



AT&T

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Issue 1

AT&T 3B2 Computer
UNIX[®] System V Release 3
Owner/Operator Manual

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This equipment has been certified to comply with the limits for a Class A computing device, pursuant to Subpart J of Part 15 of FCC Rules. Only peripherals (computer input/output devices, terminals, printers, etc.) certified to comply with the Class A limits may be attached to this computer. Operation with non-certified peripherals is likely to result in interference to other electronic equipment.

Your 3B2 computer generates radio frequency energy and should not be turned on unless the cover and filler plates are installed and securely fastened. If your 3B2 computer is not installed and used according to the manufacturer's instructions in this manual, it can interfere with nearby radio and television reception. The operator must then take whatever steps are necessary to correct the interference.

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Introduction

This manual tells you how to set up and operate your AT&T 3B2 computer. This manual can be used with two different types of 3B2 computers:

- (1) A rear card access computer is a computer where feature card access and peripheral connections are made from the back of the computer. The 3B2/600, 3B2/700, and 3B2/1000 computers are rear card access computers.
- (2) A side card access computer is a computer where feature card access and peripheral connections are made from the right side of the computer (as viewed from the front). The 3B2/500 computer is a side card access computer.

Plastic labels have been provided with your *AT&T 3B2 Read Me First* manual or *Installation Guide*. Apply them to the cover and spine of this manual for future identification. Use this manual only after you have read and performed the procedures in the *AT&T 3B2 Read Me First* manual or *Installation Guide* packed with your computer. Your 3B2 computer, a 32-bit multiuser computer, runs the UNIX* System V operating system. Even if you have limited computer experience, you should find this manual easy to read and follow as you set up and operate your computer. You will also find your *AT&T 3B2 Computer UNIX System V Release 3 Owner/Operator Manual* a valuable

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Introduction

reference to keep handy. This *Owner/Operator Manual* is applicable to Release 3 software only. You may verify the release any time the computer is operating by entering:

```
# uname -a  
  
unix unix 3.2.2 3 3B2
```

Should any other version number appear, use the *Owner/Operator Manual* appropriate for that hardware.

Note: Please note that this manual describes the AT&T 3B2 computer as it is shipped from the manufacturer. If you purchased or leased your machine from any source other than the manufacturer, some of the information in this manual may not be appropriate. In the event that the computer was purchased or leased from a source other than the manufacturer, please consult that source for information regarding any hardware or software packages that are not AT&T products.

This is one of several manuals accompanying your computer. The manuals tell you about the computer hardware and software, how they relate to each other, and how to maximize the usefulness of this very powerful computer system.

Note: If "UPDATE" information for this manual was included with your 3B2 computer, please insert it in this manual and familiarize yourself with its contents. This supplementary information is necessary to optimize the set up and operation of your 3B2 computer.

The side card access computer and the rear card access computer are intended for table-top or rack-mounted applications. The 3B2 computers are specifically designed to be used with AT&T terminals. However, you can use almost any type of terminal with your 3B2 computer (see the *Read Me First* document for details).

A variety of applications, including office automation, engineering research, and scientific research, are supported by the standard hardware and software supplied with every 3B2 computer. In addition, an array of optional features, such as networking, enable you to enhance your 3B2 computer.

This chapter describes the standard and optional hardware, software, and firmware of the 3B2 computer. This chapter also explains key concepts and terminology used in this manual that may be unfamiliar to inexperienced computer users.

Note: If you are an inexperienced computer user, read "Key Concepts Used in This Manual" first, but if you are an experienced computer user, skip that part of this chapter.

3B2 Version 3 Computer Hardware

Major hardware features of the 3B2 Version 3 computers are listed below:

- A 32-bit WE* 32000 series microprocessor.
- Nonvolatile time-of-day clock. (Nonvolatile means that the clock is battery powered, so it continues to run even when the computer is turned off.)
- Cache memory is a “fast-access” Random Access Memory (RAM) device which stores most recently used instructions and data.
- Small Computer System Interface (SCSI) Host Adapter provides the industry standard SCSI bus for peripheral support.
- SCSI Cartridge Tape Drive for installing and removing large amounts of data.
- SCSI hard disk(s) for data storage.
- A 5¼-inch floppy disk drive with 720 kilobytes of storage.
- Random Access Memory with Error Correction Code (ECC).
- Nonvolatile Random Access Memory (NVRAM), which holds information specific to your computer. This information includes the firmware password, the computer node name, and error messages recorded at the time of a system failure. It is called “nonvolatile” because it is battery powered; thus, information in NVRAM does not depend on the main power supply.
- Enhanced Peripheral Ports Controller (EPORTS) (RS-232-C).

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3B2 Computer Software

All 3B2 computers run a release of the UNIX System V operating system. The operating system has two functions: it supervises the work of the computer and it provides you with the tools you need to do your work. Supervising the work of the computer is the job of the "kernel." This is the core of the operating system; it controls the hardware and keeps track of the location where information is stored. The kernel and the most commonly used commands make up the Essential Utilities.

The tools to do your work are provided in "software utilities packages." Each package is a collection of commands used for a particular purpose. For example, all the commands that you need for word processing are contained in the Editing Utilities package. These utilities packages are delivered on a SCSI Cartridge Tape and floppy disks. For example, the Security Administration Utilities package, available only to customers within the United States, is delivered on a floppy disk. (Instructions for installing these packages are in Chapter 5, "Software Utilities Packages.")

The UNIX Operating System

The UNIX operating system on the 3B2 computer performs the following functions:

- Automatically reconfigures the operating system to reflect changes in the hardware or software
- Helps you to supervise your system and the users on it through a set of interactive menus
- Provides job control
- Provides mandatory and advisory file and record locking
- Enables you to partition and format floppy disks
- Enables you to map out bad blocks (damaged areas) on the hard disk
- Turns off the computer with a software-controlled "power shutdown" process that ensures system integrity
- Automatically runs the power shutdown process when it becomes necessary to protect the computer from heat buildup or power fluctuations.

For more information on the UNIX operating system, refer to the *UNIX System V User's Guide*, the *UNIX System V User's Reference Manual*, and the *AT&T 3B2 Computer UNIX System V Release 3 System Administrator's Reference Manual*.

Software Utilities Packages

For instructions on installing utilities packages and brief descriptions of each package, refer to Chapter 5, "Software Utilities Packages." For instructions on using floppy disks, refer to Appendix B, "Using Floppy Disks," of this manual. These software utilities are described in the *UNIX System V User's Guide* and the *AT&T 3B2 Computer UNIX System V Release 3 System Administrator's Guide*.

3B2 Computer Firmware

Firmware instructions are stored in Read Only Memory (ROM) rather than on the built-in hard disk, where other software instructions are stored, because of the special functions they perform: controlling the powerup sequence and loading the UNIX operating system into RAM. Although the UNIX system controls most hardware and software functions of the computer, the UNIX system is started by firmware. Computer instructions stored in ROM perform this function.

Firmware provides the following important functions that aid in the operation and administration of your 3B2 computer:

- Performs automatic diagnostic tests and automatically boots the operating system whenever the computer is turned on. (Refer to Chapter 2, "Getting Started," for a description of the powerup procedure.)
- Enables you to run diagnostics (demand, interactive, or normal) from the firmware state.
- Identifies the system configuration so that the self-configuring software can properly function.
- Provides a "floating boot" feature that allows an experienced user to designate a boot device (other than the default boot value on the hard disk) from the firmware state.

Optional Hardware and Software

You can configure your AT&T 3B2 computer system for many different applications by making use of the wide range of optional hardware and software. The optional hardware includes: terminals, printers, networking hardware, modems, extra hard disk drives (in selected sizes), an industry standard 9-track tape drive, additional RAM cards for expansion of main memory, additional EPORTS cards for additional users, multiprocessor enhancement or processing element feature cards for improved performance, and serial devices. Optional software includes: programming languages, workbenches, and networking software.

For more information on optional hardware, see your AT&T Service Representative or authorized dealer. For an extensive overview of available optional software, see the *AT&T Computer Software Catalog*.

Key Concepts Used in This Manual

This section is for first-time or novice computer users who may be unfamiliar with some of the terms and concepts this manual uses.

Hardware/Software Descriptions

The hardware and software in the 3B2 computer work so closely together that it is often difficult to describe one area without describing the other. For example, when you turn off the computer with the power switch (hardware), you also invoke a program (software) that closes files and saves information before the power is removed. From a hardware point of view, you have pressed a switch; but from a software point of view, you have entered a command to the computer to run a program. Sometimes there is a hardware term and a software term for the same item. This manual will alert you to several such potentially confusing items.

Internal Structure of the 3B2 Computer

The 3B2 computer main components are: hard disk drive(s), cartridge tape drive, floppy disk drive, power supply, system board, memory, and backplane. It is not necessary for you to understand in detail how the power supply and hard disk drives operate in order to set up and use your computer. However, a general understanding of the other main components of the computer will make it easier for you to follow the instructions in this manual.

The system board is the "workroom" of the computer. It is a long, rectangular board that holds the chips in which software is executed. These chips are generally referred to by their architectural names, such as NVRAM or ROM.

An architectural name conveys the function of a particular chip or set of chips in the design of the computer. In the following discussion, architectural names will be used.

Memory, also called RAM, is similar to an empty desktop that is gradually filled with books and notebooks as you progress through a work session. When you are working on your computer, memory holds the UNIX operating system and any programs you are running.

The contents of RAM are "volatile;" they disappear, like words erased from a blackboard when the computer is turned off. Permanent storage for software and data is available on the built-in hard disk. The "kernel," the basic part of the UNIX operating system, is stored on this hard disk. Every time the computer is turned on, it automatically loads the UNIX operating system into memory from the hard disk.

The procedure for turning on the computer and loading the operating system is called "booting the system." The UNIX operating system provides methods to control most hardware and software functions, but obviously it cannot be used in the booting process. (The operating system is not available in memory until after the booting process has been completed.)

Programs that boot the system are stored in ROM. A program(s) stored in ROM is referred to as firmware. Firmware, as its name implies, is not volatile; turning off the computer will not affect it. Also, programs stored in ROM cannot be changed. Therefore, the boot programs are always available.

“Nonvolatile RAM” (NVRAM) contains data that can be changed. The NVRAM holds data used by those programs.

The system board also provides two “ports.” A port is an interface between the computer and another device (such as a terminal) that enables information to be sent from and received by the computer.

The hardware for each port on the 3B2 computer consists of an Input/Output (I/O) chip on the system board and a jack (outlet) on the outside of the computer where you can plug in a cable. The 3B2 computer has two ports at the rear of the computer. The jack labeled CONSOLE is the jack attaching the console terminal to the computer. All system messages necessary for system administration are sent to the console terminal connected to this jack.

Each EPORTS card has eight jacks to which you can connect peripheral devices. The number of EPORTS cards depends upon the particular configuration of your computer.

Firmware and the Floppy Key

Firmware is a set of programs (stored in ROM) and data (stored in NVRAM) that is used for a number of purposes. One purpose, booting the UNIX system when the computer is turned on, was previously discussed.

A second purpose of firmware is to facilitate troubleshooting and repairs of the computer. The ROM programs used for booting the system include sanity tests. These are programs that check the usability of the principal hardware components. If your computer requires repairs, an AT&T Service Representative or authorized dealer can use these programs to find out which part of the hardware has been damaged. Moreover, since the programs for the sanity tests are stored in ROM, they will continue to be usable even if your hard disk is damaged.

The NVRAM contains information that is specific to your computer, such as its name. The NVRAM also contains data that serves the same purpose as a flight recorder on an airplane: if your computer crashes, this data contains a record of the cause.

Since access to a firmware is equivalent to accessing the computer, it is important to control this access. Every 3B2 computer is given the same firmware password (**mcp**) in the factory.

Make a “floppy key” before you assign the new password. If you later forget your firmware password or if your NVRAM is damaged, you can restore the default values in NVRAM with this floppy disk. After you have set up your software (and changed the operating state to firmware state), change the firmware password to one of your choice. (Refer to Chapter 2, “Getting Started,” for instructions.)

No one can gain access to your 3B2 computer with the floppy key from another computer. Anyone having access to your floppy key can gain access to your computer. Be sure to keep your floppy key in a safe place.

Operating States

An “operating state” is a set of parameters that govern the behavior of a computer. For example, there is one operating state (called single user) that allows only one user (**root**) to be logged in and another operating state (called multiuser) that allows many users to be logged in at the same time.

Almost all your work on the 3B2 computer will be done in the multiuser operating state. However, several administrative tasks can be done only in other operating states. This is why the instructions for setting up and running the 3B2 computer sometimes mention operating states.

In addition to references to operating states, you may also notice references to “run levels” and “init states.” These are simply other names for operating states. For example, one command for changing operating states is called **init**. Therefore, it is a good idea to be familiar with all three terms.

It is not necessary for you to understand in detail how operating states work in order to use a 3B2 computer. However, a general understanding of what operating states are will make it easier for you to follow the instructions in this and other manuals.

The 3B2 computer has five assigned operating states (which cannot be changed by the user) and two unassigned operating states (to which the user can assign any function).

Note: Other run levels may be used with add-on packages.

The assigned operating states are:

- Powerdown state (run level 0)
- Single-user state (run level s or S)
- Multiuser state (run level 2)
- Firmware state (run level 5)
- State for going to firmware state and rebooting (run level 6).

Descriptions of Operating States

The assigned operating states are described as follows:

- Powerdown state (run level 0): When you turn off the computer, it automatically changes to this operating state briefly before it goes off.
- Single-user state (run level s or S): This operating state is for tasks that should be performed while only one user is logged on and using the computer. Only the port for the console terminal is usable in this state. When you change from the multiuser state to the single-user state, all other users are warned to log off. Single-user state is recommended for the following administrative tasks:
 - Installing and removing software utilities packages
 - Saving and restoring files (with the backup procedure)
 - Checking file systems.
- Multiuser state (run level 2): This is the state in which almost all your work is done. The only tasks that you do not perform in multiuser state are the administrative ones that must be performed in single-user state or firmware state. The number of users allowed to use the computer when it is in multiuser state is limited only by the capacity of your machine.

- Firmware state (run level 5): Programs loaded by firmware can only be invoked while in the firmware state. Only the port for the console terminal is usable in this state. Firmware state is required for the following administrative tasks:
 - Running diagnostics
 - Making a floppy key.

When you change from the multiuser state to the firmware state, all other users are warned to log off.

- Reboot state (run level 6): This is a transient operating state used by the computer to reboot the UNIX operating system. First, the computer is placed in the firmware state, then the operating system is rebooted. When reboot is completed, the operating state automatically changes to multiuser.

How to Change Operating States

You can change operating states by executing the **shutdown** command or the **init** command. (Use the **init** command only to change from single-user to multiuser state.) To use these commands, you must be logged in as **root** and be in the *root* (/) directory. There are three options **-i**, **-y**, and **-g** that can be used with the **shutdown** command:

- i** This option allows you to specify the operating state to which you want to change. (If you do not specify a state, the computer changes to single-user state.) To specify an operating state, enter an **-i** followed immediately (without leaving a space) by the number of the state to which you want to change. For example, if you want to change to the firmware state (run level 5), enter the following:

shutdown -i5

Single-user state is specified by entering **-is** or **-iS**.

- y** This option allows you to accelerate the change to a new operating state. If you do not use this option, the **shutdown** procedure will stop halfway through and ask you:

Do you want to continue? (y or n):

An **n** response cancels your request for a **shutdown**, and a **y** response signals the **shutdown** procedure to continue.

- g** This option allows you to define how long (in seconds) the computer will take before beginning to change operating states. (If you do not use this option, the computer will assign a default interval of one minute.) With this option you can provide a "grace period" for other users so that they can stop their processes and log off before the computer changes operating states. If you do not allow users to log off, the computer will log them off without further notice when it changes operating states.

How to Verify Your Current Operating State

After you have changed operating states, you can verify that the computer is in the correct state by using the **who** command as follows:

```
# who -r
run-level 2 Apr  4 08:42  2  0  S
```

Example Usage of the shutdown Command

Let's say you want to change the operating state of your computer from multiuser to single user. You want to change states quickly, without being interrupted to be asked if you have changed your mind. You also want to give the users on your system a 30-second grace period in which to log off. You should enter the following command line:

```
# shutdown -y -g30 -is

Shutdown started.    Tue Apr  4 09:00:43 EDT 1989

Broadcast Message from root (console) on unix Tue Apr  4 09:00:44...
THE SYSTEM IS BEING SHUT DOWN NOW !!!
Log off now or risk your files being damaged.

The system is coming down.  Please wait.
System services are now being stopped.
Print services stopped.
Stopping job accounting.
cron aborted: SIGTERM

INIT: New run level: S

# INIT: SINGLE USER MODE
```

Example Usage of the `init` Command

Let's say you want to change the operating state of your computer from single user to multiuser using the `init` command. You should enter the following command line:

```
# init 2
```

System Response:

```
INIT: New run level: 2
```

```
The system is coming up. Please wait.
```

```
*  
*  
*
```

```
The system is ready.
```

```
Console Login:
```

Typographical Conventions

This manual contains sample displays to help you understand described procedures. The sample displays in this document and the displays on your terminal screen may differ slightly due to improvements in the software product after this document was written. Therefore, use the displays in this document as examples of data available. The data displayed on your screen accurately reflects the software on your computer. The following conventions are used to show your terminal input and the system output.

This style of type is used to show system generated responses that are displayed on your screen.

Bold type is used to show inputs entered from your keyboard that are displayed on your screen.

The symbols < and > identify inputs from the keyboard that are not displayed on your screen, such as: <CR> carriage return, <CTRL d> control d, <ESC g> escape g, passwords, and tabs.

This style of italic type is used for notes that provide you with additional information.

Command References

When commands are mentioned in a section of the text for the first time, a reference to the manual section where the command is formally described is included in parentheses: **command**(section). The numbered sections are located in the following manuals:

Section (1), (1M), (4), (5), (7), (8)
UNIX System V User's Reference Manual and
UNIX System V Release 3 System Administrator's Reference Manual

Sections (2), (3), (4), (5)
Programmer's Reference Manual

Information in the Examples

While every effort has been made to present displays of input and output just as they will appear on your terminal, it is possible that your system may present output slightly different. Some displays depend on a hardware configuration that may be different from yours. Also, improvements made in the UNIX system software may cause small differences between the messages that appear on your terminal screen and those shown in the examples.

Using the Keyboard

To use your 3B2 computer, you must first know how to use your terminal keyboard. The computer requires that you follow certain conventions when you enter data and correct typing errors.

- Use uppercase and lowercase characters carefully. The same character often has a different meaning in uppercase than it does in lowercase. Therefore, it is important that you enter characters exactly as shown in this manual. (Most of the characters you enter will be lowercase letters.)
- Here is the general syntax of commands to the UNIX operating system:

\$ command<CR>

The **\$** sign is the default prompt for an ordinary user, the **#** sign is the default prompt for **root**, **command** is a UNIX system command, and **<CR>** is the RETURN key.

- To correct a typing error, use one of the following five methods:
 - Use the BREAK key to get a new line (and a prompt) so you can start over, as shown in the example below.

\$ daet<BREAK>

\$ date<CR>

- If you do not have a BREAK key, use the **<@>** symbol instead. This also gives you a new line (without a prompt) so you can start over.

\$ daet<@>

date<CR>

- To erase single characters, type the **#** symbol once for each character you want to erase, followed by the replacement letters on the same line. For example:

\$ daet##te<CR>

The 3B2 computer interprets the two **#** signs as an instruction to ignore the two previous characters, and it "reads" the word as you intended to type it: "date."

Key Concepts Used in This Manual

- If you prefer to use the BACKSPACE key to erase characters, assign the erase function to it with the following command:

```
stty erase <BACKSPACE><CR>
```

where <BACKSPACE> is the BACKSPACE key. Note that by assigning the erase function to the BACKSPACE key, you make the # symbol inoperative for erasing.

- The DEL (delete) key can also be used to cancel a command line and start over. The system responds by advancing a line and giving you a prompt. For example:

```
$daet<DEL>
```

```
$date<CR>
```

- To protect your password, the computer never prints it on the screen as you type it. You know that the system has recognized your password when a system prompt sign (usually a \$ sign) appears on the next line. If your password is not accepted because of a typing error, the system asks you to retype your login ID and password. Remember to press the <CR> after typing your password.

Manual Organization

The remainder of this manual is divided into the following chapters:

Chapter 2, "Getting Started," tells you how to turn on your computer and prepare it for use.

Chapter 3, "Security," is a discussion of the computer features for protecting information stored on your 3B2 computer.

Chapter 4, "System Administration Menus," describes the various menus that enable you to administer your computer.

Chapter 5, "Software Utilities Packages," describes the individual software utilities delivered with your computer. Procedures in this chapter tell you how to install and remove these utilities.

Chapter 6, "Clearing Trouble," contains the information you need to correct the more common operating problems.

Chapter 7, "Side Card Access—Card Installation and Removal," contains the information you need for installing and removing feature cards on the side card access computer.

Chapter 8, "Rear Card Access—Card Installation and Removal," contains the information for installing and removing feature cards on the rear card access computers.

