SETTING UP VENIX/RAINBOW

1. How to Use This Document

This document contains step-by-step instructions for installing your VENIX/RAINBOW system. If you don't have previous VENIX/UNIX experience, look through "VENIX for Beginners" before plunging into the installation. You will need to be able move around in the file system and do simple text editing.

A few words on notation: throughout this document, frequent references are made to pages in the VENIX Reference Manual. These are often in the form of a name followed by a section number, e.g. **fsck** (1), referring to the **fsck** command description in section one of the Reference Manual.

Examples of commands to be typed in by the user are always given in **bold;** responses from VENIX are in plain text. Commands are almost always in lower-case letters.

After you copy your system onto the hard disk, you may need to edit tables and files to customize the system to your particular installation. The **ed** editor is a line-oriented editor which will work on any terminal; we recommend that you use this editor at first. **vi** and **ice** are full-screen editors which may be used to make these changes, but you must tell VENIX what type of terminal you are using and that terminal must be described in the file /etc/termcap. (See **ed**(1), **vi**(1), and **ice**(1) in the Reference Manual, and "Setting Up Screen Editors" in this document.) After your system is up and going, you will probably find the screen editors preferable for day-to-day use.

An index is given at the end of this document.

2. Installing VENIX/RAINBOW

2.1. Hardware Requirements

VENIX requires an DEC Rainbow with at least 128k bytes of memory, a winchester disk and a winchester hard disk. A minimum of 192k is required to run certain programs, such as the C compiler. With more memory, you can run more tasks in the background (multi-tasking) and comfortably add other users (multi-user).

Floating point hardware is not generally required, but is recommended if any amount of floating point computation is to be done. If an 8087 chip for floating point is in place,

the C compiler and other programs will use it automatically. Otherwise, VENIX's floating point simulator will be used.

2.2. Distribution Media

VENIX/RAINBOW is delivered on eleven floppy diskettes: one bootable transfer (XFER) floppy, six USER floppies and four SYSTEM floppies. You will also need the Rainbow Hard Disk Rainbow Hard Disk Utility Program diskette that is supplied with your computer.

2.3. Before You Start

The VENIX loading process is controlled step-by-step via a control dialogue, as you will see. The entire process takes about 30 minutes. If you encounter problems at any point in the loading process and are unable to proceed further, you can start over by rebooting (type <SET-UP><CTRL/SET-UP>).

The installation process consists of two parts, initializing and partitioning the hard disk with the Rainbow Hard Disk Utility Program, and the VENIX loading process. The VENIX loading process is further subdivided into four parts: specifying the VENIX partitions (Part I — this is different from the partitioning done with the Rainbow Hard Disk Utility Program), loading the user area (Part II) and the system area (Part III), and setting the time zone (Part IV).

Always remember to align the matching orange stripes on the floppy and the disk drive when inserting floppy diskettes.

3. Winchester Usage

If you have already been using your Rainbow with DOS, be sure to use DOS to backup all files currently on the winchester. Initializing and partitioning will write over any files and data that are currently in place. If you decide to specify a DOS partition on the winchester, these DOS backup files can be put back on the hard disk after VENIX is installed.

3.1. Initializing and Partitioning the Winchester

If your hard disk has never before been used, you must test and initialize it before continuing on. This is done with the Rainbow Hard Disk Utility Program diskette that is supplied with your computer. Consult the Rainbow "System Kit and Installation Instructions".

Before installing VENIX, the Rainbow's winchester hard disk must be reinitialized (unless you have just tested and initialized it as described in the preceding paragraph). In all cases, after the disk is initialized or reinitialized, it must be repartitioned. Use the Rainbow Hard Disk Rainbow Hard Disk Utility Program to accomplish these tasks.

Insert the Rainbow Hard Disk Utility Program floppy into the upper or left-most disk drive of your machine and boot the program by typing <SET-UP><CTRL/SET-UP>. Select booting drive 'A' when the Rainbow booting menu appears. (Rainbow firmware

and documentation refer to the disk drives as 'A' and 'B', VENIX refers to these drives as '0' and '1'.) Use the Utility Program to reinitialize the disk.

After this, partition the disk by selecting the 'repartition disk' option of the Rainbow Hard Disk Utility Program. When partitioning the disk, you must choose the 'MS-DOS only' option: no other option will work with VENIX. You will then have some number of options for partition sizes. For example, Version 2.0 of the program provides three options for DOS partitions:

1. Two partitions, the first is 8 MBytes, the second is 2 MBytes.

2. Two partitions, each is 5 MBytes.

3. Four partitions, each is 2.5 MBytes.

If only VENIX will be running on the system, choose any of the options. If a DOS partition is desired, it will be the last partition; the other partitions must total at least 5 MBytes and preferably more.

