr/sys/lib3
/usr/sys/lib4
/usr/sys/locore.o
/usr/tmp

```

APPENDIX B: Revised TM30 Keyboard Definition

INTRODUCTION

This document defines a Four-Phase version of the TM30 keyboard. The legends on the keyboard and the keyboard translation table have been modified to allow users access to software on the series 6000 range of machines, including UNIX-derived Operating System, UNIVIEW, and a number of third-party products. The keyboard layout has been designed to minimize the differences between the revised TM30 keyboard and the keyboard for the ET range of terminals and to allow users to access all functions provided by UNIVIEW.

This document contains the revised TM30 keyboard layout and the codes generated by each key.

The changes between Rev. 3 and Rev. 4 of this document are in the codes generated by the following keys:

Key	Code Generated
CTRL RESET	177
LEFT	010
TAB	011
CTRL ACCEPT	012

Rev. 5 contains changes to a number of keycode sequences. These changes have been introduced to support applications wishing to use the TM30 terminal but not wanting to go through the VIT.

The following characters have had their keystroke sequences redefined:

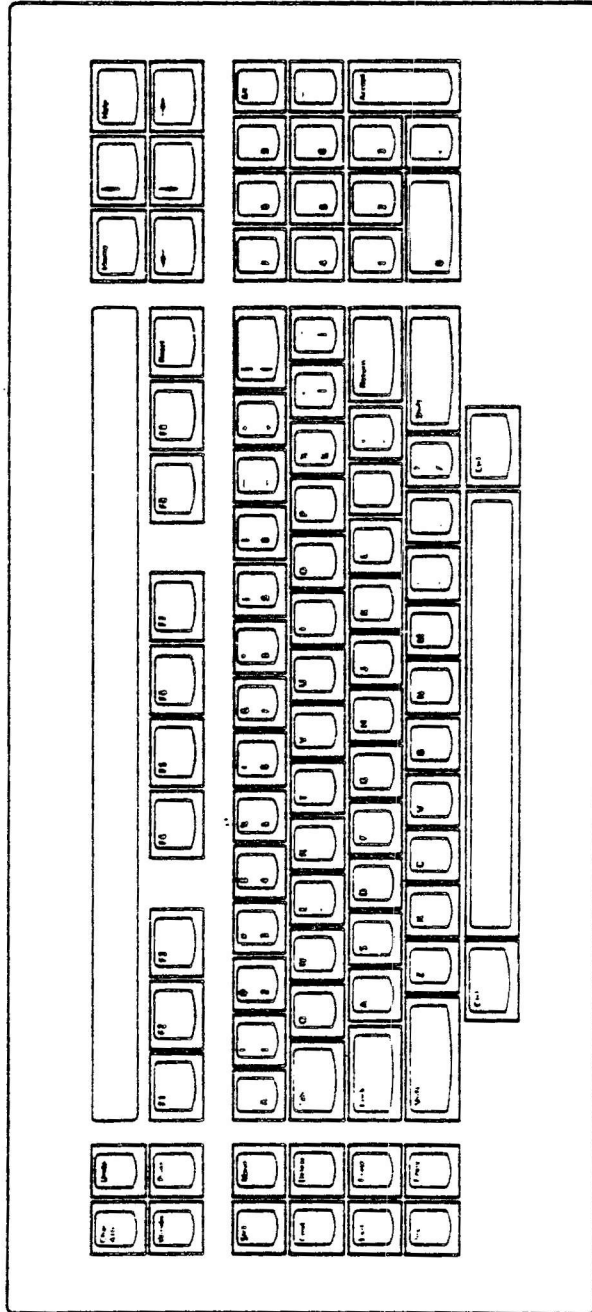
CHAR ATTR	UNDO	HOME	UP	HELP
WINDO	PRINT	F1	F3	F4
F5	F6	F7	F9	DOWN
RIGHT	I4	I5	I6	I-
INS	I.			