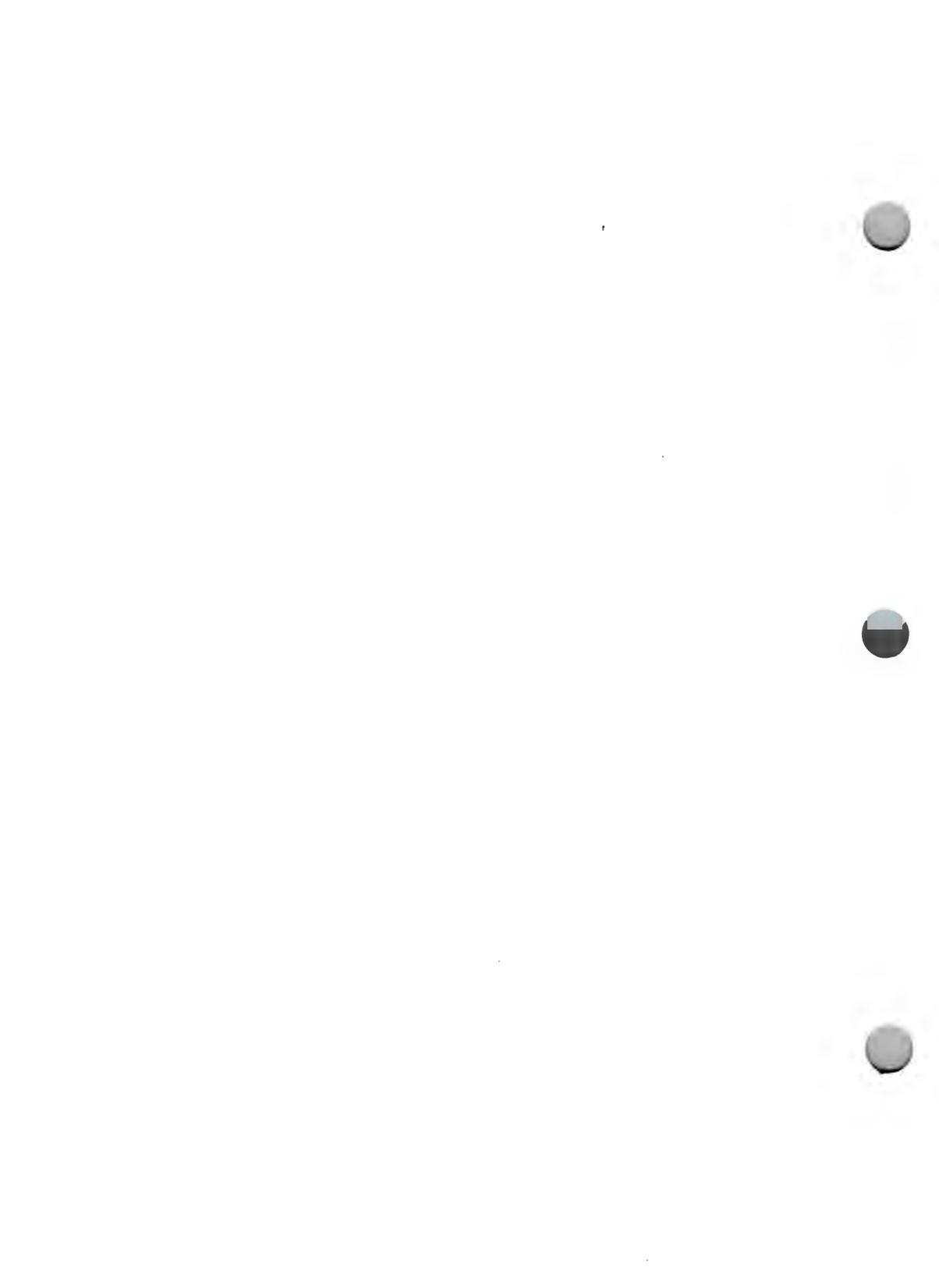
Appendices A through F contain supplementary information on topics such as: use of floppy disks, use of SCSI Cartridge Tapes, cable connections, etc.

The "Glossary" contains a description of terms used in this manual.



Chapter 2: Getting Started

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Introduction

Note: *Read Me First* manuals are delivered with 3B2/500, 3B2/600, and 3B2/700 computers. The *Read Me First* manuals only cover hardware installation. Therefore, if you are installing a 3B2/500, 3B2/600 or 3B2/700 computer, use the information in this chapter and Chapter 5 to turn on your computer and install your software.

The section, "Turning On the 3B2 Computer for the First Time," explains how to load the operating system and run the interactive setup program. Running the interactive setup program includes steps such as adjusting the time on the system clock, assigning logins, and assigning passwords. This section also covers making a floppy key and assigning a new password to the firmware. The floppy key and firmware password are important tools for protecting your computer against system failure and unauthorized use of your software. (See Chapter 1, "Introducing the 3B2 Computer," for a description of the floppy key and firmware password.)

Most of the procedures for setting up the software are interactive. The system "asks" you questions by printing them on your terminal screen. The answers that you respond with are interpreted by the system as requests for action that it then executes. To help you understand this sequence, a sample setup session is shown illustrating the screen messages that you will see.

The rest of the chapter explains how to log in and off the system and how to turn the computer on and off.

Configuring the Computer

The 3B2 computer does not have the UNIX operating system installed on the hard disk when you receive it. When you apply power to the computer for the first time, you must sequentially perform the following steps described in the section "Turning On the 3B2 Computer for the First Time."

- Install the UNIX operating system
- Run the interactive setup program
- Make a floppy key and assign a firmware password.

"Turning On the 3B2 Computer for the First Time" gives a detailed account of events that occur when you initially apply power to the computer. The "Initial Powerup" section shows the screen messages appearing upon successful completion of the computer self-check and diagnostic tests. When you see the message "DIAGNOSTICS PASSED" you may begin the section "Installing the Operating System On the Hard Disk."

Screens shown during the interactive installation process guide you until you see the "Console Login" message indicating the completion of the operating system installation.

"Making a Floppy Key and Assigning a Firmware Password" is the final heading under "Initial Powerup." This interactive program enables you to make a "key" so that you can access the computer if you forget the password or in the unlikely event that the firmware becomes corrupted. After you make the floppy key, you can safely change the firmware password on your computer. This section ends by describing how to boot the operating system.

Turning On the 3B2 Computer for the First Time

If you have not turned on the computer yet, do so now by pressing the power switch to the ON position. Figure 2-1 describes the steps of the powerup process and lists the approximate amount of time that each step should take. A detailed description of what happens during the powerup process is given in the next section.

Note: The first time that you power up a new computer, you must install the operating system software.

Approximate Elapsed Time (Seconds)	Action	Power Light	Diagnostic Light	Messages	System Condition
	—	Off	Off	—	Power Off
0	Press Power Switch	On	On	—	Power On; Disk Spin-up Begins
10	—	On	On	SELF-CHECK	Check that disk has been formatted. Sanity Tests Begin
50	—	On	On	—	Disk is up to speed; Sanity Tests Completed
55	—	On	On	Diagnostics	Diagnostics Begin
160*	—	On	Off	Diagnostics Passed	Computer is ready for installation of the operating system.

* This figure depends upon the hardware configuration.

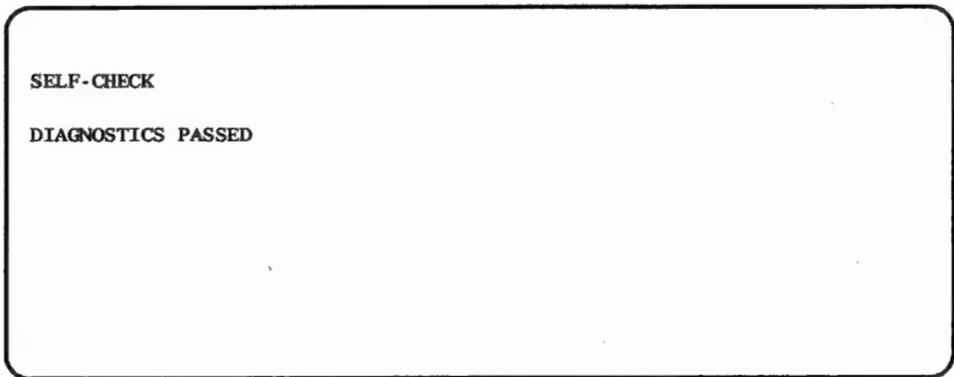
Figure 2-1: Powerup Sequence Before Installation of the Operating System

Initial Powerup

When you turn on your computer for the first time, you begin the process for installing the operating system on the hard disk. This is a sequence of steps automatically executed from the firmware state. Figures 2-2 and 2-3 show the messages that appear on your console terminal during this sequence. Explanations of the major steps in the process and of screen messages that may not be self-explanatory are given below.

Note 1: The screens used in this manual are examples for a 3B2 computer running UNIX System V Release 3.2.2 Operating System.

Note 2: Error messages are displayed during installation. This results from drivers not being installed at this time. Ignore these messages unless you see a message indicating that the system does not come up.



```
SELF-CHECK
```

```
DIAGNOSTICS PASSED
```

Figure 2-2: Initial Powerup Screen

- **SELF-CHECK:** These are the first words that appear on your screen after you turn on the computer. When this message appears, the computer is running a "sanity test" to make sure that all its basic components are present and usable.
- **DIAGNOSTICS:** The computer is running "diagnostic tests" to make sure that all devices are functioning properly. These devices include the built-in hard disk, memory, the floppy disk drive, the system board, and any performance feature cards that have been installed. When these tests have been completed, the word **PASSED** appears after the word **DIAGNOSTICS**.

Installing the Operating System on the Hard Disk

Your 3B2 computer is shipped without the operating system software installed on the hard disk. The initial powerup sequence instructs you to install the software from the SCSI Cartridge Tape which you received. Load the operating system software before attempting to add any other hardware to the system.

Note 1: If you are unfamiliar with cartridge tapes, refer to Appendix C. Follow the instructions on the screen.

Note 2: Error messages will be displayed during installation. This results from drivers not being installed at this time. Ignore these messages unless you see a message indicating that the system will not boot.

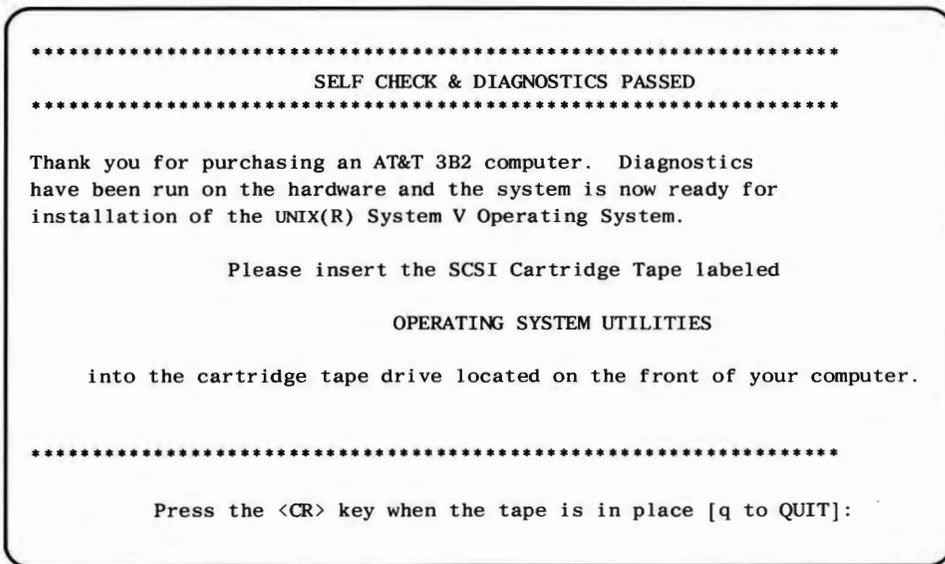


Figure 2-3: Installing Operating System Software (Screen 1 of 5)

When you press the <CR> with the "OPERATING SYSTEM UTILITIES" cartridge in the tape drive, the firmware begins to install the operating system onto the hard disk drive.

Step 1: Follow the displayed instructions to select the Full Restore procedure (option number 1) shown in Figure 2-3 (Screen 2 of 5).

Note: Verify that you have selected the proper option for a Full Restore. If you select another option, you must begin the restore procedure from the firmware mode. See the *UNIX System V Release 3 System Administrator's Guide* for this procedure.

```
UNIX System V Release 3.2.2 AT&T 3B2 Version 3
Node unix
Total real memory = 14680064
Available memory = 11743232
*****

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THIS IS UNPUBLISHED PROPRIETARY SOURCE CODE OF AT&T INC.
The copyright notice above does not evidence any actual or
intended publication of such source code.
*****

UNIX System V Release 3.2.2 Installation

    1 Full Restore
    2 Partial Restore

When responding to a question, you may use the "backspace" key
to erase the last character typed or the "@" key to erase the
entire line. Enter "help" for additional information.

Selection? [ 1 2 quit help ] 1<CR>
    — Full Restore selected —
```

Figure 2-3: Installing Operating System Software (Screen 2 of 5)

Initial Powerup

- Step 2: When the screen prompts you for the hard disk to hold the ROOT file system, enter a <CR> to choose the default (1) hard disk as shown in Figure 2-3 (Screen 3 of 5).
- Step 3: When the screen prompts you for the hard disk to hold the USR file system, enter a <CR> to choose the default (2) hard disk as shown in Figure 2-3 (Screen 3 of 5).
- Step 4: When the screen prompts you to choose whether or not to reformat a hard disk, enter the <CR> to choose the default (no).
- Note:** In some cases it is preferable to use partition sizes other than the default. Refer to the *UNIX System V Release 3 System Administrator's Guide* for further information.
- Step 5: When the screen prompts you for the file system block size for usr2-type partitions, enter a <CR> to choose the default (1024) block size as shown in Figure 2-3 (Screen 4 of 5).
- Step 6: At the prompt:
Use the default hard disk partitioning?
respond with <CR> to select default (yes).

The possible ROOT disks configured on the system are:

- 1) /dev/dsk/clt1d0s6
- 2) /dev/dsk/clt3d0s6

Select disk to hold the ROOT file system [(1 - 3) quit help] (default 1) <CR>

The possible USR disks configured on the system are:

- 1) /dev/dsk/clt1d0s6
- 2) /dev/dsk/clt3d0s6

NOTE: System performance will be greater if the ROOT disk is NOT the same device as the USR disk.

Select disk to hold the USR file system [(1 - 3) quit help] (default 2) <CR>

The disk (/dev/dsk/clt1d0s0) is formatted.

Reformatting it may remove undetected bad-blocks.

WARNING: Reformatting will destroy the data on the entire disk!

Reformat /dev/dsk/clt1d0s0? [yes no] (default no)<CR>

The disk (/dev/dsk/clt3d0s2) is formatted.

Reformatting it may remove undetected bad-blocks.

WARNING: Reformatting will destroy the data on the entire disk!

Reformat /dev/dsk/clt1d1s2? [yes no] (default no)<CR>

Default hard disk partitioning assumes certain defaults for the dump partition. If this system has more than 16 megabytes (MB) of memory, the dump partition will be set to the size of the memory. You may not want to devote this much disk space to the dump partition. Also, if you anticipate adding more memory to the system and the total memory at that time will exceed 16 MB, a full restore will be necessary to increase the size of the dump partition. See the documentation supplied with your computer for more information regarding hard disk partitioning.

Use the default hard disk partitioning? [yes no help] (default yes)<CR>

Figure 2-3: Installing Operating System Software (Screen 3 of 5)

Initial Powerup

Setting up the initial system with default partition sizes.

The following partitions are available on the root disk:

Partition	Size
8	245760
9	245760
a	7296

The following partitions are available on the usr disk:

Partition	Size
8	245760
9	137856

Select file system block size for usr2-type partitions

[1024 2048 help] (default 1024) <CR>

Installing the initial core system files.

8610 blocks

You may remove the tape.

Performing the 'Finishing Touches'...

Making /dev/root & /dev/swap node.

Making hard disk bootable.

Linking files.

Installation is now complete. The system is restarting itself from the hard disk. It will be ready to use when you receive the "Console Login" prompt. This should take about 10 minutes depending on your configuration.

Figure 2-3: Installing Operating System Software (Screen 4 of 5)

After the message beginning with, "Installation is now complete." [Figure 2-3 (Screen 4 of 5)] appears, the computer begins loading the UNIX operating system from the hard disk into RAM. See Figure 2-3 (Screen 5 of 5).

```
SELF-CHECK

DIAGNOSTICS PASSED

UNIX(R) System V Release 3.2.2 AT&T 3B2 Version 3
Node unix
Total real memory = 14680064
Available memory = 11743232

.....

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The copyright notice above does not evidence any actual or
intended publication of such source code.

.....

      *
      *
      *

Welcome!

This machine has to be set up by you. When you see the "login" message type
setup
followed by the <return> key. This will start a procedure that leads you
through those things that should be done the "first time" the machine is
used.

The system is ready.

Console Login:
```

Figure 2-3: Installing Operating System Software (Screen 5 of 5)

When the screen in Figure 2-3 (Screen 5 of 5) appears, the system is rebooting the system from the hard disk. Some of the messages displayed on that screen are described below.

- **SELF-CHECK** indicates the beginning of a process that checks the processor and disk sanity, and access to such hardware as RAM, ROM, and NVRAM.

Note: EDT (equipped device table) **COMPLETION ERRORS** may be printed after the **SELF-CHECK** message. These messages are caused by hardware for which software drivers have not been loaded.

- **DIAGNOSTICS** indicate the beginning of running normal diagnostics for all equipped boards or cards listed in the equipped device table. When **PASSED** appears, it indicates that the diagnostic phase is complete.

If the *root* file system is damaged, it is repaired and the UNIX operating system is rebooted. If this happens, you see the message **FILE SYSTEM WAS MODIFIED**. This means that damage was found and repaired; it is not necessary to call your AT&T Service Representative or authorized dealer if you see this message.

If the message **BOOT FAILURE** appears during this sequence of events, it means that the computer is unable to load the UNIX operating system automatically from the hard disk into RAM. If you see this message, call your AT&T Service Representative or authorized dealer.

Until now the computer was in the firmware operating state. Once the soundness of the */usr* file system is verified, the system changes its operating state to multiuser.

- **The system is ready...Console Login:** These two messages mean that the boot process is complete and that the computer is ready for use. Once you see the prompt **Console Login** on the screen, you must set up the software for your 3B2 computer by using the interactive program called **setup**. The next part of this chapter guides you through **setup**.

Running the Interactive setup Program

The first step in setting up your software is to run the interactive **setup** program. This program helps you complete six tasks:

- Set the time zone
- Adjust the date and time on the system clock
- Assign a user login
- Assign passwords to administrative commands and logins
- Assign passwords to system logins
- Change the node name of the computer.

An interactive program prompts you to make choices and enter requests so that it can execute a function according to your choice. Throughout the **setup** procedure (and when you use other interactive programs) use these commands as shown in the following key:

- y** = yes
- n** = no
- ?** = help or explain
- q** = quit (where available as an option)

Step 1: Enter the **setup** command after you see the **Console Login:** prompt. Your command line looks like this:

```
Console Login: setup<CR>
```

The system responds with the text shown in Figure 2-4.

Initial Powerup

```
Console Login:setup
UNIX System V Release 3.2.2 AT&T 3B2
unix
Copyright (c) 1984, 1986, 1987, 1988, 1989 AT&T
All Rights Reserved
Warning: .lastlogin did not exist, creating it
```

Setup Procedure

Setup establishes this machine as yours and can make sure that no one else uses it without your permission. We assume that you have read about "initial setup" in the GETTING STARTED chapter of the Owner/Operator Manual.