For example, if you choose two partitions of 8 MBytes and 2 MBytes respectively, DOS will occupy the last 2 MBytes and VENIX will occupy the first 8 MBytes. (If an option lists partitions of varying sizes, the first listed size is the size of the first partition, the second listed size is the size of the second partition, etc.) If you choose four partitions of 2.5 MBytes each, DOS will occupy the last 2.5 MBytes and VENIX will occupy the first 7.5 MBytes.

For further information, or if you encounter problems while initializing or partitioning the winchester, consult the Rainbow documentation.

When the winchester has been partitioned, the Rainbow Hard Disk Rainbow Hard Disk Utility Program will prompt you to insert a system diskette into drive A. Insert the XFER diskette (not one of the four SYSTEM diskettes) into the upper or left-most drive, type <SET-UP><CTRL/SET-UP>, and boot from drive 'A' (hereafter called drive '0'). The XFER floppy must not be write protected.

VENIX will now begin loading and you may continue on to the next section.

4. Loading and Booting VENIX

If you have inserted the XFER diskette and booted it, the words 'VENIX Loading ...' and, shortly after, a '&venix' prompt will appear. In a moment this will be replaced by a three-line message: the words 'VENIX/RAINBOW Version 2.0', then a copyright notice, total memory and available memory in kilobytes, and a serial number. Check that the memory indicated by VENIX agrees with the memory installed on your Rainbow. If it isn't the same, refer to "Difficulties in Booting" (section 5.1).

The first question to appear on the screen is:

```
Do you wish to prepare the winchester hard disk
for VENIX operation? (y or n)
```

Type in 'y' (for 'yes').

(If you type in 'n' (for 'no'), the shell will be executed, and you will be able to run a limited number of VENIX commands. You will see a prompt (#) on the left side of the screen. If you type **^D** the system will stop, and you will need to reboot. To restart the transfer process, reboot by striking <SET-UP><CTRL/SET-UP>.)

4.1. Part I — Specifying Partitions

The Rainbow winchester is divided into three or four partitions by VENIX. This is done both for convenience and for protection. Should one partition be damaged, the other areas are still left intact. All of the partitions are used by VENIX, unless the last partition is specified as a DOS partition. For the exact layout of the winchester, see **winchester**(4) in Appendix B of this manual.

The three (or optionally four) disk partitions are:

1. The system partition (known as **/dev/w0.sys**) holds many commonly used VENIX commands, libraries, devices, and so on, as well as space for swapping processes (the swap area).

2. The temporary partition (known as **/dev/w0.tmp**) is used by compilers, editors, and other programs for temporary data storage. The file system on this partition is cleared and then **mount**ed under directory **/tmp** every time the system is booted.

3. The user partition (known as **/dev/w0.usr**) covers all the disk area unused by the system, temporary, and DOS partitions. The user partition holds the remaining system commands, libraries and is available for user programs and files.

4. The DOS partition (known as **/dev/w0.dos**) is used to run DOS files and commands under the DOS operating system. (This is optional.)

We have set default sizes for the system, temp and user partitions, but you can specify sizes of your choice. The default partitions will not apply if you choose to make a DOS partition.

The table below outlines the default, minimum and maximum sizes in blocks (a block is 512 bytes) for each partition. The total number of blocks on the winchester is 19120.

PARTITION SIZES IN BLOCKS			
Partition	Default	Minimum	Maximum
/dev/w0.sys	3744	3744	6784
/dev/w0.tmp	352	352	1024
/dev/w0.usr	14992	3744	14992
/dev/w0.dos	0	0	9552

2993

After you have installed VENIX, if you wish to see the partition sizes displayed, see the section "Display Partitions" for instructions.

4.1.1. Default Partitions

If you have typed 'y' when asked if you want to prepare the hard disk for VENIX operation, the screen will now look like this:

VENIX/RAINBOW Installation Procedure

Part I (Disk Partitions)

Are the default winchester partitions acceptable?

(See section 4.1 of "Setting Up VENIX/RAINBOW"
in your Installation Manual for a table of default
partition sizes.)

Answer (y or n)

Answer 'y' unless you require a DOS partition or larger system or temporary partitions, then skip the next section.

4.1.2. Non-default Partitions

If you answer 'n', you will be instructed to specify the number of blocks for the system and temp partitions, as described below. The DOS partition (if chosen) will be the last partition on the disk as specified with the Rainbow Hard Disk Rainbow Hard Disk Utility Program. The user area will take up all remaining space on the winchester. The number of blocks on each partition is range checked.

After you have typed in 'n', the next question will appear:

Please enter a number between 3744 and 6784
as the system partition size (default 3744).>>

(The number you enter will be rounded up to the nearest multiple of 16.)

Next, you will specify the size of the temporary area. You will be asked:

Please enter a number between 352 and 1024
as the temporary partition size (default 352).>>

Type in your selected size, 352 to 1024 blocks.