ATTRIBUTE DEFINITIONS

The following attributes are used for keys:

ATTRIBUTE NAME	DEFINITION
CONTROL	no shift lock, no repeat
ALPHA	shift lock, repeats 20/second after 0.7 seconds
REPEAT	no shift lock, repeats 20/sec after 0.7 seconds
REPEAT FAST	no shift lock, repeats 30/sec after 0.4 seconds

APPENDIX B: Revised TM30 Keyboard Definition



APPENDIX B: Revised TM30 Keyboard Definition

Revised TM30 Keyboard CODES

KEY	PLAIN	SHIFT	CTRL	ATTRIBUTES
CHAR ATTR	ESC [r	ESC [2 r	ESC [4 r	CONTROL
UNDO	ESC [s	ESC [2 s	ESC [4 s	CONTROL
HOME	ESC [t	ESC [2 t	ESC [4 t	CONTROL
UP	ESC [u	ESC [2 u	ESC [4 u	REPEAT FAST
HELP	ESC [v	ESC [2 v	ESC [4 v	REPEAT
WINDO	ESC [w	ESC [2 w	ESC [4 w	CONTROL
PRINT	ESC [x	ESC [2 x	ESC [4 x	CONTROL
F1	ESC [y	ESC [2 y	ESC [4 y	CONTROL
F2	ESC [I	ESC [2 I	ESC [4 I	CONTROL
F3	ESC [z	ESC [2 z	ESC [4 z	CONTROL
F4	ESC [{	ESC [2 {	ESC [4 {	CONTROL
F5	ESC [ |	ESC [2 |	ESC [4 |	CONTROL
F6	ESC [}	ESC [2 }	ESC [4 }	CONTROL
F7	ESC [~	ESC [2 ~	ESC [4 ~	CONTROL
F8	ESC [O	ESC [2 O	ESC [4 O	CONTROL
F9	ESC [ [	ESC [2 [	ESC [4 [	CONTROL
RESET	ESC [Q	ESC [2 Q	177	CONTROL
LEFT	010	ESC [2 R	ESC [4 R	REPEAT FAST
DOWN	ESC [^	ESC [2 ^	ESC [4 ^	REPEAT FAST
RIGHT	ESC [-	ESC [2 -	ESC [4 -	REPEAT FAST
SLCT	ESC [U	ESC [2 U	ESC [4 U	CONTROL
MOVE	ESC [V	ESC [2 V	ESC [4 V	CONTROL
	136	176	ESC O A	REPEAT
1 !	061	041	ESC O B	REPEAT
2 @	062	100	ESC O C	REPEAT
3 #	063	043	ESC O D	REPEAT
4 \$	064	044	ESC O E	REPEAT
5 %	065	045	ESC O F	REPEAT
6	066	174	ESC O G	REPEAT
7 &	067	046	ESC O H	REPEAT
8 *	070	052	ESC O I	REPEAT
9 (	071	050	ESC O J	REPEAT
0)	060	051	ESC O K	REPEAT
- _	055	137	177	REPEAT
= +	075	053	000	REPEAT
{ }	173	175	035	REPEAT
I7	ESC [W	ESC [2 W	ESC [4 W	CONTROL
I8	ESC [X	ESC [2 X	ESC [4 X	CONTROL
I9	ESC [Y	ESC [2 Y	ESC [4 Y	CONTROL
ALT	ESC	ESC [2 Z	ESC [4 Z	CONTROL

APPENDIX B: Revised TM30 Keyboard Definition

Revised TM30 Keyboard CODES

KEY	PLAIN	SHIFT	CTRL	ATTRIBUTES
CMD	ESC [\	ESC [2 \	ESC [4 \	CONTROL
DELETE	ESC []	ESC [2]	ESC [4]	CONTROL
TAB	011	ESC [2 !	ESC [4 !	CONTROL
q Q	161	121	021	ALPHA
w W	167	127	027	ALPHA
e E	145	105	005	ALPHA
r R	162	122	022	ALPHA
t T	164	124	024	ALPHA
y Y	171	131	031	ALPHA
u U	165	125	025	ALPHA
i I	151	111	011	ALPHA
o O	157	117	017	ALPHA
p P	160	120	020	ALPHA
1/2 1/4	ESC [b	ESC [2 b	ESC [4 b	REPEAT
[<	133	074	037	REPEAT
] >	135	076	ESC O L	REPEAT
I4	ESC ["	ESC [2 "	ESC [4 "	CONTROL
I5	ESC [#	ESC [2 #	ESC [4 #	CONTROL
I6	ESC [\$	ESC [2 \$	ESC [4 \$	CONTROL
I-	ESC [%	ESC [2 %	ESC [4 %	CONTROL
EXIT	ESC [g	ESC [2 g	ESC [4 g	CONTROL
ERASE	ESC [h	ESC [2 h	ESC [4 h	CONTROL
LOCK	NONE	NONE	NONE	CONTROL
a A	141	101	001	ALPHA
s S	163	123	023	ALPHA
d D	144	104	004	ALPHA
f F	146	106	006	ALPHA
g G	147	107	007	ALPHA
h H	150	110	010	ALPHA
j J	152	112	012	ALPHA
k K	153	113	013	ALPHA
l L	154	114	014	ALPHA
;	073	072	ESC O M	REPEAT
:"	047	042	140	REPEAT
RETURN	015	ESC O N	ESC O O	REPEAT
I1	ESC [i	ESC [2 i	ESC [4 i	CONTROL
I2	ESC [j	ESC [2 j	ESC [4 j	CONTROL
I3	ESC [k	ESC [2 k	ESC [4 k	CONTROL
ACCEPT	ESC [l	ESC [2 l	012	CONTROL
INS	ESC [&	ESC [2 &	ESC [4 &	CONTROL

APPENDIX B: Revised TM30 Keyboard Definition

Revised TM30 Keyboard CODES

KEY	PLAIN	SHIFT	CTRL	ATTRIBUTES
COPY	ESC [n	ESC [2 n	ESC [4 n	CONTROL
SHIFT1	NONE	NONE	NONE	NONE
z Z	172	132	032	ALPHA
x X	170	130	030	ALPHA
c C	143	103	003	ALPHA
v V	166	126	026	ALPHA
b B	142	102	002	ALPHA
n N	156	116	016	ALPHA
m M	155	115	015	ALPHA
, ,	054	054	034	REPEAT
. .	056	056	036	REPEAT
/ ?	057	077	134	REPEAT
SHIFT2	NONE	NONE	NONE	NONE
IO	ESC [o	ESC [2 o	ESC [4 o	CONTROL
I.	ESC ['	ESC [2 '	ESC [4 '	CONTROL
CTRL1	NONE	NONE	NONE	NONE
SPACE	040	040	040	REPEAT
CTRL2	NONE	NONE	NONE	NONE