The first step is to set the timezone, date, and time of the system clock.

```
Current time and time zone is: hour:minutes timezone
Change the time zone? [y, n, ?, q]
```

Figure 2-4: Entering the **setup** Procedure

Step 2: Set the time zone, date, and system time. The procedures for these steps are shown in Figures 2-5 and 2-6. In this example, the date and time on a computer are changed from 2:30 p.m. (Central Daylight Time) Sunday, June 25, 1989, to 12:27 p.m. (Eastern Daylight Time) Wednesday, July 5, 1989.

```
Current time and time zone is: 14:30 CDT
Change the time zone? [y, n, ?, q]  y<CR>
```

```
Available time zones are...
```

1. Greenwich (GMT)
2. Atlantic (AST & ADT)
3. Eastern (EST & EDT)
4. Central (CST & CDT)
5. Mountain (MST & MDT)
6. Pacific (PST & PDT)
7. Yukon (YST & YDT)
8. Alaska (AST & ADT)
9. Bering (BST & BDT)
10. Hawaii (HST)

```
Enter zone number: 3<CR>
```

```
Does your timezone use Daylight Savings Time during the year? [y, n, ?, q] y
Time zone now changed.
```

```
NOTE: Any logins and processes running when the time
zone changes, and all their child processes, will continue
to see the old time zone. The cron(1M) will be restarted at
the end of this procedure.
```

Figure 2-5: Setting the Time Zone

Initial Powerup

Then, **setup** asks you to finish setting the system clock by setting the date and time, as shown in Figure 2-6.

```
Current date and time: Sun. 06/25/89 14:30
Change the date and time? [y, n, ?, q]: y<CR>
Month default 06 (1-12): 7<CR>
Day default 25 (1-31): 5<CR>
Year default 89 (70-99): <CR>
Hour default 14 (0-23): 12<CR>
Minute default 30 (0-59): 27<CR>
Date and time will be set to: 07/05/89 12:27. OK? [y, n, q] y<CR>
Wed Jul 5 12:27:01 EDT 1989
The date and time are now changed.
cron aborted: SIGTERM
The cron has been restarted to pick up the new time and/or time zone.
```

Figure 2-6: Setting the Date and Time

Step 3: Next, **setup** asks you to enter information required for assigning logins, beginning with your own. The example in Figure 2-7 shows you how to create a login for yourself. If you make errors, **setup** allows you to edit them before it installs the logins.

```
The next step is to set up logins.
The first one you make should be for yourself.

Anytime you want to quit, type "q".
If you are not sure how to answer any prompt, type "?" for help,
or see the Owner/Operator Manual.

If a default appears in the question, press <RETURN> for the default.

Enter user's full name [?, q]: John R. Doe<CR>
Enter user's login ID [?, q]: jrd<CR>
Enter user ID number (default 100) [?, q]: <CR>
Enter group ID number or group name
(default 1) [?, q]: <CR>
Enter user's login (home) directory name.
(default '/usr/jrd') [?, q]: <CR>

This is the information for the new login:
    User's name:   John R. Doe
    login ID:     jrd
    user ID:      100
    group ID:     1      (other)
    home directory: /usr/jrd

Do you want to install, edit, or skip this entry [i, e, s, q]? i<CR>
Login installed.
Do you want to give the user a password? [y, n] y<CR>
New Password: <password><CR>
Re-enter new password: <password><CR>
Do you want to add another login? [y, n, q] n<CR>

NOTE: Your password is very important. It is the way that the computer
verifies that someone who attempts to login as you is indeed you.
If you give it away to someone, they can do anything that you can do
and the machine does not know the difference. Please read the chapter
on SECURITY in the Owner/Operator Manual.
```

Figure 2-7: Assigning a User Login

Initial Powerup

Step 4: The **setup** command asks you if you want to assign passwords to any of the seven administrative commands for which logins of the same name are also available. These administrative commands are **checkfsys**, **makefsys**, **mountfsys**, **powerdown**, **setup**, **sysadm**, and **umountfsys**.

Figure 2-8 shows you how the program for assigning passwords appears on your screen during **setup**.

```
The next step is to establish passwords for the administrative logins
and commands.

Do you want to give administrative logins passwords? [y, n, q, ?] y<CR>
The login 'setup' does not have a password.
Do you want to give it one? [y, n, ?, q] y<CR>
New password: <password>
Re-enter new password: <password>

The login 'powerdown' does not have a password.
Do you want to give it one? [y, n, ?, q] y<CR>
.
.
.
```

Figure 2-8: Assigning Passwords to Administrative Logins

Step 5: The **setup** command asks you if you want to assign passwords to any of the nine system logins. The system logins are **adm**, **bin**, **daemon**, **lp**, **nuucp**, **root**, **sys**, **trouble**, and **uucp**. If you want to assign a password to the **root** login, this is the time to do so. Follow the instructions on the screen as shown in Figure 2-9.

```
        The next step is to establish passwords for the system logins that
do not already have them. Once set, these passwords can only be changed by
the login or "root".

Do you want to give passwords to system logins? [y, n, ?, q] y<CR>
Do you want to give the 'root' login a password? [y, n, ?, q,] y<CR>
New password: <password><CR>
Re-enter new password: <password><CR>
.
.
.
```

Figure 2-9: Assigning Passwords to System Logins

Note: It is possible to log in as **nuucp** without having installed any utilities packages. However, the advantage of using this login is having access to information provided by the Basic Networking Utilities package. Therefore, if you have not installed this package, there is no point in using this login.

Initial Powerup

Step 6: The **setup** command now asks if you want to change the present node name of your machine. All 3B2 computers are named "unix" by the factory.

- If your 3B2 computer is not going to be part of a network, enter an **n**<CR>. The **Console Login:** prompt then appears.
- If your 3B2 computer is going to be part of a network, enter a **y**<CR>. Then follow the instructions that appear on the screen. In the example shown in Figure 2-10, the owner of a 3B2 computer at Metropolitan Software Inc. renames the computer "metro." (See the *UNIX System V Release 3 System Administrator's Guide* for information about node names.)

Note: The network administrator may assign the node name for the machine.

The next step is to set the node name of this machine. This is the name by which other machines know this one.

This machine is currently called "unix".

Do you want to change it? [y, n, q, ?] **y**<CR>

What name do you want to give it? [q] **metro**<CR>

This completes your initial set up of the machine.

You may now log into your login.

Console Login:

Figure 2-10: Changing the Node Name of the Computer

You have completed the initial software setup. You are now ready to make a floppy key and assign a new password to the firmware.

Making a Floppy Key and Assigning a Firmware Password

Firmware is a set of programs that allows the administrator access to the operating system. Because of a need to restrict casual access to the operating system, the firmware is protected with a password. Each computer shares a common password (**mcp**) as it is shipped from the factory. You are encouraged to choose another password after you make a floppy key.

The floppy key is a floppy disk that will contain a copy of your computer's serial number. The floppy key can be used to access the operating system in the event that the system administrator forgets the firmware password or in the unlikely event that information in the NVRAM is corrupted. However, be forewarned: anyone having access to the floppy key can access the operating system. So store the floppy key in a secure place.

A blank, formatted floppy disk with the label "Floppy Key" is included with the computer, but you can use any formatted floppy disk.

Making a floppy key is a six-step procedure. (Each step is described in detail below.) You must do the following:

- Step 1: Log in as **root**.
- Step 2: Change the operating state to firmware.
- Step 3: Enter the original firmware password.
- Step 4: Execute the **newkey** command to make the floppy key.
- Step 5: Insert the Floppy Key disk into the disk drive.
- Step 6: Remove and store the floppy disk—your new floppy key.

The example in Figure 2-11 shows you how to do the first three steps: how to log in as **root**, change the operating state, and enter the original password (**mcp**). To make your floppy key, follow this example and enter the necessary information.

Note: If you have changed the node name of your machine, the new name appears on the screen instead of the node name *unix* when you execute the **passwd** command.

```
Console Login: root <CR>
Password: <password><CR>
UNIX System V Release 3.2.2 AT&T 3B2
unix
Copyright (c) 1984, 1986, 1987, 1988, 1989 AT&T
All Rights Reserved
# sysadm firmware<CR>

Running subcommand 'firmware' from menu 'machinemgmt'.
MACHINE MANAGEMENT

Once started, this procedure CANNOT BE STOPPED.
Do you want to go to firmware 'express'? [y, n, q, ?] y<CR>

Shutdown started.   Mon Mar 27  14:21:18 EDT 1989

Broadcast Message from root (console) Mon Mar 27  14:21:18...
THE SYSTEM IS BEING SHUT DOWN NOW !!!
Log off now or risk your files being damaged.

INIT: New run level: 5
The system is coming down.  Please wait.
System services are now being stopped.
cron aborted: SIGTERM

The system is down.

SELF-CHECK

FIRMWARE MODE
<mcp><CR>
```

Figure 2-11: Making a Floppy Key — Steps 1 Through 3

The next step is for the computer to run a sequence called **boot**. The computer runs **boot** automatically.

The computer is now waiting for you to specify a program for it to execute. Before you do, make sure that your Floppy Key disk is write enabled. (Refer to Appendix B for information on using floppy disk if you are not familiar with using them.) Then enter **newkey**<CR> and insert the floppy disk into the drive. Follow the example shown in Figure 2-12.

```
Enter name of program to execute [/unix]: newkey<CR>
Creating a floppy key to enable clearing of saved NVRAM information.
Insert a formatted floppy, then type 'go' (q to quit): go<CR>
Creation of floppy key complete
```

Figure 2-12: Making a Floppy Key — Steps 4 Through 6

When you see the completion message, `Creation of floppy key complete`, remove the Floppy Key disk and store it in a safe place. If you ever forget the firmware password you are about to assign, you can use your floppy key to enter the firmware state using the original password (**mcp**).

Initial Powerup

Now that you have a floppy key, you can safely change the firmware password on your computer. Before you decide on your new password, read the section, "Selecting Passwords," in Chapter 3. Then use the **passwd** command and follow the example shown in Figure 2-13.

```
Enter name of program to execute [ ]: passwd<CR>
Enter old password: mcp
Enter new password: <new password><CR>
Confirmation: <new password><CR>
Enter name of program to execute [ /unix ]: <CR>
Possible load devices are:
Option Number      Slot      Type      Name
-----
      0              0      INTEGRAL  FD5
      1              0      I/O Bus   SCSI
Enter Load Device Option Number [1 (SCSI)]: <CR>
Possible subdevices are:
Option Number  Subdevice  Name
-----
      0          0      disk
      1          1      tape
Enter Subdevice Option Number [0 (disk)]: <CR>
UNIX System V Release 3.2.2 3B2 Version 3
*
*
*
The system is coming up. Please wait.
```

Figure 2-13: Changing the Firmware Password (Sheet 1 of 2)

AT&T 3B2 SYSTEM CONFIGURATION:

Memory size: 16 Megabytes

System Peripherals:

Device Name	Subdevices	Extended Subdevices
SBD		
	Floppy Disk	
SCSI (S.E. BUS ID0)		
	SD01 ID1	322 Megabyte Disk ID0
	ST01 ID2	Tape ID0
	ST01 ID3	322 Megabyte Disk ID0

VOID
VOID
VOID
VOID
MAU
VOID (PBUS)

The system is ready.

Console Login:

Figure 2-13: Changing the Firmware Password (Sheet 2 of 2)

This completes the **setup** procedure. When you see the **Console Login:** prompt shown in Figure 2-13, the computer is ready for use.

Installation of Software Utilities Packages

After installing the operating system, running the interactive **setup** program, making a floppy key, and assigning a new firmware password, the utilities packages can be loaded. The general installation instructions for these packages are in Chapter 5.

Turning On the Computer

Use the following procedure to turn on your computer.

- Step 1: Remove any magnetic media that may be in the computer before power is applied.
- Step 2: Press the computer power switch to the ON position. Check for signs that the power is applied:
- Fan noise
 - Power and Diagnostic indicators are on
 - Messages on the terminal screen.
- Step 3: Follow the sequence of events on the terminal screen. The entire powerup process takes about 2 minutes.

Logging In

When the `Console Login:` prompt appears on the screen, the system is ready for you to log in. `Console Login:` is the normal login prompt for the console terminal. It appears on your console screen for the first time at the end of the powerup procedure as a signal that the powerup sequence has been successfully completed. It appears again when you finish the **setup** procedure and again when you finish making a floppy key and assigning a firmware password. Now you are ready to log in as a user. Follow the instructions below:

- Step 1: Enter your login ID and a `<CR>`. You can log in as **root** or, by using the login you assigned yourself, as an individual user.
- Step 2: If you have assigned a password to the login you are using, the prompt `Password:` appears on the next line. Enter the password associated with your login followed by a `<CR>`. Remember, passwords do not appear on the screen.

If you have not assigned a password to your login, enter a `<CR>`.

- Step 3: A system prompt sign appears on the next line. The type of prompt you receive depends on the type of login ID you use. Remember, if you log in as **root**, you get a `#` as the default prompt; if you log in as a user, you get a `$` as the default prompt.

Note: If the message `Login incorrect` appears on the screen, either the login name and/or the password are misspelled or missing.

Logging Off

The 3B2 computer allows you to log off only from multiuser operating state. (See Chapter 1 for an explanation of operating states.) If your system is in another operating state (such as single user), you must return to multiuser before logging off. To return to multiuser state, use the **init** command. Your command line should look like this:

```
# init 2<CR>
```

If you do not know which operating state your system is in, use the **who** command (with the **-r** option) to find out. Your command line should look like this:

```
$ who -r<CR>
```

The system responds with the number of a "run level." (Run level is another term for operating state. Refer to Chapter 1, "Introducing the 3B2 Computer," for a description of run levels.) For example, if you are in multiuser state, the answer is a message beginning with these words:

```
run-level 2
```

Once you are sure that your computer system is in multiuser state, log off by typing **CONTROL-d** (hold the **CONTROL** key down while you press and release the **d** key). Be careful not to confuse the **SHIFT** key with the **CONTROL** key; by entering **SHIFT-d** you print an uppercase **d**, not a **CONTROL-d**.

If you accidentally attempt to log off in single-user state by using **CONTROL-d**, the system will not log you off. Instead, it prompts you to choose a different operating state from a list of possible states. Return to level 2 by entering a 2 after the prompt. The prompt line and the request you enter should look like this:

```
# ENTER RUN LEVEL (0-6, s, S): 2<CR>
```

The **Console Login:** prompt appears on the next line to show that the system is "waiting" for another user to log in. This is a signal that you have successfully logged off.

Turning Off the Computer

If your 3B2 computer is in multiuser state, there are three ways to turn it off. You can use the power switch, the **powerdown** subcommand, or the **shutdown** command. If your computer is operating in single-user state, use the power switch or the **shutdown** command. (Instructions for all three methods appear on the following pages.)

If you do not know which operating state your system is in, use the **who** command (with the **-r** option) to find out. (Refer to the previous instructions under "Logging Off.")

When you turn off your computer using either the power switch or the **powerdown** subcommand, the system automatically performs a "soft powerdown." Soft powerdown is a two-stage procedure.

1. The system immediately stops all software processes currently running, closes any open files, and writes needed information (about directories, for example) to the hard disk.
2. The system removes power from the computer.

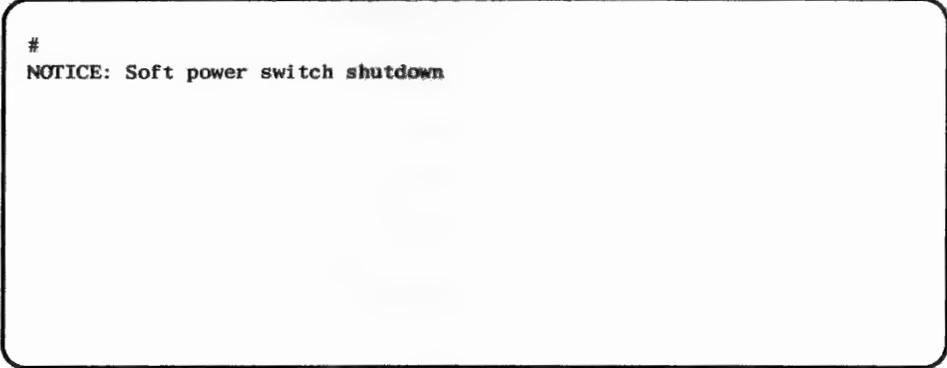
Warning: **DO NOT PULL THE POWER PLUG UNTIL THE 3B2 COMPUTER HAS COMPLETED THE POWERDOWN PROCEDURE. If you pull the power plug or externally remove power before the computer has completed this step, your files may be damaged or destroyed.**

The Power Switch

The quickest way to turn off the computer is by pressing the power switch. On rear card access computers, the power switch is on the front of the computer in the upper-right hand corner. On side card access computers, the power switch is on the left side of the computer in the lower-left hand corner. When you press the power switch to STANDBY, the system executes an "express soft powerdown." Turning the computer off in this way does not give other users a "grace period" to finish their work. To give other users time to finish, use the **powerdown** subcommand instead. A switch initiated powerdown takes between 1 and 2 seconds. You can verify that it is underway by two indications:

- The Power indicator starts flashing after you press the switch.
- The message "Soft power switch shutdown" appears ONLY at the console terminal (see example message in Figure 2-14). Other terminals that are logged in receive NO message.

You can be sure that the powerdown has completed only when the computer is silent.



```
#  
NOTICE: Soft power switch shutdown
```

Figure 2-14: Power Switch Shutdown Message

The **powerdown** Subcommand

An alternate way of turning off the computer while your system is in multiuser state is by executing the **powerdown** subcommand. This subcommand produces a "soft powerdown." It gives you functionality that is not available when you use the switch. (For instructions, see the section on "Using the **powerdown** Subcommand Options.")

- You can specify a delay between the time users are notified that the computer is being turned off and the time power is actually removed.
- All users logged in the system are warned that power is about to be shut down.

Note: Press the power switch to the STANDBY position after the powerdown sequence has completed.

Executing the **powerdown** Subcommand

There are two ways to execute the **powerdown** subcommand. First, since **powerdown** is listed on the System Administration menus, you can execute it as an argument to the **sysadm** (pronounced "sis-adam") command. The advantage of executing **powerdown** in this way is that you are guided in the construction of a correct command, and you can ask to quit at various points in the process. New users are advised to execute **powerdown** as an argument. To do this, enter the following command line:

```
$ sysadm powerdown<CR>
```

If a password is assigned to **sysadm**, the system prompts you to enter it.

Second, if you are more experienced with the UNIX operating system, you may prefer to bypass the menu structure and use **powerdown** as a "shell command;" that is, as a command that you enter directly after a system prompt, as follows:

```
$ powerdown<CR>
```

If a password is assigned to **powerdown**, the system prompts you to enter it.

Using the powerdown Subcommand Options

By default, the **powerdown** subcommand gives users a grace period of 60 seconds between the time they are notified that the computer is being turned off and the time power is actually removed. However, the subcommand asks you (as system administrator) if you want to change that period. For example, let's say you want to give users 90 seconds to log off before the computer is turned off. Figure 2-15 shows you how to do that when you execute the **powerdown** subcommand.

```
sysadm powerdown<CR>
```

```
Once started, a powerdown CANNOT BE STOPPED.
```

```
Do you want to start an express powerdown? [y, n, ?, q] n<CR>
```

```
Enter the number of seconds to allow
```

```
between the warning messages (default 60): [ ?, q ] 90<CR>
```

```
Shutdown started. Tue Apr 4 14:57:12 EDT 1989
```

```
Broadcast Message from root (console) on unix Tue Apr 4 14:57:13...
```

```
THE SYSTEM IS BEING SHUT DOWN NOW !!!
```

```
Log off or risk your files being damaged.
```

```
INIT: New run level: 0
```

```
The system is coming down. Please wait.
```

```
System services are now being stopped.
```

```
Print services stopped.
```

```
Stopping job accounting
```

```
cron aborted: SIGTERM
```

```
The system is down.
```

```
Please flip the power switch to the STANDBY position.
```

Figure 2-15: Specifying a Grace Period

Restricting Access to the `powerdown` Subcommand

Since `powerdown` turns off the computer, you may want to restrict the number of people who may execute it. You can do this by assigning a password to the `powerdown` subcommand. (For information about assigning passwords, see Chapter 3, "Security," and Chapter 4, "System Administration Menus.")

The shutdown Command

If your system is in single-user state, avoid using the `powerdown` subcommand.

Warning: Using the `powerdown` command from the single-user state can damage your files. To turn off your computer and guarantee file system integrity, use the power switch or the `shutdown` command, as shown:

```
# shutdown -i0 -g0 -y

Shutdown started.  Wed Mar  1 13:29:01 EST 1989

Broadcast Message from root (console) on unix Wed Mar  1 13:29:02...
THE SYSTEM IS BEING SHUT DOWN NOW !!!
Log off now or risk your files being damaged.

#
INIT: New run level: 0
The system is coming down.  Please wait.
System services are now being stopped.
Print services stopped.
Stopping job accounting
cron aborted: SIGTERM

The system is down.

Please flip the power switch to the STANDBY position.
```

If you want to have the option of stopping the shutdown, use the `shutdown` command without the `-y` option and the computer prompts you:

```
Do you want to continue?
```

If you change your mind and no longer want to turn off your computer, you can abort the **shutdown** process simply by entering an **n**<CR>. Press the power switch to the STANDBY position after the shutdown sequence has completed.

For more information about this command, see the *UNIX System V Release 3 System Administrator's Guide*.



Chapter 3: Security

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Introduction

Information stored in your 3B2 computer is a valuable resource requiring protection. Your 3B2 computer has some of the most advanced security features available in small, business-type computers.

When viewed from a broad prospective, security may be seen as an effort to prevent or to minimize the effects of the following:

- Operator error
- Unauthorized access
- System malfunction.

This chapter briefly outlines the events or situations which may result in compromising the system or its data. It furnishes suggestions, sometimes basic but often overlooked, regarding precautions to minimize any such compromises. Finally, this chapter discusses nine security features provided with your 3B2 computer to safeguard your system and data. These features include:

- Floppy key
- System backups
- Passwords
- Access permissions
- Data encryption
- The *loginlog* file
- Sticky bit
- Shadow password
- Hardware lock (not available on the 3B2/500 computer).

The sections entitled "The Floppy Key," "System Backups," "Passwords," "Access Permissions," and "Data Encryption" contain a paragraph titled INSTRUCTIONS. These paragraphs contain information that will help you implement the described feature.