At any point, typing in a number that is outside the permissible range will result in the following message:

Invalid Number: please type again

Now that the system and temp areas have been partitioned, only the user and DOS areas remain. You will be asked:

Will you require a DOS partition? (y or n)

If you answer 'n', that part of the disk not taken up by the system and temp areas will be assigned to the user area. If you answer 'y', the last partition on the disk, as made with the Rainbow Hard Disk Utility Program, will be assigned to DOS, and what remains of VENIX's portion of the disk will be given to the user area.

You can use a bootable DOS floppy to boot DOS on the DOS partition, if chosen. Refer to your DOS and Rainbow documentation for information on booting DOS.

4.1.3. Confirming Partition Sizes

VENIX will now ask for confirmation of the partition sizes:

VENIX will occupy the first 19120 blocks.
There will be no DOS partition.
Is this acceptable? (y or n)

or:

VENIX will occupy the first xxxxx blocks.
The remaining xxxxx blocks will be a DOS partition.
Is this acceptable? (y or n)

A 'no' answer will result in termination of the installation process, and an error message will be displayed:

Please consult your manual for the correct way to
partition your hard disk with the Rainbow Hard Disk
Utility Program.

FATAL ERROR: Cannot continue
XFER halting. Consult your manual for assistance.

You must now reinitialize and repartition the disk with the Rainbow Hard Disk Utility Program and load VENIX again. If 'n' was typed by mistake it is only necessary to reboot (<SET-UP><CTRL/SET-UP>), but the partitions selected cannot be changed without running the Utility Program.

If you type 'y', and you have specified a system partition greater than the default 3744 blocks, you will be asked:

Is the default swap size (750) acceptable? (y or n)

(The swapping area is the part of the system area where processes are temporarily placed in a multi-tasking environment.) Typing 'y' brings you to the next step in the process, typing 'n' causes VENIX to prompt for the size of the swapping area:

Choose the number of blocks for swapping [750 to xxx] (intervals of 50)?

The numbers which appear inside the brackets will depend upon the particular size of the system partition. (VENIX calculates the range automatically for you.) For example, if you specified the system area to be 3856 blocks, the range of available space for the

swap area would be [750 to 850]. Set the size for the swap area, using increments of 50 within the designated range. (E.g., 750, or 800, or 850, etc.)

After specifying the size of the swap area, or if you chose the default system partition and thus were not asked to specify the swap area, VENIX will display the chosen partitions. You will be asked:

Continue? (y or n)

Typing 'y' brings you to Part II. If you answer 'n', the "Fatal Error ..." message previously described will appear, and you will have to run the Rainbow Hard Disk Utility Program and start over. If 'n' was typed by mistake it is only necessary to reboot, but the partitions selected cannot be changed without running the Utility Program.

Specifying the partitions on the winchester is now completed.

4.2. Part II — User Area

After confirmation of the partition sizes the screen will display:

VENIX/RAINBOW Installation Procedure

Part II (User Area)

Do you wish to create the user area? (y or n)

Type in 'y'. If you type 'n', VENIX will skip directly to Part III, the system area, but you will not be able to bring up VENIX.

If you are installing VENIX for the first time, skip the next paragraph.

VENIX checks to see if there are any VENIX files in the user area. If you already have installed VENIX, a warning will appear automatically. It will say:

WARNING: There is a VENIX file system already on the user area. Do you wish to continue? (y or n)

Typing 'n' will cause VENIX to skip to Part III, leaving the user area intact. If you have reinitialized the hard disk before beginning installation, the remnants of any previous VENIX file system will still trigger this message, but there is no way to recover the data and you may as well continue. Type 'y'.

Having decided to continue installing the user area, you will be asked:

Do you wish to check for bad blocks on the user area? (y or n)

Normally you would say 'y'. However, if you know that your disk is O.K., you can answer 'n', and skip the bad block check. Opting for the check will produce this message:

Get a cup of coffee, this will take about 5 minutes.

While VENIX is checking blocks and making a file system on the user area, the words:

mkfs -b /dev/w0.usr 14992
Isize = 214

will be visible on the screen. The Isize number (214) and block number (14992) are default numbers. If you have specified a DOS partition, or non-default partition sizes,

the Isize and size of the user area will be different.

VENIX will procede to make a file system on the user area if the block check is not specified. The words:

mkfs /dev/w0.usr 14992
Isize = 214

will be visible. Again, these numbers will vary with the partition sizes.

4.2.1. Loading the User Area

The user area holds some system commands and libraries. In this section, these commands will be loaded onto the hard disk. There are six blue-labeled user partition floppies, in **tar** format.

At this point there is a file system on the user area, and the screen will display the following messages:

Ready to transfer files from USER diskettes.

DO NOT remove the XFER diskette from drive 0 (the upper or left-hand drive)

When inserting diskettes, please remember to align
the matching orange stripes on the diskette and drive.

Insert USER diskette #1 into drive 1 and press 'return' . . .

Put the diskette labeled 'USER 1' into the bottom or right-most drive and press <RETURN>. You will see the following:

tar xf /dev/rf1

In a minute or two, you will be prompted for the next diskette:

Insert USER diskette #2 into drive 1 and press 'return' . . .

This sequence will continue until all six USER floppies have been transferred. VENIX will then tell you:

User area completed.

Inserting a floppy which has already been read will result in this message:

This diskette has already been copied.
Please insert a different USER diskette.

Inserting a floppy which has not been read but which is out of order will yield no error message and you may continue, although it is always best to follow the correct order.

Always wait for the red 'in-use' lights between the floppy drives to go off before inserting or removing floppies.

4.3. Recoverable Errors

If, during this loading procedure, you do either of the following things:

— Press 'return' when no floppy is in the drive;

— Put the floppy in the drive incorrectly;

a HARD ERROR will result.

The error message "HARD ERROR in reading this floppy" means that the floppy is inserted improperly, or is a bad floppy. After the error message, you will be asked:

Would you like to
Abort the transfer
Retry reading the floppy, or
Ignore the error?
Type 'a', 'r', or 'i'.

Typing 'a' causes the transfer to abort. Hit <SET-UP><CTRL/SET-UP> to start again.

Typing 'r' allows you to retry reading the floppy. You will be instructed to:

Check floppy and press 'return' when ready.

You can remove the floppy from the drive and check that it is inserted properly.

If you type 'i' the error will be ignored. The user area will be installed, but one or more files may be missing or corrupted.

If you repeatedly get a HARD ERROR, the floppy may be bad. Contact your VENIX distributor.

If you encounter a CRC error, see the section "Difficulties in Booting."

4.4. Part III — System Area

You have just completed loading the user area onto the winchester hard disk. In this section, Part III, the system area will be transferred to the hard disk. Now, the screen will say:

VENIX/RAINBOW Installation Procedure

Part III (System Area)

Do you wish to create the system area? (y or n)

Type 'y'. (If you type 'n', VENIX will go to the end of the loading process and it will be necessary to reboot.)

After you type 'y', you will be informed:

Check the swapping area for bad blocks

VENIX is now checking the swapping area for bad blocks. In a moment another message will appear:

xxx blocks for swapping

If the number of blocks shown is not the same as the number chosen in Part I (default 750), then there is a bad block(s) in the swap area. See section 5, "Difficulties in Booting". This may indicate a serious problem with your hard disk.

VENIX will now check the temporary area for bad blocks. On the screen you will see

the words:

Check the temporary area for bad blocks

mkfs -b /dev/w0.tmp 352
Isize = 8

The block number and Isize are default values. Once again, if the size of your temporary area has been modified, these numbers will be different.

At this point, if you have some VENIX files in the system area, a warning will appear:

WARNING: There is a VENIX file system already on the system area. Do you wish to continue? (y or n)

If you type 'n', VENIX will preserve the files; if you type 'y', the files in the system area will be obliterated. As is the case with the user area, this message may be triggered by the remnants of data left on the disk after reinitialization. Reinitializing the disk removes any possibility of recovering the data and you should type 'y' to continue.

The warning mentioned above will not occur if you are loading VENIX for the first time. Instead, the following words will automatically come up on the screen:

Please wait several minutes.

mkfs -b /dev/w0.sys 2993
Isize=65

Take it easy for a few moments while VENIX makes a file system on the winchester. (Isize and block numbers reflect the default setting.)

4.4.1. Loading the Primary System Area

The next step is loading the primary system area (root area) onto the hard disk. The following familiar message will appear on the screen:

Ready to transfer files from SYSTEM diskettes.

DO NOT remove the XFER diskette from drive 0 (the upper or left-hand drive)

Insert SYSTEM diskette 'A' into drive 1 and press 'return' . . .

As with the user area, this sequence will continue until all four SYSTEM diskettes have been read. Remember to wait for the floppy drive 'in-use' lights to go off before inserting or removing diskettes.

The SYSTEM diskettes must be inserted in the correct order. If they are not, filenames which are linked to other files won't be installed correctly and the relevant commands will not work. A message similar to the following will probably result if SYSTEM diskettes are inserted out of order:

tar: bin/mail: cannot link
tar: bin/ls: cannot link
tar: bin/fsck: cannot link
tar: etc/mount: cannot link
tar: etc/umount: cannot link
tar: etc/fsck: cannot link

If this happens, reboot and answer 'n' when asked if you want to install the user area.

It is already installed. You may then proceed to install the system area correctly.

If you get a HARD ERROR message during the loading procedure, see section 4.3 for recoverable errors.

If you receive a Checksum error this could mean that the wrong floppy was inserted or that the floppy is bad. If the error appears on the same floppy after several attempts, the floppy may be defective. Contact your VENIX distributor.

If you see a CRC error, refer to section 5, "Difficulties in Booting".

When all the SYSTEM floppies have been transferred, you are finished with Part III and can continue to Part IV. You will see the message:

System area completed.

Remove the last SYSTEM diskette from drive 1, but do not remove the XFER floppy.

4.5. Part IV — Time Zone Selection

Part IV is setting the time zone. VENIX will readjust the clock to reflect your local time zone, standard or daylight saving time.