Sources of Potential Damage

To provide adequate security for your system, you first need to consider the types of problems that might arise. It is important to consider each contingency: theft of the hardware, breakdowns in the hardware or software, tampering with data in the computer, theft of data, and simple human error. To determine the types of problems to which your system may be vulnerable, ask yourself the following questions:

If you are using your computer in an office, would the accessibility of the computer and removable media present an opportunity for pilfering?

- Deter pilfering by physically locating your hardware and software in a secure area. If a secure area is unavailable, you may consider a location away from visitors', customers', or competitors' view. While such a location does little to actually prevent theft, at least it minimizes temptation. On computers equipped with a locking front cover, keeping the cover locked eliminates easy access to removable storage media. Media should be stored in a locked desk or cabinet when not in the computer.

Do you need to limit unauthorized access to information in the computer?

- You can limit access to files and directories by using a combination of permission modes for files and directories along with assigning user logins. Further limitation occurs when you require the use of passwords with logins. All of these are built-in features of the UNIX operating system. See Chapter 2, "Getting Started," for further discussion of the logins and passwords and how they are installed.

Do you wish to safeguard your file system against user error?

- You can use the extensive file system backup plan fully explained in the *UNIX System V Release 3 System Administrator's Guide*. This automated process makes duplicate copies of newly created or revised files during periods of reduced machine activity. You have full control with respect to when backup is performed, types of files backed up, etc.

Do you mail or otherwise ship programs or data on removable media (floppy disk or cartridge tapes) or do you send files on the telephone network?

- The Security Administration Utilities enable you to encrypt and decrypt files. These utilities are available only to users in the United States. See Chapter 5, "Software Utilities Packages," for further information on this utilities package.

The way you answer these questions will help you decide which measures you want to take to safeguard your data.

The Floppy Key

Caution 1: The floppy key gives you a way to change the computer operation to the firmware state if you forget the firmware password. For this reason, it is essential that you make a floppy key. The floppy disk used as a floppy key should be labeled as follows: "DO NOT reformat, used to store data."

Caution 2: The floppy key provides the only conventional means of entering the firmware state if you forget your firmware password. Therefore, it is essential to the security of your computer. If you have not yet made a floppy key, make one now.

Passwords play an important role in the security of a 3B2 computer, and the password that you assign to the firmware is especially important. Firmware is important because two crucial administrative functions—running diagnostic tests and booting the UNIX system—can be done only when the computer is in the firmware operating state. You cannot change the operating state to the firmware state without the firmware password. If you forget it, you will not be able to perform these administrative functions. Therefore, it is important to have a backup method of entering the firmware state.

To provide this kind of backup method, all 3B2 computers are shipped with the same default firmware password (**mcp**). As soon as you load the operating system, make a floppy key so that you will always be able to restore the default password. A blank, formatted disk was included with your system to make a floppy key. This disk is labeled "Floppy Key" for your convenience.

After making the floppy key, change the firmware password on your computer. If you later forget the firmware password you have assigned, you can use the floppy key to restore the default password. Then you can use the restored default password to enter the firmware mode.

Caution: A floppy key is equivalent to a password; anyone having access to the floppy key can access your computer. It is important to keep your floppy key in a safe place.

INSTRUCTIONS: For instructions on making a floppy key and then changing the firmware password, see Chapter 2, "Getting Started" and the **floppykey** subcommand in Chapter 4, "System Administration Menus."

System Backups

If a system malfunction occurs, you may lose information stored in the computer. You can avoid much of this kind of loss if you have copies of your files stored on removable storage devices. Copy your data periodically onto SCSI Cartridge Tapes and store the tapes in a safe place, away from the computer site.

This procedure is known as "backing up the system." With your files backed up regularly and stored safely off site, you will not have to worry about losing your information, even if your files are damaged.

There are two types of backups, complete and incremental. In a complete backup, you copy your entire file system. In an incremental backup, you make copies of only those changes made to files since the last backup.

INSTRUCTIONS: To back up your system, use the **backup** subcommand described in Chapter 4, "System Administration Menus." For instructions on handling floppy disks and SCSI Cartridge Tapes, see Appendices B and C, respectively. (For detailed information about the backup procedure, see the *UNIX System V Release 3 System Administrator's Guide*.)

Passwords

You can prevent unauthorized system access and you can restrict authorized users from performing some functions by assigning various types of passwords. There are five types of passwords that offer different types of protection on a UNIX system. To assign most of them, you must use a subcommand from the System Administration menus.

INSTRUCTIONS: For instructions on using the subcommands listed in the descriptions below, see Chapter 4, "System Administration Menus."

User Login Passwords

Assigning passwords to user logins ensures that only authorized people may use the system. Once users have been assigned passwords, they will not be able to log on the system without them.

INSTRUCTIONS: Execute the **adduser** subcommand from the User Management Menu (**usermgmt**). This subcommand is invoked by the **setup** program that you use to set up the software when you first get your computer. However, you can execute **sysadm adduser** alone to assign a password to a new user at any time. If you want to change an existing user login, use the **chpasswd** subcommand in the **moduser** submenu (in the User Management Menu).

Firmware Password

Assigning a password to the firmware state allows only authorized users to enter the firmware operating state. Firmware passwords are recommended because certain powerful administrative functions can severely disrupt the system operation.

INSTRUCTIONS: Use the **floppykey** subcommand or follow the instructions in Chapter 2, "Getting Started."

Administrative Login and Subcommand Passwords

Assign passwords to administrative logins and subcommands (that can be executed as commands from the UNIX system shell) that enable a user to perform functions affecting the entire 3B2 computer system. There are seven administrative logins: **checkfsys**, **makefsys**, **mountfsys**, **powerdown**, **setup**, **sysadm**, and **umountfsys**.

INSTRUCTIONS: Use the **admpasswd** subcommand (System Setup Menu).

System Login Passwords

Assigning passwords to system logins enables an authorized user to perform functions affecting the entire 3B2 computer system. There are nine system logins: **adm**, **bin**, **daemon**, **lp**, **nuucp**, **rje**, **sys**, **trouble**, and **uucp**.

INSTRUCTIONS: Use the **syspasswd** subcommand (System Setup Menu).

Selecting Passwords

A password consists of any random mixture of alphanumeric or special characters. (Special characters are symbols such as \$, %, *,], and ?.) Alphabetic characters may be either uppercase or lowercase or a combination of both. A password must include at least two alphabetic characters and at least one numeric or special character. You can use more than eight characters, but only the first eight are recognized by the system.

Because passwords are stored in an encrypted form, they are reasonably secure if they are not easy to guess. When you select a password, do not use obvious names or strings of numbers, such as your name, your spouse's or child's name, a social security number, or license plate number. The more unusual it is, the safer it will be.

Enhancing the Effectiveness of Passwords

To enhance the effectiveness of passwords, periodically change all login passwords. In addition, you should remove the passwords and logins of any former users. You can do this by executing the **deluser** subcommand of the User Management Menu. Refer to the *UNIX System V Release 3 System Administrator's Guide* for information on password aging.

Using Passwords

When using a password, observe the following precautions:

- **DO NOT**, repeat **DO NOT** write down your password or store it on your system. Keep your password private.
- Do not choose the same password more than once.
- Choose your password with care. The best password is a unique combination of letters, numbers, and other characters that are not a recognizable word or phrase.
 - Do not use the names of family members.
 - Do not add a number to the beginning or end of a password.
 - Do not use birthdays, telephone numbers, license numbers, or any string of numbers that can be associated with you.

Access Permissions

If several users share a computer, they may wish to share some information while keeping other information private. The UNIX operating system allows you to satisfy both these needs by defining the following:

- Users having permission to access data
- Types of permission users have (that is, if they are allowed to read from, write to, or execute other users' files).

The UNIX operating system recognizes three categories of users of stored data: the owner of the data, the group to which the owner belongs, and all other people who use the system. Users can be given permission to use data in any combination of three ways: to read, write, and execute data.

When a user creates a file (or a directory), the system automatically identifies users allowed to read, write, and execute the file. The file owner, however, can change the access permission after the file or directory is created. The only other person who can change the permission on the file is the user having "super-user" privileges, usually the system administrator.

INSTRUCTIONS: Use the **chmod(1)** command to set or change access permissions. For instructions, see the *UNIX System V User's Guide*.

Data Encryption

Note: The Security Administration Utilities package has restricted distribution and is available only with UNIX operating system software sold in the United States.

If you have data requiring greater protection than that afforded by access permission, you can encrypt the data. Encryption is a means of scrambling data so that it is unintelligible. A "key" word is used during the encryption process. The same "key" word is required to unscramble (or decrypt) the data so that it can be read.

INSTRUCTIONS: Load the Security Administration Utilities package from the floppy disk and use the **crypt(1)** command. For instructions on loading this utilities package, see Chapter 5, "Software Utilities Packages." For instructions on using the **crypt** command, see the *UNIX System V User's Reference Manual* and the *UNIX System V Release 3 System Administrator's Reference Manual*.

UNIX System Security Enhancements

The following paragraphs describe the essential elements of the UNIX system security enhancements. Although these enhancements are part of the Essential Utilities, some of them must be enabled before they can be used. See the *UNIX System V Release 3 System Administrator's Guide* for complete information on using these enhancements.

The *loginlog* File

To make the user more security conscious, the time and date of the previous login is displayed during each login sequence. In addition, if login is unsuccessful for five consecutive attempts, a record of each attempt is recorded in */usr/adm/loginlog*. After five unsuccessful attempts the login process sleeps for 20 seconds and then drops the line. The system administrator can monitor login attempts by monitoring the */usr/adm/loginlog* file.

The *loginlog* file is not created automatically. The system administrator must create and monitor it. For more information, see the *UNIX System V Release 3 System Administrator's Guide*.

Sticky Bit

Directories writable to the world or to a group, such as */tmp* or */usr/tmp*, are vulnerable to access by any process. This ease of access poses a serious problem to the integrity of files contained in those directories, as well as to the system in general. To circumvent the potential problem, the "sticky bit" is used on a directory to restrict the removal of any files or subdirectories within the parent directory. When the "sticky bit" is set on a parent directory, not only must the parent directory be writable, but the user must own the file, or own the parent directory, or the file itself must be writable by the user. What this means is, that with the "sticky bit" set, any program that attempts to remove files not owned by its invoker from a world-writable directory is unable to do so, unless the directory is owned by the user.

The "sticky bit" on a directory is set by a user by using the **chmod** command. By default, the "sticky bit" is set on the */tmp* and */usr/tmp* directories.

Shadow Password

Prior to Release 3.2.1 of the UNIX operating system, encrypted passwords and their associated aging information were contained in */etc/passwd* which was readable by all users. A new file, */etc/shadow*, was added to the operating system in the Release 3.2.1. The */etc/shadow* file will contain the passwords and their aging information if the shadow password feature is enabled. This file is readable only by **root**.

The **pwconv** command enables the shadow password feature. The **pwunconv** command disables the shadow password feature.

Hardware Lock

The hardware lock is used to prevent physical access to the floppy disk drive, cartridge tape drive, and power switch.

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Introduction

For more information about terminology used in this chapter, see Chapter 1, "Introducing the 3B2 Computer." For more information about system administration for a 3B2 computer, see the *UNIX System V Release 3 System Administrator's Guide* and the *UNIX System V User's Guide*.

This chapter describes the tasks involved in maintaining and running a 3B2 computer and the system of menus known as **sysadm** (system administration) that can help you perform those tasks. The chapter is divided into three parts. The first part explains in detail what the menus are and describes each menu, along with the submenus and subcommands listed in it. The second part explains how to use the menus, and it leads you step-by-step through an example. It also tells you how to bypass the menus and execute the subcommands directly, a useful technique once you are familiar with the system. The third part of the chapter is a reference chart that lists the subcommands according to the tasks they perform. The chart also shows the menu on which each subcommand is listed.

Note 1: This *Owner/Operator Manual* is applicable to Release 3 software only. You may verify the version by entering:

uname -a

If the response is other than Release 3, use the *Owner/Operator Manual* appropriate for that software.

Note 2: Some menu items (i.e., **mirrormgmt**, **packagemgmt**) are not present until the associated software utilities are loaded.

Menus and Subcommands

The administration of a 3B2 computer entails management of three overlapping areas: the hardware, the software, and the people who use the system. (See the Reference Chart at the end of this chapter for a list of tasks that a system administrator must perform.) The hardware related tasks include installing optional hardware and formatting blank floppy disks.

Software related tasks include: managing the directory/file system, creating new file systems, installing utilities packages, and saving files on the hard disk by making copies of them on floppy disks or cartridge tapes.

Supervising the users of a 3B2 computer is basically a matter of controlling access to the computer itself and to those subcommands that affect the entire system. The system administrator does this by "adding" users to the system (or "removing" them from it), assigning login IDs and passwords to individuals, and assigning passwords to system logins and administrative subcommands.

To help you perform these tasks, the UNIX operating system provides a system of menus from which you can choose an appropriate subcommand. This system is accessed by the command **sysadm**. There is a System Administration Main Menu, ten System Administration menus, and seven submenus (see Figure 4-1).

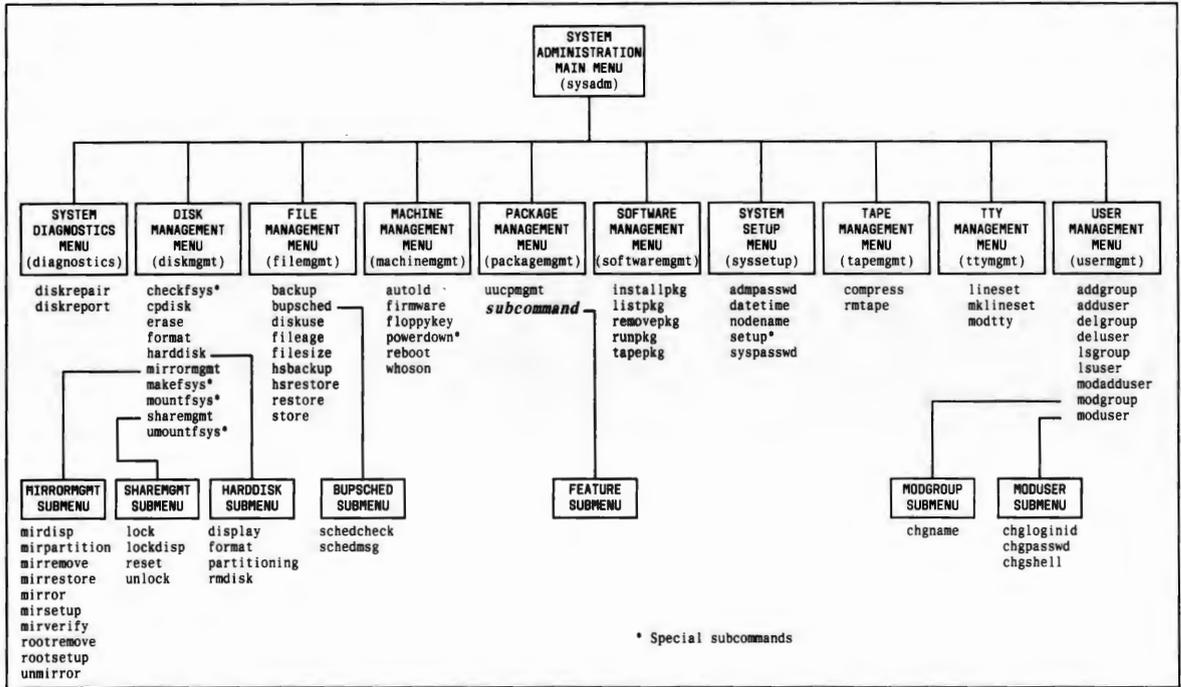


Figure 4-1: System Administration Menus and Subcommands

Menus and Subcommands

The rest of this section describes each of the System Administration menus. A menu is a list of subcommands for a given task in the area of system administration. Each subcommand is the name of a program that helps you manage your hardware, software, and the users on your 3B2 computer. Some menus also contain submenus on which you will find subcommands for a specific area of a given task. (For example, the Disk Management Menu contains a submenu called Hard Disk Management.) The format for all menus, including submenus, is the same. For each item listed there is a number, a full name, and an abbreviated name.

The System Administration Main Menu is the menu you see when you enter the **sysadm** command. It appears on the screen as shown in Figure 4-2.

```

                                SYSTEM ADMINISTRATION

1  diagnostics          system diagnostics menu
2  diskmgmt            disk management menu
3  filemgmt           file management menu
4  machinmgmt        machine management menu
5  packagemgmt       package management menu
6  softwaremgmt     software management menu
7  syssetup          system setup menu
8  tapemgmt          tape management menu
9  ttygmt            tty management menu
10 usermgmt         user management menu

Enter a number, name, the initial part of a name, or
? or <number>? for HELP, q to QUIT:
```

Figure 4-2: System Administration Main Menu

System Diagnostics Menu and Subcommands

This menu lists the subcommands that look for, report on, and explain how to repair errors on the built-in hard disk. It appears on the screen as shown in Figure 4-3.

```
                                SYSTEM DIAGNOSTICS

1  diskrepair  advice on repair of built-in disk errors
2  diskreport  report on built-in disk errors

Enter a number, a name, the initial part of a name, or
? or <number>? for HELP, ^ to GO BACK, q to QUIT:
```

Figure 4-3: System Diagnostics Menu

- 1 diskrepair** Provides advice on how to attempt repairs of errors on the hard disk(s). This includes instructions for changing the operating state of the computer prior to doing repairs, selecting the correct repair program, and restoring the system.

Caution: The repair of hard disk errors should be performed only by trained service personnel.

- 2 diskreport** Provides a report about errors on the hard disk(s). You can choose either a summary or a full report. The summary provides enough information to determine if a repair should be attempted. The full report provides detailed information for the troubleshooting expert.

Disk Management Menu Subcommands

The subcommands listed on this menu help you do the following tasks with hard disks and floppy disks: format floppy disks, copy floppy disks, and use floppy disks as mountable file systems. You can also partition an additional hard disk and create file systems on it. The fifth, seventh, and ninth items, **harddisk**, **mirrormgmt**, and **sharedmgmt** are submenus. The Disk Management Menu appears on the screen as shown in Figure 4-4.

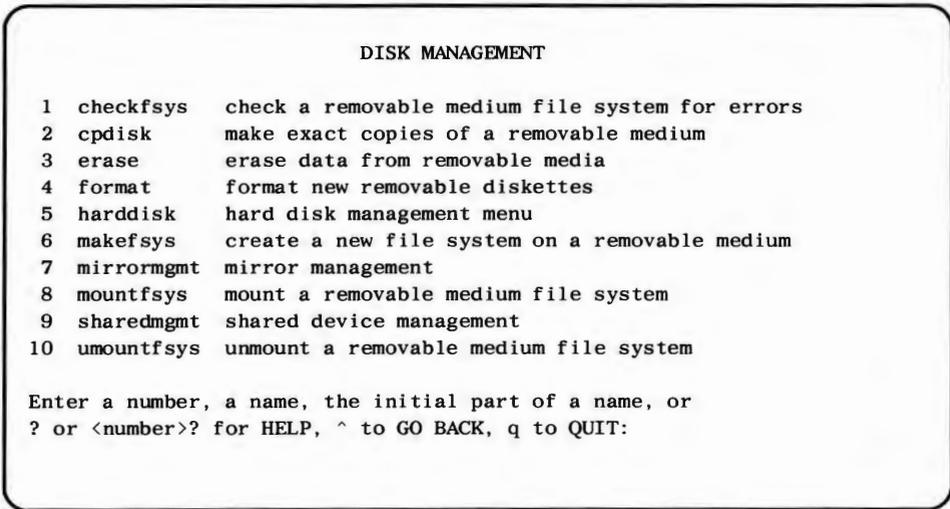


Figure 4-4: Disk Management Menu

- 1 **checkfsys** Checks a file system on a floppy disk for errors. If there are errors, **checkfsys** attempts to repair them.
- 2 **cpdisk** Makes copies of floppy disks identical to the original in all respects. If you have more than one floppy disk drive, **cpdisk** copies the contents of one disk directly onto another.

If you have only one floppy disk drive, **cpdisk** makes a copy by first reading the contents of the original floppy disk onto hard disk and then by writing those contents onto a duplicate disk. The procedure will fail if there is not enough space in the *root* file system to hold the data from the original floppy disk.

Note: A floppy disk cannot be used until it has been formatted. For instructions on how to format floppy disks, see Appendix B, "Using Floppy Disks."

- 3 erase** Erases a floppy disk by overwriting the information on it with null bytes. It allows you to erase all the files on a floppy disk. The main purpose is to let you destroy data that you no longer want. Be careful when you start erasing files because the process is not reversible.
- 4 format** Formatting is an operation that you perform on new or unused floppy disks to make them capable of storing information. (Before you can write programs and data on a floppy disk, you must format it.) The **format** subcommand does this for you.
- 5 harddisk** When you select item 5, you do not initiate a subcommand, you get a submenu. The subcommands listed in this menu are functions for administrating a hard disk on your computer. The Hard Disk Management Submenu appears on the screen as shown in Figure 4-5.

```
                                HARD DISK MANAGEMENT

1 display      display hard disk partitioning
2 format       format a hard disk
3 partitioning partition a hard disk
4 rmdisk       remove a hard disk

Enter a number, a name, the initial part of a name, or
? or <number>? for HELP, ^ to GO BACK, q to QUIT:
```

Figure 4-5: Hard Disk Management Submenu

These subcommands enable you to perform the following tasks: display the current disk partitioning, partition the hard disk with default partitioning, format hard disk file systems, remove hard disk file systems, and create hard disk file systems.