On the screen you will see the menu:

VENIX/RAINBOW Installation Procedure

Part IV (Time Zone Selection)

1. Eastern time zone (EST)
2. Pacific time zone (PST)
3. Mountain time zone (MST)
4. Central time zone (CST)
5. Atlantic time zone (AST)
6. Japan time zone (JST)
7. Greenwich mean time zone (GMT)
8. Other

Enter a number and press 'return' to select your time zone [1 to 8]?

Select a number, 1-8, to indicate your time zone. After you have typed in the number, your choice will be displayed on the screen and you will be asked to confirm it:

You have selected the xxx zone. Are you sure?

Type 'y' if the correct time zone is indicated on the screen. If you entered the wrong number, type 'n' and the menu will come up again.

If you selected 'other' (8), further information will be requested to calculate your time zone:

Enter the minutes west of GMT (minus for east) [-720 to 720]?

The time will be calculated and set for your local time zone.

The next question to appear on the screen is:

Does daylight saving time apply here? (y or n)

If you answer yes, the changes in daylight saving time will be taken into consideration. Your printed times will always accurately indicate the correct time for your time zone, standard and daylight saving time.

The screen will now display the following message:

System will be multi-user.

Installation complete.
Remove XFER floppy and reboot.

You are done! Remove the transfer floppy from drive 0 and type <SET-UP><CTRL/SET-UP>; then select 'W' (for winchester) from the Rainbow booting menu. You will be asked to specify which partition of the disk to boot from; choose the system area. VENIX will now boot from the hard disk, and you're ready to take VENIX for a spin in the country.

The Rainbow can be set to boot automatically from the winchester. See section 6.1.

5. Difficulties in Booting

5.1. General

There are several general types of problems which will prevent you from transferring the floppies or booting your winchester.

If no prompt appears, or the screen is dark, or the red in-use light never appears on either of the floppy drives, this is due to a problem in the hardware.

If the prompt and VENIX appear on the screen, but no questions are asked, such as, "Do you wish to prepare the winchester hard disk for VENIX operation?", this could be either a hardware or software problem. Try booting DOS. If DOS works, you may have a bad VENIX floppy, and you should contact your VENIX distributor. If you cannot boot DOS on your Rainbow, the drive may be bad.

Occasionally, defective memory boards or switch settings for the Rainbow can confuse BIOS and subsequently confuse VENIX. A symptom is that VENIX will sometimes report more memory than is actually present. Check that the memory size shown on the screen matches the memory installed in your Rainbow.

5.2. Error Messages

An error message in the form "Error ..." indicates an error in reading or writing to either the floppy itself or the hard disk. This could be due to incorrectly configured hardware, a misaligned floppy drive, or write protection on either the XFER floppy or the hard disk (both must be write-enabled).

If you receive the message "WARNING: Bad block . . ." while the swapping area is be-

ing checked this is indicative of serious problems with the hard disk. VENIX checks every partition for bad blocks on the winchester and certain areas are very sensitive. If the swapping area is bad, errors will appear later, e.g. a PANIC message. We recommend that you consider replacing your winchester.

It is possible that you will encounter a CRC error while transferring the system image to the winchester. If so, VENIX will continue the process, but one of your files will not be correct, and this will cause problems in the future. We advise you to reboot and try again. A CRC error may be due to improper seating of one of the floppies. Be sure that the floppy is completely inserted in the drive, and is properly seated. If after several repeated attempts to load the floppy the CRC error appears consistently for the same floppy, it is possible that the floppy is defective and you should contact your VENIX distributor for a replacement.

A message beginning with "PANIC ..." indicates an unrecoverable error, and will be followed by silence (i.e. the screen is blank, 'return' key is inoperative, etc.). (See "VENIX Maintenance" for a list of "PANIC" messages.) While PANIC messages are unlikely to occur during the loading process, they generally indicate that the hardware is bad. If problems persist after several attempts to reload, consult your distributor for further advice.

6. Some Initialization Exercises

6.1. Booting

At this point, it is assumed that you have a complete VENIX system on your hard disk. Take out the floppy diskette in drive 0 (if you have not done so already) and hit <SET-UP><CTRL/SET-UP> simultaneously. The Rainbow booting menu will come up; type 'W' to boot from the winchester, and another menu will appear. Type '1' or move the cursor to that position, and hit the 'Do' function key. VENIX will now boot from the system area; you will see an '&' followed by 'venix' on the screen and then the system will print:

VENIX/RAINBOW Version 2.0

as well as total and available memory size. If you type in a pathname (you have about 2 seconds to start typing) after the prompt, then that file will be booted.

The <SET-UP> function of the Rainbow can be set to boot automatically from the winchester, and the Rainbow Hard Disk Utility Program can be used to set the booting partition to always be the system partition. Typing <SET-UP><CTRL/SET-UP> will then boot VENIX automatically, without further typing. Consult your Rainbow documentation.