- | | |
|------------------|--|
| 1 display | Shows you the layout of hard disk partitions and file systems. |
| 2 format | Formatting is an operation that prepares a SCSI hard disk for use. After the hard disk is formatted, it may be partitioned by using the partitioning subcommand. |

Note: The 3B2 computer must be in the single-user operating state to run the **format** subcommand.

3 partitioning Creates one or more file systems on the hard disk. When a hard disk is added to the computer, it must be partitioned to become usable. A hard disk can be partitioned with default partition values or you can define the disk partitions. If a disk is already partitioned, it can only be repartitioned if the disk is removed from service by using the **rmdisk** command.

4 rmdisk Unmounts a hard disk from the system configuration so it can be physically removed or repartitioned. At the same time, **rmdisk** removes all system references to the hard disk and undoes all the things done by partitioning.

Note: A disk cannot be removed if it contains the *root (/)* or */usr* file system (normally disk1).

6 makefsys Creates a file system on a floppy disk, thereby enabling you to store and readily access data from a disk. The file system you create on a floppy disk has all the properties of a file system on a hard disk. (The **makefsys** is a special subcommand. See "Bypassing the Menus" in this chapter for more information on special subcommands.)

- 7 mirrmgmt** When you select item 7, you get the Mirror Disk Partition Management Submenu shown in Figure 4-6. See the *AT&T 3B2 Computer SCSI Release 3.0 SCSI Operations Manual* for detailed instructions for initially setting up the mirroring feature.

```
MIRROR DISK PARTITION MANAGEMENT

1 mirdisp      display the mirrored partitions
2 mirpartition partition a hard disk for mirroring
3 mirremove   remove the mirroring capability
4 mirrestore   copy a disk partition to its mirrored pair
5 mirror      mirror two disk partitions
6 mirsetup    configure the system to support mirroring
7 mirverify   verify two mirrored disk partitions are identical
8 rootremove  unmirror root, /usr, and swap partitions
9 rootsetup   mirror root, /usr, and swap partitions
10 unmirror   unmirror one or two disk partitions

Enter a number, a name, the initial part of a name, or
? or <number>? for HELP, q to QUIT:
```

Figure 4-6: Mirror Disk Partition Management Submenu

- 1 mirdisp** The **sysadm mirdisp** subcommand lists all currently mirrored partition.
- 2 mirpartition** The **sysadm mirpartition** subcommand interactively configures a SCSI hard disk for mirroring. Once partitioned, the drive can be mirrored by using the **sysadm rootsetup** command or the **sysadm mirror** command. This command does not configure the drive into the system automatically.
- 3 mirremove** The **sysadm mirremove** subcommand undoes the setup done by **sysadm mirsetup**, removing the mirroring capability from the system.

- 4 mirrestore** The **sysadm mirrestore** subcommand copies the contents of an **ACTIVE** partition to an **OUT-OF-DATE** partition, bringing both partitions into the **ACTIVE** state.
- 5 mirror** The **sysadm mirror** subcommand binds one or two hard disk special files to one mirror device file. The mirror device file is then added to the */etc/scsi/mirrortab* file. Currently, mounted file systems must be unmounted before the disk partitions can be bound to the mirror special file.
- 6 mirsetup** The **sysadm mirsetup** subcommand includes the mirror driver line in */etc/system*, which creates a specified number of mirror device files or a default of 16 in the */dev/dsk* and */dev/rdisk* directories, and specifies the value for the **MPARTS** parameter in the */etc/master.d* mirror file.
- 7 mirverify** The **sysadm mirverify** subcommand verifies that two hard disk partitions that are mirrored together are identical.
- 8 rootremove** The **sysadm rootremove** command performs the software steps required to unmirror the *root*, */usr*, and *swap* partitions.
- 9 rootsetup** The **sysadm rootsetup** subcommand performs the steps necessary to support mirroring for *root*, */usr*, and *swap*. It does things like edit the */etc/system* file, edit the */etc/scsi/mirlist* file, etc. The ASCII file, */etc/scsi/mirlist*, lists all hard disk partitions which should automatically be mirrored when the system comes up. A **sysinit** entry in */etc/inittab* executes the shell script */etc/init.d/mirdisk*. When invoked, the **mirdisk** shell script executes **setmirror** and then mirrors all partitions listed in the */etc/scsi/mirlist* file. When the system goes to multiuser state, the */etc/rc2.d/S80restore* shell script examines all mirrored partitions and starts restore for any mirrored partitions with one disk **ACTIVE** and the other **OUT-OF-DATE**.

10 unmirror The **sysadm unmirror** subcommand is used to unbind a mirrored partition from a mirror device file. The **sysadm mirdisp** subcommand accesses the `/etc/scsi/mirrtab` file and displays all currently **ACTIVE** mirror device files and the states of their partitions.

8 mountfsys Mounts a file system that was made on a floppy disk, making the file system accessible to users. (The **mountfsys** is a special subcommand. See "Bypassing the Menu" in this chapter for more information on special subcommands.)

Caution: Do not remove the floppy disk from the disk drive while the file system is still mounted.

9 sharedmgmt When you select item 9, you get the Shared Disk Management Submenu shown in Figure 4-7. See the *AT&T 3B2 Computer SCSI Release 3.0 SCSI Operations Manual* for detailed instructions for using shared disk management commands.

SHARED DISK MANAGEMENT

1 lock	lock a SCSI drive
2 lockdisp	display locks
3 reset	clear inactive locks
4 unlock	unlock a SCSI drive

Enter a number, a name, the initial part of a name, or
? or <number>? for HELP, ^ to GO BACK, q to QUIT:

Figure 4-7: Shared Disk Management Submenu

- 1 lock** Restricts the access of a SCSI drive to a single computer. Also used to add drives to the system lock list. Drives on the lock list are locked each time the system is booted.
- 2 lockdisp** Displays the locked SCSI drives on all shared buses and the system lock list.
- 3 reset** Clears the locks applied by another computer that is no longer active.
- 4 unlock** Releases a locked drive so that other computers can access the drive. Also used to remove drives from the system lock list.

10 umountfsys Unmounts a file system from the floppy disk drive so that the floppy disk can be removed. (The **umountfsys** is a special subcommand. See "Bypassing the Menus" in this chapter for more information on special subcommands.)

File Management Menu and Subcommands

File management includes tasks such as backing up file systems, scheduling backup reminders, keeping track of free file space, and removing or archiving old files on removable media. The subcommands listed on the File Management Menu help you do these tasks. The menu appears on the screen as shown in Figure 4-8.

FILE MANAGEMENT

1	backup	backup files from built-in disk to removable media
2	bupsched	backup reminder scheduling menu
3	diskuse	display how much of the built-in hard disk are being used
4	fileage	list files older than a particular date
5	filesize	list the largest files in a particular directory
6	hsbackup	high speed backup of file system
7	hsrestore	high speed restore of file system
8	restore	restore files from "backup" & "store" media to built-in disk
9	store	store files and directories of files onto removable media

Enter a number, a name, the initial part of a name, or
? or <number>? for HELP, ^ to GO BACK, q to QUIT:

Figure 4-8: File Management Menu

- 1 backup** Copies files from a hard disk to a SCSI Cartridge Tape or a floppy disk. There are two kinds of backups: complete and incremental. In a complete backup, all files are copied (useful in case of serious file system damage); in an incremental backup, only files changed since the last backup are copied. The conventional practice is to do a complete backup of each file system initially, and then do incremental backups periodically. You should keep two cycles of backup copies, each consisting of one complete backup and several incremental backups. In the event of damage to the hard disk file systems, you can use these backup copies to replace the damaged files (see **restore** subcommand).
- 2 bupsched** When you select item 2, **bupsched**, you do not initiate a subcommand, you get a submenu. Since backing up file systems is an important part of system administration, reminders that a backup is due are displayed on the console terminal at predefined times. The **bupsched** is a submenu of subcommands that enables you to control the backup reminders. You specify the file systems for which you want

backup reminder messages to be displayed. Reminder messages are displayed at the times you specify and before the computer is turned off during a given time period. The Backup Reminder Scheduling Submenu appears as shown in Figure 4-9.

```
                                BACKUP REMINDER SCHEDULING

1  schedcheck  schedule backup reminder checks
2  schedmsg    schedule backup reminder message

Enter a number, a name, the initial part of a name, or
? or <number>? for HELP, ^ to GO BACK, q to QUIT:
```

Figure 4-9: Backup Reminder Scheduling Submenu

- 1 schedcheck** Accesses the file that defines when checks will be made to see if any file systems are due for backup. The computer is shipped with default times for checking the backup schedule, but you have the ability to modify this file to satisfy your backup requirements.
- 2 schedmsg** Allows you to access the file that schedules the times when backup reminder messages are to be displayed. The default backup schedule calls for daily backups of the */usr* file system and monthly backups of the *root (/)* file system on the fifteenth of each month. You have the ability to change the default backup schedule and to add other file systems to the backup schedule.
- 3 diskuse** Reports the number of free blocks in a file system and the percentage of a file system hard disk space being used.
- 4 fileage** Displays the names of all files created before a date that you specify. If you do not enter a date, all files older than 90 days will be listed. If you do not specify a directory, your login directory will be used.
- 5 filesize** Displays the names of the largest files in a specific directory. If you do not enter a directory name, your login directory will be used. If you do not specify a number of files, only the ten largest files will be listed.
- 6 hsbackup** Copies files from a SCSI hard disk to SCSI Cartridge Tape. This procedure will run faster than **backup**, but you can only make a COMPLETE backup onto a SCSI Cartridge Tape. File system backups using **hsbackup** can only be restored using **hsrestore**. You should keep two cycles of backup copies, each consisting of one complete backup. In the event of damage to the hard disk file systems, you can use these backup copies to replace the damaged files (see **hsrestore** subcommand).

- 7 hsrestore** This subcommand is used to restore a file system that has been backed up using the **hsbackup** subcommand. It CANNOT be used to restore a file system that has been backed up using the **backup** subcommand.
- 8 restore** Copies files stored on a floppy disk or tape (with the **backup** or **store** subcommand) back onto a hard disk. You can restore individual files, a directory, or all the files on a disk or tape. Files from both "incremental" and "complete" sets of backup copies can be restored. The subcommand **restore** also provides a list of the files saved on the floppy disk.
- 9 store** Copies files and directories from a hard disk to floppy disk or cartridge tape. Typically, these are files that you want to archive or manually transfer to another computer. You can store single files or directories of files.

Machine Management Menu and Subcommands

The subcommands on this menu perform tasks such as: turning off the computer, rebooting the computer, or changing the operating environment to firmware state. The Machine Management Menu appears on the screen as shown in Figure 4-10.

```

                                MACHINE MANAGEMENT

1  autold      set automatic boot device, default manual boot program
2  firmware   stop all running programs then enter firmware mode
3  floppykey  create a "floppy key" removable disk
4  powerdown  stop all running programs then turn off machine
5  reboot     stop all running programs then reboot the machine
6  whoson     print list of users currently logged onto the system

Enter a number, a name, the initial part of a name, or
? or <number>? for HELP, ^ to GO BACK, q to QUIT:
```

Figure 4-10: Machine Management Menu

- 1 autold** Changes the default boot file and boot device. Usually, you boot from the *unix* file that is on the built-in hard disk.
- 2 firmware** Stops all running programs, closes open files, writes information (such as directory information) onto a hard disk, and then places the computer in the firmware state. In the firmware state, you can perform machine diagnostics and other special functions not available through standard UNIX system subcommands.
- 3 floppykey** Creates a floppy key on a floppy disk. The floppy key enables you to enter the firmware state if you have changed the firmware password and then forgotten it. Thus, the floppy key is just that—the key to your system—and should be protected as such. (See Chapter 2, “Getting Started,” for more information about the floppy key.)
- 4 powerdown** Stops all running programs and then turns off your computer. Before turning off the computer, it closes any files that are open and writes out information (such as directory information) to a hard disk. Only after completing these steps does it turn off the computer.
- 5 reboot** Stops all running programs and then reboots the computer. As it stops programs, **reboot** closes any open files and writes out information (such as directory information) to a hard disk. Only when these steps have been completed does it reboot the computer.
- The **reboot** subcommand can also be used to solve some system problems. For example, you can use it to kill a process that you cannot kill with any other method.
- 6 whoson** Prints a list of users who are currently logged on to the system. It also reports a login ID, terminal device number, and sign-on time for each user.

Package Management Menu and Subcommands

The `sysadm` command supports the administration of some optional utilities packages and hardware. (Refer to the manual for the utilities package or hardware you are adding to see if it is supported by the System Administration menus.) The subcommands provided for these optional features are available only if the appropriate utilities package or hardware is installed.

The Package Management Menu is empty until you install a supported optional feature. When you do so, a menu containing the subcommands for managing your new utilities or hardware automatically appears in the Package Management Menu. For example, when you install the Basic Networking Utilities, the following menu is listed automatically on the Package Management Menu, as shown in Figure 4-11.

```

                                PACKAGE MANAGEMENT

1  FACE          FACE management menu
2  lpmgmt       LP print service management menu
3  rfsmgmt      remote file sharing management menu
4  uucpmgmt     basic networking utilities menu

Enter a number, a name, the initial part of a name, or
? or <number>? for HELP, ^ to GO BACK, q to QUIT:
```

Figure 4-11: Example of a Package Management Menu

Not all optional utilities packages and hardware are supported by the System Administration menus. Check the manual or the *UNIX System V Release 3 System Administrator's Guide* to see if the optional feature is supported. If it is, you will find descriptions of the available subcommands for that feature in the appropriate manual.

Software Management Menu and Subcommands

The subcommands listed on this menu help you manipulate the software utilities packages. Specifically, they enable you to install and remove utilities packages, and run software directly from the media on which it is delivered. (Not all utilities packages have the “remove” and “run” capabilities; refer to the guide for each utilities package to see whether or not these capabilities are present.) This menu appears on the screen as shown in Figure 4-12.

```

                                SOFTWARE MANAGEMENT

1  installpkg  install new software package onto built-in disk
2  listpkg     list packages already installed
3  removepkg   remove previously installed package from built-in disk
4  runpkg     run software package without installing it
5  tapepkg    install/remove packages from SCSI tape.

Enter a number, a name, the initial part of a name, or
? or <number>? for HELP, ^ to GO BACK, q to QUIT:

```

Figure 4-12: Software Management Menu

- 1 installpkg** Copies a utilities package from a floppy disk onto a hard disk. If necessary, **installpkg** performs additional tasks to enable you to run the software.
- 2 listpkg** This is a listing of all packages already installed.
- 3 removepkg** Removes utilities packages that were installed with the **installpkg** subcommand from the hard disk. The subcommand shows you a list of the optional utilities packages that are currently installed. You select the packages you want to remove, insert the appropriate floppy disk, and the system performs whatever actions are necessary to remove the packages. Packages installed from tape are removed using **tapepkg**.

4 runpkg Enables you to run software from a floppy disk without installing it on a hard disk. The **runpkg** subcommand takes a file off the floppy disk and executes it. This subcommand is useful if you do not use the software often or if you do not have enough space on the hard disk to load an entire utilities package.

Note: Do not use the **runpkg** subcommand to install standard utilities packages. Use the **installpkg** subcommand. For optional software packages, check the documentation provided with the package before attempting to use the **runpkg** or **removepkg** subcommands.

5 tapepkg Enables you to install or remove packages from a SCSI Cartridge Tape.

System Setup Menu and Subcommands

The subcommands listed on this menu enable you to define parameters such as the following: the time zone, date, and time; the name of the computer; administrative subcommands and system logins that have passwords (assigned by you); and a list of the peripheral devices attached to the computer. Since creating an environment for your computer is one of the tasks required to set it up, the **setup** subcommand that you used the first time you turned on your computer is also included on this menu. The System Setup Menu appears on the screen as shown in Figure 4-13.

```

                                SYSTEM SETUP

1  admpasswd    assign or change administrative passwords
2  datetime     set the date, time, time zone and daylight savings time
3  nodename     set the node name of this machine
4  setup        set up your machine the very first time
5  syspasswd    assign system passwords

Enter a number, a name, the initial part of a name, or
? or <number>? for HELP, ^ to GO BACK, q to QUIT:

```

Figure 4-13: System Setup Menu

- 1 admpasswd** Enables you to assign and change passwords to the **sysadm** command and the six special menu subcommands.
- 2 datetime** Enables you to set the computer date, time, time zone, and whether you observe Daylight Savings Time (DST). This subcommand is normally run once when the machine is first set up. If you request Daylight Savings Time with the **datetime** subcommand, the computer will automatically start to observe it in the spring and return to Standard Time in the fall.
- 3 nodename** Enables you to change the node name of the computer. The node name is used by various communications networks to identify your computer. If you are not familiar with relating node names to a network, refer to the *UNIX System V Release 3 System Administrator's Guide* for further information.
- 4 setup** Enables you to set up the software on your computer the first time you turn it on. Setting up the software includes the following tasks: defining the first login, adding other logins, assigning passwords to logins, and setting the time zone for your location. (The **setup** is a special subcommand. See "Bypassing the Menus" in this chapter for more information on special subcommands.)

Menus and Subcommands

- 5 syspasswd** Enables you to assign passwords to system logins that are normally reserved for very knowledgeable users. You cannot use this subcommand to change or clear system passwords. Once set, these passwords can be changed only by the holder of the **root** login or the holder of the system login for which the password is being changed. Therefore, set them with care!

Tape Management Menu

The Tape Management Menu contains subcommands for using the SCSI Cartridge Tape Drive. The screen is shown in Figure 4-14.

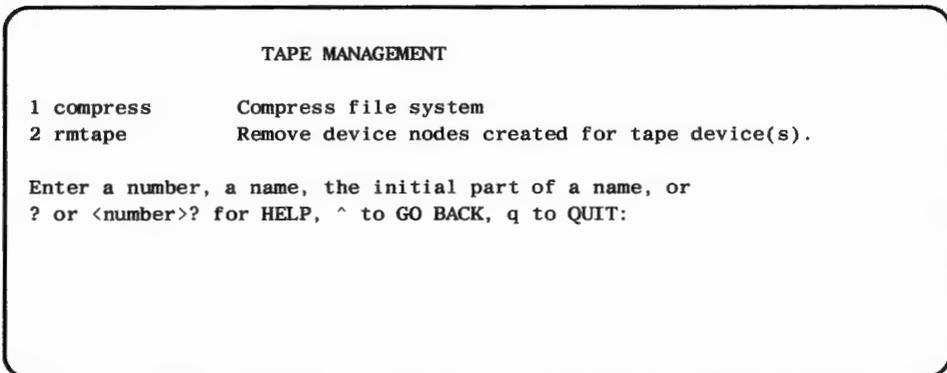


Figure 4-14: Tape Management Menu

1 compress Reorganizes a file system (except *root* and */usr*) in order to improve access efficiency in that file system. The reorganization is accomplished by first copying the file system from built-in hard disk to cartridge tape. The hard disk is then restructured and the file system is copied from the cartridge tape back onto the hard disk. There are two requirements for **compress** to work:

- The file system to be reorganized must be mounted on a hard disk.
- The temporary storage device must be a SCSI Cartridge Tape.

Caution 1: You must back up the file system that you want to **compress** before starting this procedure.

Caution 2: If the file system is larger than 120 megabytes, see the *UNIX System V Release 3 System Administrator's Guide*. The cartridge tape cannot hold more than 120 megabytes.

2 rmtape Removes the entries created for a tape device. After this subcommand is executed, the tape device can be physically removed. This subcommand may be used to remove one or more tape devices.

TTY Management Menu and Subcommands

Note: **To beginners:** Before attempting to use the subcommands on the TTY Management Menu, you should be familiar with the **getty** command and the *gettydefs* file. (Refer to the *UNIX System V Release 3 System Administrator's Guide* for information about the **getty** command.)

To experienced users: The TTY Management Menu subcommands enable you to display and to add information to */etc/gettydefs* and to edit the *getty* entries in */etc/inittab*.

The physical interface between the computer and any device connected to it is called a "port." The UNIX operating system gives you access to ports through "tty lines," providing one tty line for each port. Each tty line is defined by several parameters that together comprise a "tty line setting." These parameters include "baud rate," "initial flags," "final flags," "login prompt," and "next setting." There is an array of tty line settings from which to choose; any tty line can have any line setting.

The important items on this list are the "baud rate" and the "next setting." The baud rate is important because the computer and the device connected to it will not work together unless they have the same baud rate. For this reason, one of the first things that the computer does after being turned on is to check the line setting of any device connected to it to verify that it has the proper baud rate. If the computer discovers that the line setting for that device does not have the required baud rate (the same rate as that of the computer), it will not function properly.

If that happens, the user must press the BREAK key. This causes the computer to hunt for the required baud rate by examining another line setting. The computer determines which line setting to examine next by looking at the value of next setting. Thus, part of each tty line setting can be described as a hunt sequence.

For example, let's say the computer first examines line setting 300. This setting does not contain the baud rate required by the computer. So the computer looks up the value of next setting in */etc/gettydefs* and discovers that it is 1200 baud. When the user presses the BREAK key, the computer examines line setting 1200. This process continues with the computer hunting one tty line setting after another until it finds the required setting.

The subcommands in this menu enable you to do the following tasks: see the available line settings (and the hunt sequences for them), create tty line settings and hunt sequences, and disable tty lines. The TTY Management Menu appears on the screen as shown in Figure 4-15.

```
TTY MANAGEMENT

1 lineset      show tty line settings and hunt sequences
2 mklineset   create new tty line settings and hunt sequences
3 modtty      show and optionally modify characteristics of tty lines

Enter a number, a name, the initial part of a name, or
? or <number>? for HELP, ^ to GO BACK, q to QUIT:
```

Figure 4-15: TTY Management Menu

- 1 lineset** Shows the various hunt sequences of line settings and each line setting in detail.
- 2 mklineset** Helps you create tty line setting entries. You might want to add line settings that are not in the current set or create hunt sequences with specific line settings in them. The hunt sequences that you create are circular; after the computer has examined the last setting, it returns to the first one in the set.
- 3 modtty** Reports and allows you to change the operating conditions of tty lines for peripheral devices such as terminals, printers, or modems (in most cases, it will be a terminal). These operating conditions include setting the data transmission rate (baud rate) and turning a tty line on and off.

User Management Menu and Subcommands

The subcommands listed on this menu enable you to control access to your computer. Specifically, you can add to, modify, and delete from your list of users. You can also separate users into groups to facilitate procedures for data security. (Refer to Chapter 3, "Security," for information about protecting data with passwords.) The User Management Menu appears on the screen as shown in Figure 4-16.

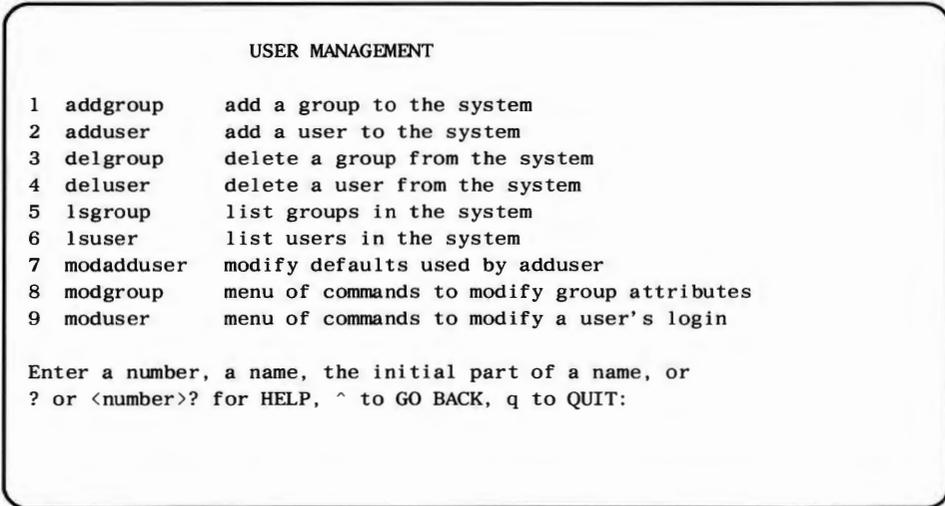


Figure 4-16: User Management Menu

- 1 addgroup** Adds a new group name or ID to the list of those recognized by the computer. Group names and IDs are used to identify groups of users who desire common access to a set of files and directories.
- 2 adduser** Enables you to add users to the list of those with access to the 3B2 computer.
- 3 delgroup** Allows you to remove groups from the list of those recognized by the computer. Once you have deleted a group, users are no longer able to access information according to the group name. (However, you may still identify files with the group ID number.)
- 4 deluser** Enables you to remove logins from the list of those recognized by the computer. All administrative information about these logins and associated data are removed.
- 5 lsgroup** Lists all groups that have been entered into the computer with the **addgroup** subcommand. (This list is updated automatically by the **addgroup** and **delgroup** subcommands.)

- 6 lsuser** Lists all logins entered into the computer with the **adduser** subcommand. (This list is updated automatically by the **adduser** and **deluser** subcommands.)
- 7 modadduser** Enables you to change some of the default values used for creating new logins with the **adduser** subcommand. Changing the default values does not affect any existing logins, but affects all those added later.
- 8 modgroup** Enables you to change the name of an existing group that was entered as part of the **addgroup** routine when the group was added to the computer list of groups. The **modgroup** submenu appears on the screen as shown in Figure 4-17.

```
MODIFY GROUP ATTRIBUTES

1 chgname      change name of the group on the system

Enter a number, a name, the initial part of a name, or
? or <number>? for HELP, ^ to GO BACK, q to QUIT:
```

Figure 4-17: Modify Group Attributes Submenu

- 1 chgname** Allows you to change the name of a group that you previously entered into the system. Only groups with group IDs larger than 100 can be modified.
- 9 moduser** This is a menu of subcommands that enables you to modify two things: the information required to log in and the shell invoked when the user logs in. The **moduser** submenu appears on the screen as shown in Figure 4-18.

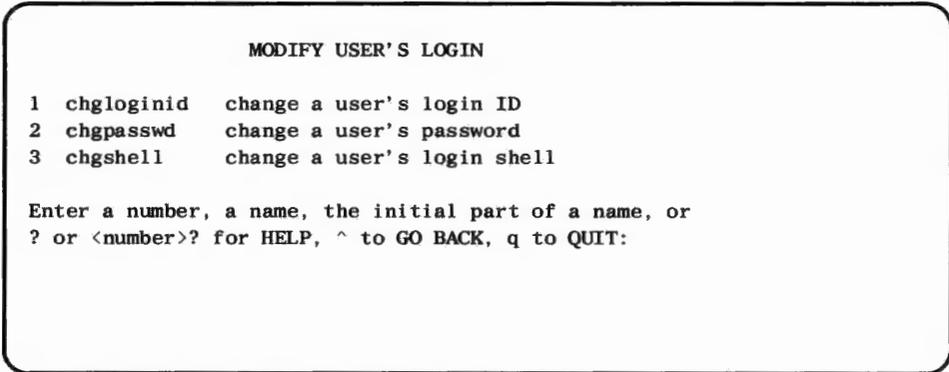


Figure 4-18: Modify User's Login Menu

- | | |
|-----------------------|--|
| 1 chgloginid * | Enables you to change a user's login ID. |
| 2 chgpasswd † | Enables you to remove or change a user's password. |
| 3 chgshell * | Enables you to change the command that is run when a user logs in. |

* You cannot use this subcommand to change the login IDs of the administrative and system logins. Those logins cannot be changed.

† You cannot use this subcommand to change the passwords of the administrative and system logins. To do that, you must use the **admpasswd** subcommand on the System Setup Menu.

How to Use the System Administration Menus

The subcommands listed on the menus help you to complete many administrative tasks. This means that when you choose a subcommand from a menu, you initiate a program that performs a given task for you. Part of this program is a question-and-answer (interactive) session during which you supply information that the system needs to perform your task. An example of this kind of interactive program is the **setup** program that you invoked the first time you turned on the computer.

Caution: You may access the **sysadm** menus logged in as root or logged in as a regular user. Only log in as root when you are completely familiar with the system. As root, you may inadvertently remove or misplace files, possibly losing valuable data. To be safe, assign a password to the **sysadm** command, and access **sysadm** as a regular user.

Executing a subcommand through the menu system is a three-step process. First, you access the System Administration menus by typing the command **sysadm**. Second, you select a task-specific menu from the System Administration Main Menu. Finally, you select a subcommand from that menu. A detailed description of each step is as follows:

Note: After you have become familiar with the menus, you may prefer to use a one-step procedure that gives you less guidance but is quicker than the three-step procedure explained here. For a description of this one-step process, see "Bypassing the Menus" in this chapter.

Step 1: Enter the command **sysadm**. The System Administration Main Menu will appear on the screen, as shown in Figure 4-19.

How to Use the System Administration Menus

```

                SYSTEM ADMINISTRATION

1  diagnostics      system diagnostics menu
2  diskmgmt         disk management menu
3  filemgmt         file management menu
4  machinmgmt      machine management menu
5  packagemgmt     package management menu
6  softwaremgmt    software management menu
7  syssetup        system setup menu
8  tapemgmt        tape management menu
9  ttymgmt         tty management menu
10 usermgmt        user management menu

Enter a number, a name, the initial part of a name, or
? or <number>? for HELP, q to QUIT:
```

Figure 4-19: System Administration Main Menu

Each menu has two parts. The first part is the list of subcommands and submenus from which you can choose. Each item on the menu is numbered and named (a full name and an abbreviation). The Main Menu lists the ten task-specific menus.

The second part of each menu is a multiple choice query line.

When you see this query at the end of a menu, you have a choice of actions:

- You can invoke a subcommand by entering its number or its name (full or partial).
- You can ask **sysadm** for help with a menu item by entering either a **?** or the number of the item followed by a **?**. The **sysadm** command responds by explaining the function and/or use of the subcommand. Figure 4-20 shows what happens when you ask for help with the first item on the Main Menu. Notice that after reading the message from the system, you must press the **<CR>** key to get the Main Menu back.

Enter a number, name, the initial part of a name, or
? or <number>? for HELP, q to QUIT: 1?<CR>

These subcommands look for and sometimes repair problems in the system. Those subcommands that issue reports allow you to determine if there are detectable problems.

Commands that attempt repair are for repair people only. You must know what you are doing!

Press the <CR> key to see the sysadm menu [?, q]:

Figure 4-20: Output From a Request for Help

- Finally, you can always quit the current menu by entering a **q**<CR>. If you quit from a task-specific menu, you will return to the menu above it (usually the Main Menu). If you quit from the Main Menu, you will leave **sysadm** and return to the UNIX system shell.

Step 2: Select the menu that contains the subcommand you need. (If you do not know which subcommand you need, refer to "How to Find the Menu You Need" in this chapter.) Make your selection by entering one of the following:

- a. The number of the item you have chosen.
- b. The name of the item.
- c. The first part of the name of the item.

How to Use the System Administration Menu

For example, suppose you want to add a user to your system. Of the choices shown in the Main Menu (Figure 4-19), it seems likely that the subcommand to add a user would be listed in the User Management Menu. Any one of the following responses will show you the User Management Menu.

```
10<CR>
or
usermgmt<CR>
or
user<CR>
```

Figure 4-21 shows the output.

```

                                USER MANAGEMENT
1  addgroup      add a group to the system
2  adduser       add a user to the system
3  delgroup      delete a group from the system
4  deluser       delete a user from the system
5  lsgroup       list groups in the system
6  lsuser        list users in the system
7  modadduser    modify defaults used by adduser
8  modgroup      make changes to a group on the system <not available>
9  moduser       menu of commands to modify a user's login

Enter a number, a name, the initial part of a name, or
? or <number>? for HELP, ^ to GO BACK, q to QUIT:
```

Figure 4-21: User Management Menu

- Step 3: Select the appropriate subcommand. Select the subcommand in the same way you selected the menu: by entering its number or its name (full or partial). This initiates an interactive program that guides you through the steps in your task.

Continuing with the example in Step 2, you can see that the subcommand to add a user, **adduser**, is listed as item 2 on this menu. To initiate this interactive program, simply respond to the prompt with one of the following:

2<CR>

or

adduser<CR>

or

addu<CR>

You will then be asked to supply information about the new user.

How to Find the Menu You Need

If you cannot determine which menu you need on the basis of the menu names alone, you can look up the location of the subcommand you are interested in by either of two ways:

1. You can look up the task in the "Reference Chart" at the end of this chapter.
2. You can request information about each of the task-specific menus, in turn, by using the **sysadm** "help" facility. First enter the command **sysadm**<CR>; the Main Menu will be displayed. You can then request information for each menu listed on it by entering the number of a menu followed by a question mark after the standard query line. For example, to request information about the first menu, enter **1?** after the colon at the end of the query line.

Your request should look like this:

```
Enter a number, name, the initial part of a name,  
or ? or <number>? for HELP, q to QUIT: 1?
```

The **sysadm** command responds by printing out a short description of the tasks that you can do with the subcommands listed on Menu 1.

If you find the subcommand you need (on either Menu 1 or a submenu invoked from it), you can execute it by entering its number or a full or partial name. If you do not find the menu or subcommand you need, return to the Main Menu by entering <CR>, and request help about the next menu by entering a 2<CR>. Continue to request descriptions of the menus in this way until you find the subcommand you need.

Example of Menu Usage

This section is an example of **sysadm** menu usage showing how to store data on floppy disks. As you follow this example, keep in mind the following guidelines.

- Because you are not communicating with the shell program, you will not get a shell prompt sign while you are using **sysadm**. (The shell prompt is usually \$ for users and # for root.)

- When working in **sysadm**, you always have the following options:
 - You can ask for information by entering a **?** or the number of the menu followed by a question mark (for example, **1?<CR>**).
 - You can return to the previous menu by entering a circumflex (for example, **^ <CR>**).
 - You can quit **sysadm** by entering a **q<CR>**. When you do this, you will get a shell prompt sign. This means that the computer now expects you to enter shell commands. However, if you have entered a subcommand and then decided to leave the menu system, you must first return to the menu level (by entering a **^ <CR>**). Then you can enter a **q<CR>** to return to the shell.
 - If you are not in a default situation, you can have the current menu reprinted on the screen by entering **<CR>**.

Note: The **?** and **q** can only be used if they are listed after the question on the screen.

Let's say that you want to store the six files that are in a directory called *invoices* on a floppy disk. Your name is Susan E. Brown and your home directory is */usr2/seb*.

- Step 1: Access the System Administration Main Menu by entering **sysadm<CR>**. If the **sysadm** command is password protected the system will prompt you for the password. The System Administration Main Menu is shown in Figure 4-22.

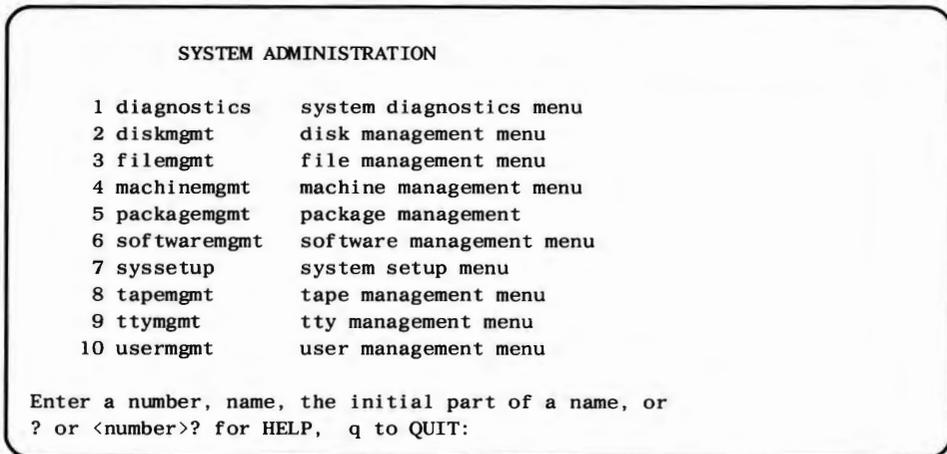


Figure 4-22: Entering the System Administration Main Menu

Do you know which menu you need? If you cannot determine which menu is the one you want based on their names, you can use either of two methods to find out what you need. You can look up the task ("store data") on the "Reference Chart" at the end of this chapter, or you can ask **sysadm** for information about each item on the Main Menu by entering the number of an item followed by a question mark. (See the previous section, "How to Find the Menu You Need," in this chapter.)

However, the names of the menus will often give you enough information for you to determine which one you need. In this case, you would probably decide that a program for storing data is most likely to be included on the File Management Menu.

- Step 2: Choose the File Management Menu by entering **3<CR>**. The File Management Menu is shown in Figure 4-23.

Enter a number, name, the initial part of a name, or
? or <number>? for HELP, ^ to GO BACK, q to QUIT: 3<CR>

FILE MANAGEMENT

1	backup	backup files from built-in disk to removable media
2	bupsched	backup reminder scheduling menu
3	diskuse	display how much of the built-in hard disks are being used
4	fileage	list files older than a particular disk
5	filesize	list the largest files in a particular directory
6	hsbackup	high speed backup of file system
7	hsrestore	high speed restore of file system
8	restore	restore files from "backup" & "store" media to built-in disk
9	store	store files and directories of files onto removable media

Figure 4-23: Invoking a Task-Specific Menu

Looking at the subcommands listed on the File Management Menu, you can see that the **store** subcommand can help you store files on floppy disks or on a SCSI Cartridge Tape.

Step 3: Begin the interactive program for storing files on disks by entering **9<CR>**. Figure 4-24 shows you how to proceed through this program to save the *invoices* directory.

How to Use the System Administration Menus

Enter a number, name, the initial part of a name, or
? or <number> for HELP, ^ to GO BACK, q to QUIT: 9<CR>

Select which drive to use:

1 diskettel 2 qtapel

Enter a number, name, the initial part of a name, or
? for HELP, q to QUIT: 1

1. Select a single file for storing.
2. Select all files under a directory for storing.

Enter a number [q, ?]: 2<CR>

Enter full path name of directory to be stored [q]:

/usr2/seb/invoices

1. Select a single file for storing.
2. Select all files under a directory for storing.
3. List files selected so far.
4. Store selected files.

Enter a number [q, ?]: 4<CR>

6 files selected.

Print each file name as it is being stored?

[y,n,q,?] y<CR>

Before inserting the first part into the diskettel drive,
mark it:

Files stored on:

Wed. 04/05/89, 08:50:09 AM

part 1

Insert the medium in the diskettel drive. Press <RETURN> when ready. [q]

Figure 4-24: Output From the **store** Program (Sheet 1 of 2)

At this point the program will pause, giving you an opportunity to label the floppy disk and insert it in the floppy disk drive. The continuation of Figure 4-24 which follows, shows the kind of output you can expect to see from the rest of the interactive program.

```
Insert the medium in the diskette drive. Press <RETURN> when ready. [q]<CR>
/usr2/seb/invoices/july
/usr2/seb/invoices/aug
.
.
.
/usr2/seb/invoices/dec
208 blocks
Store complete.
Do you want to verify that your file(s) were stored properly? [y,n,?]y<CR>
PLEASE NOTE:
To verify that the store worked properly, you must re-insert
all parts that were just written to, starting with "part 1".

Insert the medium in the diskette drive. Press <RETURN> when ready.[q]<CR>
208 blocks
Verification complete.
Should the stored files be removed from the built-in disk? [y,n,q,?]n<CR>
You may remove the medium.

Press the <RETURN> key to see the filemgmt menu [.,^,q]q<CR>
$
```

Figure 4-24: Output From the **store** Program (Sheet 2 of 2)

You have now stored the six files (*july*, *aug*, *sept*, *oct*, *nov*, and *dec*) in the *invoices* directory on a floppy disk. (To remove the files and the *invoices* directory from the hard disk, you should enter *y* after the question three lines above the prompt.) The appearance of the **\$** prompt at the bottom of the screen shows you that you are communicating with the UNIX system shell again.

Bypassing the Menus

If you know which **sysadm** subcommand can help you with the task you want to do, you may execute it without going through the menus. You can do this in two ways: by executing any subcommand as an argument to **sysadm** or, in the case of the six "special subcommands" (discussed later), by executing the special subcommand as an administrative login or shell command.

When deciding whether to use or bypass the menus, keep in mind that by entering the **sysadm** menu system, you maintain interactive access to other subcommands even after you have completed your first subcommand. Therefore, if you are planning to do more than one task, it might be more convenient to use the menus.

Using Subcommands as Arguments to the **sysadm** Command

The first method of bypassing the menus is to enter the subcommand name as an argument to the **sysadm** command. Your **sysadm** command line should look like this:

```
$ sysadm <subcommand> <CR>
```

For example, if you know that the **adduser** subcommand will add a user to your computer system, you can simply enter **sysadm** as a command followed by **adduser** as an argument to it. Figure 4-25 shows what happens when you execute the **adduser** subcommand directly in this way.

Note: In the example shown in Figure 4-25 the **sysadm** command has password protection. The **sysadm** command may not be password protected on your computer.

```
$ sysadm adduser<CR>
Password:<password><CR>
```

Running subcommand 'adduser' from menu 'usermgmt',
USER MANAGEMENT

Any time you want to quit, type "q".
If you are not sure how to answer any
prompt, type "?" for help, or see the Owner/Operator
Manual.

If a default appears in the question, press <RETURN> for the default.

Enter user's full name [?, q]:

Figure 4-25: The **adduser** Subcommand as an Argument to **sysadm**

From this point on, the procedure is the same as if you had entered it by way of the menus. Any **sysadm** subcommand can be executed this way, including the six "special subcommands."

Using Special Subcommands as Logins or Shell Commands

There is an alternative method for directly executing six of the most commonly used subcommands. These six are called “special subcommands.” Figure 4-26 lists these subcommands and the menus on which they are listed.