VENIX automatically determines the amount of memory present in the system. The available memory size is the amount of memory accessible for user programs (in kilobytes). This is equal to the total memory available minus the size of the VENIX kernel (which is, including buffers, approximately 60kb.) For example, on a system with 256 kbytes of memory, the number printed should be roughly 195kb.

6.2. Automatic fsck

When VENIX is booted, a check (**fsck**) of the file system will automatically take place. On the screen will be displayed the **fsck** of the system and user areas on the hard disk:

```
Checking the file system on the winchester disk. . .

/dev/rw0.sys (System Area)

Phase 1- Check Blocks
Phase 2- Not needed
Phase 3- Check Pathnames
Phase 4- Check Reference Counts
Phase 5- Check Free List

/dev/rw0.usr (User Area)

Phase 1- Check Blocks
Phase 2- Not needed
Phase 3- Check Pathnames
Phase 4- Check Reference Counts
Phase 5- Check Free List
```

If the **fsck** doesn't appear automatically, your transfer may have been done incorrectly and you will have to reload the floppies onto the winchester.

For further information about **fsck** see the appropriate section in "VENIX Maintenance."

6.3. Login

After the **fsck** is completed, a most welcome word will materialize on the screen:

```
login:
```

We've installed a login name which you might wish to use. Next to the login prompt, type:

guest

If you list (**l**) the files in guest, you will see one called **hello.c.** If compiled and executed, it will print a little greeting.

6.4. Logging Off

To log off the system, type CTRL D.

6.5. Super Users

You can also login as a super user. A super user has the ability to access any and all files, as well as to execute many privileged commands associated with system growth and maintenance. To login as a super user, type:

root

When the password prompt appears on the screen, type:

gnomes

When you type **gnomes** on the screen, it will not be visible. The super user password can be changed from "**gnomes**" to something else if a more secure system is desired

(see section 8.1). After you have typed in the password, you will see the words:

Welcome to VENIX

Beware: you are the super user!

And underneath, a prompt "SUPER>" will appear. The "Beware ..." message is simply a warning that you are the super user. The "SUPER>" prompt is a repeated reminder of your status.

6.6. Setting the Date

The super user can set the current date, using the **date** command, which is:

date yymmddhhmm

yy is the current year (e.g. 85), **mm** is the month (01 to 12), **dd** is the day (01 to 31), **hh** is the hour (00 to 24), and **mm** is the minute (00 to 60). For example:

date 8506010946

sets the date to 9:46 in the morning, June 1, 1985.

If the date is not set, then the system uses the date and time it last remembers.

If the year, month or day is omitted, the last remembered value is taken by default. Now if you realize that you were off by two minutes, simply type:

date 0948

to set the date to 9:48 of the same day.

6.7. Rebooting the System

If no other users are on the system, you can always reboot (hit <SET-UP><CTRL/SET-UP>) or turn the computer off safely, provided you stop any programs that may be running. Any programs which are executing when you shut down the system may cause damage to the file system. If the light on the disk drive is blinking (indicating in-use), do not reboot until the light goes off.

7. Configuring Your Printer

To connect your printer, follow the directions in your Rainbow Owner's Manual. Once it is connected, test to see if it works by typing:

date > /dev/lp

The date should be printed out. If it is not printed correctly, first check the baud rate of the printer. The default baud rate for the printer port is 9600. If the printer is set to a different baud rate, you can either change the printer's baud rate or change the baud rate of the printer port with the **stty**(1) command. To change the baud rate of the printer port to 1200 baud, for example, give the commad:

stty 1200 > /dev/lp

To set the printer port baud rate automatically every time you boot VENIX, add an

stty command to the **/etc/rc** file.

8. Creating New Users

8.1. Editing the Password File

New users can be installed on the console terminal, or additional terminals. To add a second terminal, see "Multi-User Set Up" (section nine). The system coordinator (as super user) can install new users by editing the password file **/etc/passwd.**

Each line in the file corresponds to a separate user, and contains an entry of the form:

name:password:UID:GID:empty:directory:shell

where

name is the user's name (lower-case letters only).

password is the user's encrypted password. After the new user logs in, he will put in his own password, using the **passwd** command. Since this field is encrypted, when set it appears as nonsense letters .

UID is the user's numerical ID number, which should be unique among all user ID's.

GID is the user's numerical group ID number, indicating the group he belongs to. Until you set up different user groups, you can use group ID number 10 for everyone. If you wish to divide your users into different groups, then the file **/etc/group** can be edited to create new groups, and users can be given group ID numbers assigning them to one or another group.

empty is an unused field.

directory is the user's "home" directory, where he is placed when first logging in.

shell is the user's shell interpreter, which is run when he logs in. This field is normally left blank, to indicate that the standard shell be used. On some installations, users login to special shells designed for particular applications.