Special Subcommand	Menu
checkfsys	diskmgmt
makefsys	diskmgmt
mountfsys	diskmgmt
umountfsys	diskmgmt
setup	syssetup
powerdown	machinemgmt

Figure 4-26: The Special Subcommands

Special subcommands can be executed without going through the **sysadm** menus or as arguments to the **sysadm** command. In addition, they can be protected by passwords against unauthorized use. (Refer to the System Setup Menu in the “Menus and Subcommands” section in this chapter for instructions on assigning passwords to special subcommands.)

With special subcommands, a limited number of users can do certain administrative tasks without having access to the entire System Administration structure. For example, say you want to allow three ordinary users to be able to turn off the computer, but you do not want them to be able to do any other system administration tasks. You can assign a password to the **powerdown** subcommand and give the password to those three users. If a password has been assigned to the subcommand that you want to execute, the system will prompt you for it regardless of how you use it; whether as an administrative login or as a shell command.

A user who has access to a special subcommand can execute it in either of two ways: as an administrative login or as an ordinary shell command. Administrative logins are convenient when you are going to perform an administrative task as soon as you log in on the computer. Instead of first logging in and then executing the subcommand, you can do both in one step by entering the administrative login after the login prompt. If you are already logged in or want to perform more than one task, you can execute the subcommand as you would execute any shell command.

One of the special subcommands that you are already familiar with is **setup**. You used it to log in on the console terminal the first time you turned on the computer. Since **setup** is a special subcommand, you were able to execute it directly before knowing anything about the menus or the **sysadm** command. However, **setup** and all other special subcommands can be executed in any of the four ways below:

- As a shell command
- As an administrative login
- As a menu selection
- As an argument to the **sysadm** command.

Reference Chart

To help you find the subcommands you need, the reference chart in Figure 4-27 matches administrative tasks with the appropriate System Administration subcommands and menus. All subcommands are available in the UNIX System V operating system provided with your computer.

The chart does not include subcommands that are added to the Package Management Menu when you add an optional software utilities package to your computer. For information about these subcommands, refer to the documentation for the software package.

To locate more information about a subcommand, use the "Index" at the back of this manual to locate the information in this chapter. (The "Index" includes entries for menus and subcommands for your convenience.) You can also use the Table of Contents at the beginning of this chapter to locate subcommand descriptions.

TASK	SUBCOMMAND	MENU
Add hard disk	harddisk (submenu)	diskmgmt
Add SCSI drive to lock list	lock	sharedmgmt
Add user	adduser	usermgmt
Add user group	addgroup	usermgmt
Assign adm login password	admpasswd	syssetup
Assign sys login password	syspasswd	syssetup
Back up hard disk files	backup	filemgmt
Back up hard disk files (H.Speed)	hsbackup	filemgmt
Back up reminder checks	schedcheck	bupsched
Back up reminder messages	schedmsg	bupsched
Back up restoral	restore	filemgmt
Change adm login password	admpasswd	syssetup
Change boot file/device	autold	machinmgmt
Change group name	modgroup (submenu)	usermgmt

Figure 4-27: System Administration Reference Chart (Sheet 1 of 7)

Reference Chart

TASK	SUBCOMMAND	MENU
Change node name	nodename	syssetup
Change port speed	modtty	ttymgmt
Change user data	moduser (submenu)	usermgmt
Change user default data	modadduser	usermgmt
Change user group data	modgroup (submenu)	usermgmt
Change user group name	chgname	modgroup
Change user login ID	chgloginid	moduser
Change user login routine	chgshell	moduser
Change user password	chgpasswd	moduser
Check mirrored disk partition	mrverify	mirrormgmt
Check file system (floppy)	checkfsys	diskmgmt
Clear locks on SCSI drives	reset	sharedmgmt
Compress a file system on hard disk	compress	tapemgmt
Configure hard disk for mirroring	mirpartition	mirrormgmt
Configure new hard disk	partitioning	harddisk

Figure 4-27: System Administration Reference Chart (Sheet 2 of 7)

TASK	SUBCOMMAND	MENU
Control backup reminders	bupsched (submenu)	filemgmt
Copy disk partition	mirrestore	mirrormgmt
Copy file system from disk	backup	filemgmt
Copy floppy disk	cpdisk	diskmgmt
Copy file to floppy or tape	store	filemgmt
Create mirrored disk partitions	mirror	mirrormgmt
Create tty information	mklineset	ttymgmt
Delete user	deluser	usermgmt
Delete user group	delgroup	usermgmt
Display hard disk partition	display	harddisk
Display locked SCSI drives	lockdisp	sharedmgmt
Display mirrored partition	mirdisp	mirrormgmt
Display tty information	lineset	ttymgmt
Duplicate floppy disk	cpdisk	diskmgmt
Enter firmware state	firmware	machinmgmt

Figure 4-27: System Administration Reference Chart (Sheet 3 of 7)

Reference Chart

TASK	SUBCOMMAND	MENU
Erase floppy disk	erase	diskmgmt
Error report on hard disk	diskreport	diagnostics
Format hard disk	format	harddisk
Format floppy disk	format	diskmgmt
Hard disk error report	diskreport	diagnostics
Hard disk use	diskuse	filemgmt
Initialize 3B2 computer	reboot	machinmgmt
Install utilities package	installpkg and tapepkg	softwaremgmt
List big files	filesize	filemgmt
List installed packages	listpkg	softwaremgmt
List old files by date	fileage	filemgmt
List user groups	lsgroup	usermgmt
List users	lsuser	usermgmt
List users logged in	whoson	machinmgmt
Make file system (floppy)	makefsys	diskmgmt

Figure 4-27: System Administration Reference Chart (Sheet 4 of 7)

TASK	SUBCOMMAND	MENU
Make floppy key	floppykey	machinemgmt
Modify user data	moduser (submenu)	usermgmt
Modify user default data	modadduser	usermgmt
Modify user group data	modgroup (submenu)	usermgmt
Mount file system (floppy)	mountfsys	diskmgmt
Percentage use of hard disk	diskuse	filemgmt
Power down 3B2 computer	powerdown	machinemgmt
Reboot 3B2 computer	reboot	machinemgmt
Release locked SCSI drive	unlock	sharedmgmt
Remove hard disk	rmdisk	harddisk
Remove mirror partition from processor	mirremove	mirrormgmt
Remove mirror partition from disk	unmirror	mirrormgmt
Remove SCSI drive from lock list	unlock	sharedmgmt
Remove tape device	rmtape	tapemgmt

Figure 4-27: System Administration Reference Chart (Sheet 5 of 7)

Reference Chart

TASK	SUBCOMMAND	MENU
Remove utilities package	tapepkg	softwaremgmt
Repair hard disk	diskrepair	diagnostics
Restart 3B2 computer	reboot	machinmgmt
Restore hard disk files	restore	filemgmt
Restore hard disk files (high-speed) backed up by hsbackup	hsrestore	filemgmt
Restrict access to SCSI drive	lock	sharedmgmt
Run uninstalled utilities	runpkg	softwaremgmt
Schedule backup checks	schedcheck	bupsched
Schedule backup messages	schdmsg	bupsched
Set baud rate of port	modtty	ttymgmt
Set date and time	datetime	syssetup
Set up mirroring disk partitions	mirsetup	mirrormgmt
Set up mirroring for <i>root</i> , <i>usr</i> , <i>swap</i>	rootsetup	mirrormgmt
Set up computer first time	setup	syssetup

Figure 4-27: System Administration Reference Chart (Sheet 6 of 7)

TASK	SUBCOMMAND	MENU
Store files on floppy or tape	store	filemgmt
Turn off 3B2 computer	powerdown	machinmgmt
Turn on login getty on port	modtty	ttymgmt
Unmirror <i>root, usr, swap</i> partitions	rootremove	mirrormgmt
Unmount file system (floppy)	umountfsys	diskmgmt
Verify mirrored disk partition	mirverify	mirrormgmt

Figure 4-27: System Administration Reference Chart (Sheet 7 of 7)



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Introduction

The 3B2 computer is shipped with software utilities packages. All of the utilities are delivered on a SCSI Cartridge Tape except Security Administration which is delivered on a floppy disk. Security Administration Utilities are only available in the United States. This chapter describes all the utilities packages and tells you how to install all of them except the Essential Utilities. This chapter also tells you how to remove all of the utilities except the Essential Utilities and the SCSI Cartridge Tape Utilities, which are not removable.

Each description includes a list of the UNIX system commands and libraries that you receive with the package. Most of these commands are object code files. Others are UNIX system shell scripts that you can modify to suit your operating environment.

Introduction

The utilities packages are listed below:

- Essential Utilities
- Directory and File Management Utilities
- User Environment Utilities
- Inter-Process Communications (IPC) Utilities
- System Administration Utilities
- System Header Files Utilities
- SPELL Utilities
- Terminal Information Utilities
- Editing Utilities
- Line Printer Spooling Utilities
- Basic Networking Utilities
- Windowing Utilities
- AT&T Form and Menu Language Interpreter (FMLI) Utilities
- AT&T Framed Access Command Environment (FACE) Utilities
- Enhanced Peripheral Ports Controller (EPORTS) Utilities
- Multiprocessor Enhancement (MPE) Utilities
- SCSI Host Adapter Utilities
- SCSI Cartridge Tape Utilities
- SCSI Disk Mirroring Utilities
- Job Accounting Utilities

- System Performance Analysis Utilities
- Network Software Utilities
- Remote File Sharing Utilities
- 3.2.2 Release Upgrade Utilities
- Security Administration Utilities (available only with 3B2 computers sold within the United States).

General Installation Instructions

How you install software utilities varies from package to package, depending on the contents. Some packages cannot be installed unless others are already installed. Different utilities require different amounts of file space. Utilities packages that contain device drivers require that you reboot the operating system after installing them. Therefore, before you begin installing and using your utilities, refer to the "Utilities Installation Chart" in Figure 5-1.

Utilities	Software Dependencies	Drivers Installed	Free Blocks in / (root)	Free Blocks in /usr
Essential	None	Yes	5478	2914
Directory and File Management	None	No	195	1141
User Environment	Directory and File Management	Yes	185	689
Inter-Process Communication (IPC)	None	Yes	163	24
System Administration	None	No	841	29
System Header Files	None	No	20	849
SPELL	Directory and File Management	No	20	460
Terminal Information	None	No	145	2454*

* The number of free blocks required in /usr will vary depending on which terminal files you install. The number in Figure 5-1 represents the blocks needed to load all files. If specific terminal files are selected, the number of blocks required will be smaller.

Figure 5-1: Utilities Installation Chart (Sheet 1 of 3)

Utilities	Software Dependencies	Drivers Installed	Free Blocks in / (root)	Free Blocks in /usr
2 Editing	None	No	20	486
2 Line Printer Spooling	Directory and File Management, Inter-Process Communication, and User Environment,	No	4	2887
2 Basic Networking	User Environment	No	20	1370
27 2 Windowing	None	Yes	55	170
AT&T Form and Menu Language Interpreter (FMLI)	Directory and File Management and Terminal Information	No	0	558
AT&T Framed Access Command Environment (FACE)	Directory and File Management, Editing, FMLI, Terminal Information, and User Environment	No	4	816
7 EPORTS	None	Yes	852	125
7 Multiprocessor Enhancement (MPE)	None	Yes	500	100
7 SCSI Host Adapter	None	Yes	500	465

Figure 5-1: Utilities Installation Chart (Sheet 2 of 3)

General Installation Instructions

Utilities	Software Dependencies	Drivers Installed	Free Blocks in / (root)	Free Blocks in /usr
SCSI Cartridge Tape	SCSI Host Adapter	Yes	74	121
SCSI Disk Mirroring	Inter-Process Communication	Yes	421	204
Job Accounting	None	No	115	825
System Performance Analysis	None	Yes	84	870
Network Software	None	Yes	815	636
Remote File Sharing	Network Software, System Administration, and Directory and File Management	Yes	101	470
3.2.2 Release Upgrade	None	Yes	750	850
Security Administration	None	No	90	70

Figure 5-1: Utilities Installation Chart (Sheet 3 of 3)

How to Use the Utilities Installation Chart

The Utilities Installation Chart will help you determine the procedure to follow to install a particular utilities package. Questions that the chart will help you answer are:

- Does the utilities package you want to install depend on other utilities being installed?
- Do the utilities in this package include any device drivers?
- Do you have enough free space in the */ (root)* and */usr* file systems to install this package?

For example, let's say you want to install the Directory and File Management Utilities. Find "Directory and File Management" in the "Utilities" column in Figure 5-1. (The utilities are arranged in the same order as they are listed in the system. See Figure 5-4.) While reading across the table, you learn the following about this package:

- It has no software dependencies.
- It contains no device drivers.
- It requires 195 free blocks in the */ (root)* file system.
- It requires 1141 free blocks in the */usr* file system.

Because there are no software dependencies, you do not have to install any other utilities packages before this one. Because there are no device drivers, you will not need to reboot following installation. You must also have the required number of free blocks in the */ (root)* and */usr* file systems.

The information in the chart about how much free space you should have in these file systems is provided only for your convenience; the computer checks this information automatically as part of the installation process. It will not allow you to install a utilities package if you do not have enough free space.

If sufficient free space is not available, a message will tell you how many blocks are needed. To create free hard disk space, you can remove other utilities, directories, or files that you have created. To ensure that adequate space is available, remove at least 100 blocks more than the amount specified in the message.

Installing or Removing Utilities Using a SCSI Cartridge Tape

Utilities that include drivers require that the system be rebooted to build a new */unix* file; utilities without drivers do not require rebooting. Therefore, the installation procedure for utilities with drivers requires an additional step to reboot.

The system administration **tapepkg** command is used to install and remove utilities that are on cartridge tape. This is an interactive routine that asks you for input and displays installation instructions on the screen to guide you through the procedure.

When you activate the console logger in Step 5, you record all messages printed during the installation procedure. You may check these messages to verify that they are being installed correctly by entering **conslog -r**. For a complete description of the **conslog** command, see the *UNIX System V Release 3 System Administrator's Guide*.

Note: Once installed, the SCSI Cartridge Tape Utilities cannot be removed.

- Step 1: Log in as **root** on the console terminal.
- Step 2: Enter the **shutdown** command to change to single-user state. Your command line should look like this:

shutdown -y -iS<CR>

System Response:

```
Shutdown started.      day date time zone year

Broadcast Message from root (console) on unix day date time ...
THE SYSTEM IS BEING SHUT DOWN NOW !!!
Log off now or risk your files being damaged.

The system is coming down. Please wait.
System services are now being stopped.
cron aborted: SIGTERM

The system is down.
INIT: New run level: S

INIT: SINGLE USER MODE
#
```

Figure 5-2: System Response to the **shutdown** Command

- Step 3: Insert the SCSI Cartridge Tape in the SCSI Cartridge Tape Drive.
- Step 4: Enter the **mount** command to mount the */usr* file system. Your command line should look like this:

```
mount /usr<CR>
```

General Installation Instructions

System Response:

```
mount -f S5 /dev/dsk/ct1d1s2 /usr
```

Figure 5-3: System Response to the **mount** Command

Step 5: Turn on **conslog**. Your command line should look like this:

```
conslog -a<CR>
```

Step 6: Enter the **tapepkg** command (as an argument to the **sysadm** command) to load your tape into the computer. Your command line should look like this:

```
sysadm tapepkg<CR>
```

System Response:

```
Running subcommand 'tapepkg' from menu 'softwaremgmt',
SOFTWARE MANAGEMENT

    -- Package installation/removal from SCSI tape --

Do you wish to install or remove packages?
[ install remove quit ] i<CR>

Insert the removable medium for the package(s) you want to install
into the qtapel drive.
Press <return> when ready. Type q to quit. <CR>

Packages available:
  1 Directory and File Management.      13 AT&T Form & Menu Interpreter
  2 User Environment                    14 AT&T FACE
  3 Interprocess Communications         15 Enhanced Ports
  4 System Administration               16 Multiprocessor Enhancement Util
  5 System Header Files                 17 SCSI Host Adapter Utilities
  6 SPELL                               18 SCSI Cartridge Tape
  7 Terminal Information-part1          19 SCSI Mirroring Utilities
  8 Terminal Information-part2          20 Job Accounting
  9 Editing                             21 System Performance Analysis
 10 Line Printer Spooling                22 Network Software Utilities
 11 Basic Networking                    23 Remote File Sharing
 12 Windowing                            24 3.2.2 Release Upgrade

Enter selection(s) to install [all help quit]: help<CR>
You may enter:
  • numbers separated by spaces (eg.1 4 10)
  • ranges of numbers (eg. 4-9)
  • combinations of numbers and ranges (eg. 1 3 10-15)
  • all — install all packages
  • quit — do not install anything

Enter selection(s) to install [all help quit]: all<CR>
Selection complete---installpkg starting.
```

Figure 5-4: System Response to the `tapepkg` Command

Step 7: Follow the prompt on the screen in Figure 5-4 to install or remove the utilities you desire.

General Installation Instructions

Step 8: After you have finished installing or removing your last utility, remove the cartridge tape.

Step 9: Turn off **conslog**. Your command line should look like this:

```
conslog -d
```

Note: Never **cat** *conslog* file, from the console, when the command is enabled. This would put the console in an endless loop.

Step 10: Enter the **shutdown** command. This will reboot the system and build a new version of the */unix* file. Your command line should look like this:

```
shutdown -i6 -g0 -y<CR>
```

The options specified (**-i6**, **-g0**, and **-y**) changes the operating state of the computer to firmware, automatically reboots the system, and changes the operating state back to multiuser. During this sequence, a new version of the */unix* file is generated. This version includes the new driver(s).

System Response: A series of messages is printed reporting the progress of the reboot. First the system is taken down, then diagnostics are run, an automatic reboot is run, the system comes back up, and a new */unix* file is generated. Finally, the system is ready; a **Console Login:** prompt is displayed. The entire reboot process takes approximately 10 minutes.

Step 11: You may want to notify other users that the commands associated with the installed utilities packages are now available. Refer to the *UNIX System V Release 3 System Administrator's Guide* for information on modifying the "message-of-the-day" or for sending news.

Note: If you attempt to install a package that has a "Software Dependency" (Figure 5-1) without installing the package it depends on, the installation will fail.

Installation of Utilities From Floppy Disks

Utilities that include drivers require the system to be rebooted in order to build a new */unix* file; utilities without drivers do not require a boot. Therefore, the installation procedure for utilities with drivers requires an additional step to reboot.

All installation procedures from floppy disks are based on the **installpkg** subcommand from the System Administration menus. This is an interactive routine that asks you for input and displays installation instructions on the screen to guide you through the procedure.

Another common feature of the installation procedures is that they instruct you to change the operating environment of the computer to single-user state before installing a utilities package. By changing to this state, you kill all processes except those being run from the console terminal. The purpose of changing to single-user state is to avoid inconveniencing other users who may be using the computer; damage to files could result if a user tried to use a utility that you were in the process of installing or removing. Therefore, while changing to single-user state is not essential, it is strongly recommended.

Installation of Utilities

Use the following procedure to install utilities.

- Step 1: Log in as **root** on the console terminal.
- Step 2: Enter the **shutdown** command to change to single-user state. Your command line should look like this:

```
shutdown -y -is<CR>
```

System Response:

```
Shutdown started.      day date time zone year

Broadcast Message from root (console) day date time ...
THE SYSTEM IS BEING SHUT DOWN NOW !!!
Log off now or risk your files being damaged.

The system is coming down. Please wait.
System services are now being stopped.
cron aborted: SIGTERM

The system is down.
INIT: New run level: S

INIT: SINGLE USER MODE
#
```

Figure 5-5: System Response to the **shutdown** Subcommand

- Step 3: Enter the **mount** command to mount the */usr* file system. Your command line should look like this:

```
mount /usr<CR>
```

System Response: A message is displayed indicating that the */usr* file system has been mounted.

- Step 4: Enter the **installpkg** command (as an argument to the **sysadm** command) to load your utilities package into the computer. Your command line should look like this:

```
sysadm installpkg<CR>
```

- Step 5: Insert the floppy disk in the floppy disk drive and press <CR> as instructed. If the utilities package consists of more than one floppy disk, insert the first floppy disk of the set.

System Response: Messages identify the files that are being copied from the floppy disk to the built-in hard disk. A completion message is displayed when the utilities package has been installed. If there is a problem, the system responds with messages indicating the source of the problem and the action to be taken.

General Installation Instructions

- Step 6: Remove and store the floppy disk.
- Step 7: If the utilities package is on more than one floppy disk, repeat Steps 5 and 6.
- Step 8: When the entire package has been installed, the system gives you the option of installing another utilities package.

Do you want to install other utilities packages?

IF	THEN
YES	<ul style="list-style-type: none">■ Enter y<CR> at the prompt.■ Go to Step 5.
NO	<ul style="list-style-type: none">■ Enter q<CR> at the prompt to exit the System Administration menus.■ Continue to Step 9.

- Step 9: Enter the **umount** command to unmount the */usr* file system. Your command line should look like this:

umount /usr<CR>

System Response: A message is displayed indicating the */usr* file system has been unmounted.