For example, the following commands could be used to enter a new user "eugenia" in the password file:

```
SUPER> ed /etc/passwd
188
$a
eugenia::10:10::/usr/eugenia:
.
w
217
q
```

This appends an entry for "eugenia" to the end of the password file, with user ID 10, group ID 10, and login directory **/usr/eugenia.**

8.2. Making Home Directories for New Users

The home directory given for the newly installed user must now be made, and the owner of the directory be changed to that user. Login as each user to make sure the password file is correctly edited. For example, for user "eugenia" these commands would be given:

```
SUPER> mkdir /usr/eugenia
SUPER> chown eugenia /usr/eugenia
SUPER> chgrp other /usr/eugenia
SUPER> login eugenia
$ l -a
total 2
drwxrwxr-x   2 eugenia    64   Sep 23      12:07 .
drwxrwxrwx   7 root      208   Sep 23      12:04 ..
$ login root
Password: gnomes
SUPER>
```

In the example above, **/usr** refers to the top directory on a file system in the user area; the command **mkdir /usr/eugenia** makes a directory called **eugenia** there. The command **chown eugenia /usr/eugenia** changes the ownership of directory **/usr/eugenia** to eugenia, and **chgrp other /usr/eugenia** changes the group ownership to "other" (otherwise the group owner would be the root's group, "system").

The new user entry is tested by logging in under the new name ("login eugenia") and listing all the files with **l -a**, (that's an 'el', not a one). The only entries in this new directory should be "." and "..", referring to the current directory (**/usr/eugenia**) and its parent directory (**/usr**). Finally, a "login root" and "gnomes" will get the system coordinator back to super user status.

The following problems may arise when the new user tries to login:

1. The user receives the message "No directory". This means that the shell could not find the login directory, as specified in the password file. Either that directory is not present, or the wrong number of fields are in the password file, causing the system to be confused about what field holds the directory name.

2. The user receives a "Password:" prompt, although the user has not designated a password. The user may have typed his name incorrectly. Try logging in again. Alternatively, the password file entry for that user might be jumbled.

3. The user can not access his files. Either the ownership of the files was not correctly preset for the user, or the password file entry for that user has bad user or group ID numbers.

In any of these cases, refer back to the **passwd** command file to correct any mistakes in the file entry.

8.3. Changing the Prompt

Notice that the prompt for eugenia was set by default to '$'. This can be changed by creating a command file called **.profile** in eugenia's login directory. To edit the **.profile** file, type:

```
cd /usr/eugenia
ed .profile
```

You will see a "?" appear on the screen. Underneath the "?" type:

```
a
PS1="eugenia: "
.
w
q
```

The system will now echo "eugenia: " as a prompt whenever eugenia logs in.

Other commands can be inserted to echo login messages, or perform routine login functions. The shell variable PATH searches for commands in different directories. PATH can be set so that the shell will search a personal directory (in the home directory) in addition to the standard **bin** and **/usr/bin** to find commands. For example:

```
PATH=:$HOME/bin:$PATH
```

"**$HOME**" is a shell variable, equivalent to the login (home) directory.

8.4. New Passwords

If system security is desired, the new user should be urged to give himself a password. Type in:

```
passwd
```

On the screen it will say, "Changing password ..." and then VENIX will prompt:

New password:

Type in a password which has at least four characters. You will be prompted to type the password a second time. VENIX prompts:

Retype new password:

The password will not be visible on the screen (to keep the password confidential), but it has been entered. The next time the user logs in, when the password prompt appears, type in the password.

You can remove a password by using the passwd command to enter a null password. Hit carriage return each time you are prompted for the new password.

9. Multi-User Set Up

9.1. Connecting a Second Terminal

An additional terminal can be connected to the serial communications port in the back of your computer. This port is labeled COMM.

The 25 pin cable connection may need to be modified to hook up the Rainbow and dumb terminal. Three wires are needed to connect the Rainbow COMM port to a dumb terminal. Pin 7 of the Rainbow should be connected to pin 7 of the terminal. Pin 2 of the Rainbow is 'receive data' and should be connected to the 'transmit data' pin of the terminal (either pin 2 or 3). Pin 3 of the Rainbow is 'transmit data' and should be connected to the 'receive data' pin of the terminal (pin 2 or 3).

The **/etc/ttys** file must be edited to set an active terminal status for com1. Login as super user on your console. Type:

SUPER> **ed /etc/ttys**

the number 60 will appear on the screen. Then type:

2

On the screen you will see:

01com1.m

The number 0 is the status setting for the communications port, com1. The 0 indicates that the terminal setting is "inactive". To make the terminal active, the 0 will be reset to 1. Type the substitute command:

s/01/11/
w

The number 48 will appear under the **w**. Then type:

q

to finish editing.

To check that the file is correct, type:

cat /etc/ttys

If everything is O.K., line 2 will be:

11com1.m

To test that the dumb terminal is properly connected, type on the Rainbow console:

date > /dev/com1

The login and date should appear on the dumb terminal screen. If nothing happens, make sure that the terminal is turned on, and that the cable is securely connected between the two machines.

You may need to reset the baud rate for your terminal. The Rainbow communications lines are set at a default 9600 baud rate. If the baud rate is different for your terminal, edit the **/etc/ttys** file. Line 2 of **ttys** is currently:

11com1.m

The second digit, 1, stands for 9600 baud. If the baud rate for your terminal is different, see **ttys** (5) in the VENIX Reference Manual for a list of numbers which you can use to reset the baud rate. Edit the **/etc/ttys** file to change the second digit of the status setting for com1.

If you reset the baud rate and still cannot get the date to appear, also check the pari-

ty (it should be zero) and make certain that the cable is properly soldered.

After setting the terminal options, reboot and you will see the login.

Lines plugged in at the back of the machine for a second terminal or modem which are not connected at the other end, may cause your system to respond sluggishly. Unplug any unconnected lines from your Rainbow.

9.2. Shutting Down the System

If you have a multi-user system, you can power off or reboot as long as the system is quiet, and there are no other users on the system. (Use the **who** command to ascertain who is logged in.) If there are other users, type CTRL-D on their terminals to log them off.

10. Backing Up Files and File Systems

The importance of "backing up" files cannot be over-emphasized! "Backing up" is the process of making copies of files on a secondary medium from the primary. Any computer system will crash from time to time, due to anything from power-fails, hardware problems, software bugs, to the phase of the moon. Most often this will happen without the loss of any significant data. However, there will be occurrences with varying degrees of significant loss. Also, users can get sloppy and accidentally remove files, especially with wild card filename specifiers.

10.1. Backing Up System Files

Once you have your system fully customized for your hardware, you should back it up once so that you can easily restore it should disaster strike. You can use the **tar** command to backup the system. See section 3.1 in "VENIX Maintenance."

10.2. Backing Up User Files

One way to backup user files is to create a file system on a floppy diskette, **mount** it under an empty directory (**/f0**) copy files over to it. (See "VENIX Maintenance" section 2.3.) However, you may find it time consuming to backup many files and directories this way, so this technique is not recommended for backing up large quantities.

The **tar** command provides a useful method for backing up user files. This command is described in detail in "VENIX Maintenance."

11. Display Partitions

You may find it useful to see the hard disk partition sizes displayed. To do so, first boot the XFER floppy. When you see the question, "Do you wish to prepare the win-

chester hard disk for VENIX/RAINBOW operation", type "n" (no). This will run the shell. When you see the shell prompt, #, type:

ddisk

On the screen you will see a table which shows the status, type, start, end and size of each partition.

12. Removing VENIX

After VENIX is installed, if you wish to remove VENIX from the winchester hard disk (this also removes DOS), run the Rainbow Hard Disk Utility Program and reinitialize the disk. The winchester is now free to install a different operating system.

13. List of File Systems in /etc/checklist

/etc/checklist contains a list of file systems which are checked when **fsck** is run automatically. If you display the contents of **/etc/checklist,** you will see two entries:

/dev/rw0.sys:System
/dev/rw0.usr:User area

/dev/rw0.sys (or **/dev/rw0.usr**) specifies the partition, followed by a colon and the labels "System" or "User area". The device names given here have an extra "r" in front of them to designate the "raw" version, which can be **fsck**ed slightly faster than the ordinary "block" version.

The checklist is useful if you plan to modify the system.

14. List of Pre-configured Devices

VENIX has been pre-configured for a number of devices which include:

Device:	**Name:**
winchester	**/dev/w0.***
communications port	**/dev/com1**
serial printer port	**/dev/lp**
two floppy drives	**/dev/f0, /dev/f1**
up to 768K memory	

You must have the appropriate hardware to support these devices.

You can list the device directory with the command:

l /dev

Notice that most of the disk partitions have two entries, the "block" versions called

"w0.sys", "w0.usr", ... and the "raw" versions called "rw0.sys", "rw0.usr." These raw versions refer to the identical disk areas as their block counterparts; however, raw versions provide unbuffered, more direct access to the disk, which is in some cases more efficient to use.

15. Miscellanea

15.1. Setting Up Screen Editors

The screen editor **vi** is set up to work on a variety of different terminals. For **vi,** look in the file **/etc/termcap** for a listing of the terminals which are supported. There is an entry in **termcap** called **rb** that **vi** will use. If your system is multi-user, and your second terminal is not listed in termcap, substantial modification may be necessary. Consult your VENIX distributor.

15.2. Setting Up nroff

nroff (1) formats text for a number of different printers. For a list of printers supported by **nroff,** look in the Reference Manual under **nroff**(1), the **-T** option . If your printer is not among them, you will have to write a new terminal descriptor table. See "Nroff Terminal Descriptor Table Format" in the VENIX Word-Processing Manual for instructions.

15.3. Operating Without Floating Point Hardware

If your processor does not have the floating point 8087 option, VENIX includes a software emulator, which runs slower. If you want faster floating point calculations, install an 8087 chip in your Rainbow.