Step 10: Enter the **init** command to return to multiuser state. Your command line should look like this:

```
init 2<CR>
```

System Response:

```
INIT: new run level: 2
The system is coming up. Please wait.
.
.
.
The system is ready.
Console Login:
```

Figure 5-6: System Response to the **init** Command

Step 11: Installation is now complete if you installed only utilities without drivers. If you installed utilities with drivers, you must go to Step 12.

Step 12: Enter the **shutdown** command. This will reboot the system, building a new version of the */unix* file. Your command line should look like this:

```
shutdown -i6 -g0 -y<CR>
```

The options specified (**-i6**, **-g0**, and **-y**) changes the operating state of the computer to firmware, automatically reboots the system, and changes the operating state back to multiuser. During this sequence, a new version of the */unix* file is generated. This version includes the new driver(s).

System Response: A series of messages is printed reporting the progress of the reboot. First the system is taken down, then diagnostics are run, an automatic reboot is run, the system comes back up, and a new `/unix` file is generated. Finally, the system is ready; a `Console Login:` prompt is displayed. The entire reboot process takes approximately 10 minutes.

You may want to notify other users that the commands associated with the installed utilities packages are now available. Refer to the *UNIX System V Release 3 System Administrator's Guide* for information on modifying the "message-of-the-day" or for sending news.

Removal of Utilities With Floppy Disks

The procedures for removing utilities packages are similar to the procedures for installing utilities:

- All removal procedures for floppy disks are based on the **removepkg** subcommand (from the System Administration menus), an interactive program that provides instructions on the screen.
- Utilities packages should be removed while the computer is in single-user state to avoid interference with other users. (Remember that only the console terminal is functional in single-user state, and you must be logged in as **root** to change to single-user state.)

Removal of Utilities

Use the following procedure to remove utilities:

Step 1: Log in as **root** on the console terminal.

Step 2: Enter the **shutdown** command to change the operating state to single user. Your command line should look like this:

```
shutdown -y -is<CR>
```

System Response:

```
Shutdown started.      day date time zone year

Broadcast Message from root (console) day date time ...
THE SYSTEM IS BEING SHUT DOWN NOW !!!
Log off now or risk your files being damaged.

The system is coming down. Please wait.
System services are now being stopped.
cron aborted: SIGTERM

The system is down.
INIT: New run level: S

INIT: SINGLE USER MODE
#
```

Figure 5-7: System Response to the **shutdown** Subcommand

Step 3: Enter the **mount** command to mount the */usr* file system. Your command line should look like this:

```
mount /usr<CR>
```

System Response: A message will be displayed indicating that the */usr* file system has been mounted.

General Installation Instructions

Step 4: Enter the **removepkg** command (as an argument to the **sysadm** command) to remove your utilities package. Your command line should look like this:

```
sysadm removepkg<CR>
```

System Response:

```
Running command 'removepkg' from menu 'softwaremgmt',  
SOFTWARE MANAGEMENT
```

```
The following software packages have been installed:
```

```
< List of installed utilities >
```

Figure 5-8: System Response to the **removepkg** Subcommand

Step 5: Insert the floppy disk for the utilities package you want to remove in the floppy disk drive and press <CR> as instructed.

System Response: Messages identify the files that are being removed from the hard disk. A completion message is displayed when the entire utilities package is removed. If a problem is encountered, the system responds with messages indicating the source of the problem and the action to take.

Step 6: Remove and store the floppy disk.

Note: The **removepkg** command is designed so that any single floppy disk of a multiple floppy disk utilities package will initiate removal of the entire package.

Step 7: The system then gives you the option of removing other utilities packages.

Do you want to remove other utilities packages?

IF	THEN
YES	<ul style="list-style-type: none">■ Enter y<CR> at the prompt.■ Go to Step 5.
NO	<ul style="list-style-type: none">■ Enter q<CR> at the prompt.■ Go to Step 8.

Step 8: Enter the **umount** command to unmount the */usr* file system. Your command line should look like this:

```
umount /usr<CR>
```

System Response: A message is displayed indicating the */usr* file system has been unmounted.

Step 9: Enter the **init** command to return to multiuser state. Your command line should look like this:

```
init 2<CR>
```

General Installation Instructions

System Response:

```
INIT: new run level: 2
The system is coming up. Please wait.
 *
 *
 *
The system is ready.
Console Login:
```

Figure 5-9: System Response to the **init** Command

- Step 10: Removal of the utilities is now complete if there were no drivers associated with the utilities you removed. If there were drivers associated with the utilities, you must do Step 11.
- Step 11: Enter the **shutdown** command to reboot the operating system. Your command line should look like this:

```
shutdown -i6 -g0 -y<CR>
```

The options specified (**-i6**, **-g0**, and **-y**) changes the operating state of the computer to firmware, automatically reboots the system, and changes the operating state back to multiuser. During this sequence, a new version of the */unix* file is generated. This new version will not include drivers for the utilities you have removed.

System Response: A series of messages is printed reporting the progress of the reboot. First the system is taken down, then diagnostics are run, an automatic reboot is run, the system comes back up, and a new */unix* file is generated.

Notify the users that the utilities packages you removed are no longer available. Refer to the *UNIX System V Release 3 System Administrator's Guide* for information on modifying the "message-of-the-day" or for sending news.

Descriptions of Software Utilities Packages

This section describes the software utilities packages. Since each package is unique, the type of information needed to install and use the utilities varies a great deal. The following categories of information are the ones most frequently found in the descriptions.

- **Installation Notes:** Special instructions for installing a utilities package that are not covered in the general installation instructions.
- **Purpose:** The function for which a package is used.
- **Users:** The level of expertise required for using various capabilities of a particular package. In general, users installing the package must be experienced UNIX system users, while all users can use commands in the package. Only exceptions or additions to this statement are listed in the individual utilities package descriptions.
- **Access Restrictions:** Prerequisites for using the utilities package. A utilities package with access restrictions is meant to be used by a limited number of experienced users. Special logins (such as **root**) are used, in the same way that passwords are used, to ensure that only designated users have access to these utilities packages.
- **Directories and Files:** A section describing the structure and contents of the directories and files in a package. For each package, there is a table showing all the files it contains and the directories in which the files are located.
- **Software Dependencies:** Describes any other software that must be installed to use this package.
- **Further Information:** References for additional documentation of the utilities package are listed in this section.
- **Contents:** Describes the types of commands contained in a package.
- **Command Usage:** Describes how to use a command.

Essential Utilities

Installation Notes:

The SCSI Cartridge Tape can be used to restore the UNIX system kernel and the Essential Utilities if files on the built-in hard disk are corrupted or destroyed. Instructions for restoring the operating system from tape are in the *UNIX System V Release 3 System Administrator's Guide*.

Contents:

This package has commands that allow the user to perform the following:

- Basic UNIX system operations.
- Tasks necessary for the administration of a 3B2 computer through a series of interactive programs (menu-driven) using the **sysadm** command. These tasks include the initial setup of the computer and the administration of the file structure on the built-in hard disk. The user also has the capability of bypassing the menus and using the commands directly.

Purpose:

To give users the most commonly used commands needed to set up the computer, to do routine work, and to perform system administration tasks. This package also provides a backup copy of the kernel.

Directories and Files:

- The following is a list of the commands included in the Essential Utilities. Commands marked with an asterisk (*) are used for system administration.

COMMANDS			
basename	edit5a	login	rsh
bcheckrc*	egrep	ls	savepcio
brc*	errdump*	magic	sed
bupsched	errint	mail	setclk
bzapunix	expr	mailx	setmnt
cat	express	makefsys	setpgrp
cd	false	mesg*	setup*
checkfsys*	fgrep*	mkboot	sh
checklist	file*	mkdir*	shutdown*
chgrp	finc	mkfs*	sleep
chmod	find*	mkno*	sort
chown	fine	mkunix*	stty
ckauto	fltboot	mount*	su
ckbupscd	fmtflop*	mountall	swap
clri*	fmthard	mountfsys*	sync*
cmp	format	mv*	sysadm*
conslog	frec	newboot	tail
coredirs	fsba	newgrp	tee
cp	fsck	news	telinit*
cpio	fsstat*	passmgmt	test
cron*	fstyp	ports	touch*
cut*	getmajor	powerdown	tr
date	getopt*	pr*	true
dd*	gettype	prtconf	uadmin*
devnm*	grep*	prtvtoc	umask
df*	hdeadd*	ps*	umount*
diff	hdefix	psswd*	umountall
dirname	hdelogger*	pump*	umountfsys
disketteparm	id	pwconv	uname
disks	init*	pwd	wait
drvinstall*	kill*	pwunconv	wall
dsconfig	killall*	red	wc
du*	labelit	rm	what
echo	led	rmail	who
ed	line	rmdir	write
edittbl	ln	rmha	xargs

Descriptions of Software Utilities Packages

- The Essential Utilities also include system administration-type shell scripts that are prototypes you can change to suit your operating environment. (See the *UNIX System V Release 3 System Administrator's Guide* for further information on prototype files.)

Further Information:

- For descriptions of commonly used commands, see the *UNIX System V User's Guide*.
- For descriptions of **sysadm** subcommands, see Chapter 4, "System Administration Menus."
- For descriptions of commands related to system administration, see the *UNIX System V Release 3 System Administrator's Guide*.

Directory and File Management Utilities

Purpose:

To provide commands that enable you to organize, search for, and manipulate data stored on line.

Directories and Files:

- Not all the utilities are object code files; the **diff3** and **dircmp** commands are shell scripts.
- The **oawk** command is linked to the **awk** subcommand.
- The directory structure and files are as follows:

DIRECTORY	FILES			
/bin	ar touch	od	sum	tail
/usr/bin	awk bdiff bfs col comm csplit	cut diff3 dircmp egrep fgrep join	newform nl oawk pack paste pg	sdiff split tr uniq unpack
/usr/lib	diff3prog			
/usr/options	dfm.name			

User Environment Utilities

Purpose:

To provide a variety of tools with which all users can perform routine tasks such as calculations.

Directories and Files:

The directory structure and files are as follows:

DIRECTORY	FILES		
/boot	sxt.o		
/etc/master.d	sxt		
/bin	basename dirname env	line nice nohup	time tty
/usr/bin	at banner batch bc cal	calendar crontab dc factor logname	shl tabs units xargs
/usr/lib	calprog	lib.b	unittab
/usr/options	calc.name	shell.name	usrenv.name

Software Dependencies:

Directory and File Management Utilities.

Further Information:

See the *UNIX System V User's Guide*.

Inter-Process Communication (IPC) Utilities

Purpose:

To get, control, and operate on messages, semaphores, and shared memory.

- The IPC system calls enable you to create IPC facilities. The IPC facilities allow communication to take place between or among cooperating processes (executing programs).
- The IPC Utilities enable you to determine the status of IPC facilities or to remove selected IPC facilities from the UNIX operating system.

Directories and Files:

- The directory structure and files are as follows:

DIRECTORY	FILES
/boot	ipc.o sem.o msg.o shm.o
/bin	ipcrm ipcs
/etc/master.d	ipc sem msg shm
/usr/include/sys	ipc.h sem.h msg.h shm.h
/usr/options	ipc.name

Descriptions of Software Utilities Packages

- The IPC Utilities and system calls are object code files.
- The IPC Utilities package contains five directories. They are listed as shown with the type of files that each contains.
 - **/boot**: The object code files for the system calls
 - **/etc/master.d**: The system tunable parameters for each type of IPC facility
 - **/usr/include/sys**: The header files associated with IPC system calls
 - **/bin**: The IPC contains a file with the full name of the utilities package commands.

System Administration Utilities

Purpose:

To enable you to manage the hardware, software, and users on your computer system. The System Administration menus share this purpose. However, the use of this utilities package requires a greater degree of experience with the UNIX system than is required to use the System Administration menus.

Users:

Experienced users of the UNIX operating system.

Access Restrictions:

- To execute most of the system administration subcommands, a **root** login is required.
- To execute many system administration subcommands, membership in the system administration group (**sys** or **adm**) is required. Thus, owner and group access permissions are associated with the following names: **root**, **sys**, **adm**, and **bin**. One step in setting up the 3B2 computer is assigning passwords to these logins.

Directories and Files:

- The directory structure and files are as follows:

DIRECTORY	FILES
/etc	chroot crash dcopy512 dcopy1k dcopy2k dfscck ff fsdb512 fsdb1k fsdb2k fusr grpck ldsysdump link mvdir ncheck pwck sysdef unlink volcopy whodo
/etc/log	filesave.log
/usr/bin	chrtbl
/usr/options	sysadm.name

- Most of the utilities are object code files.
- The **mvdir** command is a shell script.
- Other system administration-type shell scripts provided by the Essential Utilities are prototypes that you can change to suit your operating environment. (Refer to the *UNIX System V Release 3 System Administrator's Guide* for further information on prototype files.)
- The majority of the system administration commands are in the */etc* directory. The */etc* directory is in the normal search path of *root*; this directory is not in the default search path for normal user logins. Certain commands in the */etc* directory are executable in a normal user login if the *PATH* variable includes the */etc* directory specified for the command.

Further Information:

The system administration-type commands in the Essential Utilities and the commands in the System Administration Utilities are described in the *UNIX System V Release 3 System Administrator's Guide*. Also described in this guide are various system administration procedures.

System Header Files Utilities

Purpose:

This utilities package should only be installed when using a separately available C Programming Language Utilities product or another language product.

Users:

Experienced programmers.

Further Information:

Manual pages in the *Programmer's Reference Manual* describe the appropriate header files.

SPELL Utilities

Purpose:

To enable you to check your text files for possible spelling errors by comparing those files to a standard dictionary. An optional feature allows you to add words to the dictionary file.

Directories and Files:

The directory structure and files are as follows:

DIRECTORY	FILES		
/usr/options	spell.name		
/usr/bin	deroff	spell	
/usr/lib/spell	compress spellhist hlista	hashcheck spellin hlistb	hashmake spellprog hstop

Software Dependencies:

Directory and File Management Utilities.

Terminal Information Utilities

Installation Notes:

The exact value of storage needed in */usr* depends on the number of terminal types installed for the *terminfo* data base.

Purpose:

To enable you to write screen-oriented programs on a variety of terminals, and to enable all other users to perform screen manipulations using the **tput** command.

Users:

- All other files besides *tput* are used by experienced C Language programmers.
- The **tput** command in */usr/bin* is available to all users.

Directories and Files:

- The Terminal Information Utilities are delivered on tape in two parts. One part contains the list of supported terminals for the *terminfo* data base. It also contains a menu of terminals from which you may select those that you want to include in your data base. The other part contains the commands and files needed by the utilities.
- The Terminal Information Utilities provide the *terminfo* data base and the **curses** screen manipulation capabilities. The *terminfo* data base is used by **curses** and other UNIX system processes (such as the **vi** editor) to identify your terminal to the computer. This identification allows the computer to send the correct character sequences so that the terminal acts the way the UNIX system processes intended.

- The directory structure and files are as follows:

DIRECTORY	FILES		
/etc	termcap		
/usr/bin	captoinfo tic	infocmp tput	
/usr/include	curses.h	term.h	unctrl.h
/usr/lib	libcurses.a libtermcap.a	llib-lcurses libterm.a	llib-lcurses.l
/usr/lib/tabset	3101 teleray	beehive vt100	std xerox1720
/usr/options	terminf.name		
/usr/src/lib/teminfo	adds.ti att.ti colorscan.ti diablo.ti hardcopy.ti heath.ti lsi.ti pc.ti special.ti teleray.ti tymshare.ti	annarbor.ti beehive.ti datamedia.ti fortune.ti hazeltine.ti homebrew.ti microterm.ti perkinelmer.ti sperry.ti televideo.ti visual.ti	ansi.ti cdc.ti dec.ti general.ti hds.ti hp.ti misc.ti print.ti teletronix.ti ti.ti

Command Usage:

Programs that use the **curses** library must be written and compiled like C Language programs. The command line for compiling a **curses** program is as follows:

```
cc program.c -lcurses -o program
```

Editing Utilities

Purpose:

To provide the UNIX system text editor (both line and screen oriented) for word processing.

Access Restrictions:

To use any editor with a particular file, you must have write permission for that file.

Directories and Files:

- The **bfs** editor is in the Directory and File Management Utilities package.
- The **sed** editor is in the Essential Utilities package.
- The file `/usr/bin/vi` is linked to `/usr/bin/vedit` and `/usr/bin/view`.
- The `/usr/preserve` directory is also established when this package is installed.
- The directory structure and files are as follows:

DIRECTORY	FILES
<code>/usr/bin</code>	<code>ctags</code> <code>vi</code>
<code>/usr/lib</code>	<code>expreserve</code> <code>exrecover</code> <code>exstrings</code>
<code>/usr/options</code>	<code>ed.name</code>

Further Information:

For information about read, write, and execute permissions for files, see Chapter 3, "Security," or the *UNIX System V User's Guide*.

Line Printer Spooling Utilities

Installation Notes:

To install the hardware for your print services, refer to the following documents:

- Printer manuals
 - *AT&T 3B2 Computer Installation Manual for AT&T Printers*
 - *Dot Matrix Printer Manual*
 - *Letter Quality Printer Manual*
- Manual for optional hardware
 - See the manual that comes with the I/O hardware for the procedures for installing feature cards in your computer.

Do not uninstall any existing version of this package before installing this package. If you do, you will lose the customized configuration files.

Contents:

The Line Printer Spooling Utilities package has two different types of commands: subcommands for using the Line Printer Spooling Utilities and commands for the administration of the utilities.

Purpose:

To enable you to store files in a temporary location until they can be printed. There are several advantages to spooling. One advantage is that you do not have to wait until a file is printed before you can continue using your terminal. Another advantage is that one printer or several printers can be shared by many users. In addition, the Line Printer Spooling Utilities provide various administrative features for management of filters, forms, printers, print requests, and fonts (print wheels and character sets), as well as providing management of users of the print service.

Users:

Administration commands should only be performed by experienced UNIX system users. With exception of the **enable** and **disable** commands, administrative subcommands can only be used by the system administrator (that is, **root**, **lp**, or **sysadm**). The system administrator decides whether the general users are allowed to enable and/or disable the printers.

Access Restrictions:

- Commands in */usr/bin* can be accessed by anyone; however, the **enable** and **disable** commands may be restricted to the system administrator.
- Commands in */usr/lib* can be accessed only by users logged in as **root** or **lp**.

Directories and Files:

The directory structure and files are as follows:

DIRECTORY	FILES		
<i>/usr/admin/menu/packagemgmt</i> <i>/lpmgmt</i>	DESC _S2.18 _S2.25 _S2.38	_S2.43 filters forms printers	service status users
<i>/usr/bin</i>	cancel disable	enable lp	lpstat
<i>/usr/lib</i>	5310 accept hp2631a lpadmin lpfilter	lpforms lpmove lpsched lpshut	lpusers pprx prx reject

Descriptions of Software Utilities Packages

DIRECTORY	FILES		
/usr/lib/terminfo	4 5 7 a	d h i	q s u
/usr/spool/lp	SCHEDLOCK admins bin fifos	logs model requests	system temp users
/usr/spool/lp/bin	alert.proto drain.output lp.cat	lp.page lp.set lp.tell	lpsched.jr slow.filter
/usr/spool/lp/model	1640 5310 dqp10 dumb	f450 hp lqp40	pprx prx standard
/usr/options	lp.name		

Software Dependencies:

- Directory and File Management Utilities
- Inter-Process Communication Utilities
- User Environment Utilities.

Basic Networking Utilities

Purpose:

The Basic Networking Utilities provide the mechanisms that enable your 3B2 computer to share information and resources with other computers that use the UNIX operating system.

Access Restrictions:

- Most commands can be executed from normal user logins. The majority of the user commands are in the */usr/bin* directory, which is in the normal path of a user. The **Utry** command is an exception because its directory (*/usr/lib/uucp*) is not in the normal search path of a user. Therefore, the user of this command must specify the full path name or be in the */usr/lib/uucp* directory. The only other alternative is to move the command to a directory where it can be accessed easily by all users (for example, into */info/usr/bin*).
- Two commands cannot be executed from normal user logins. They are the **ucheck** and **ucleanup** commands. These commands can only be executed from the **uucp** administrative (**uucp**) or **root** logins. They are located in the */usr/lib/uucp* directory, which is not in the search path for either login. Therefore, you must specify the full path name or be in the */usr/lib/uucp* directory to execute these commands.

Directories and Files:

- The Basic Networking Utilities are installed in the */usr/bin*, */usr/lib/uucp*, and */usr/admin/menu* directories. The */usr/spool/locks*, */usr/spool/uucp*, and */usr/spool/uucppublic* directories are also used by the Basic Networking Utilities for storing log and status information, temporary work space, temporary storage space, lock files, etc.
- Not all the Basic Networking Utilities are object code files. Some are UNIX system shell scripts that you can modify to suit your operating environment.

Descriptions of Software Utilities Packages

- The directory structure and files are as follows:

DIRECTORY	FILES
/usr/bin	ct cu uucp uulog uuname uupick uustat uuto uux
/usr/lib/uucp	Devconfig Devices Dialcodes Dialers nttysrv Permissions Poll remote.unknown SetUp Sysfiles Systems Utry uuchek uucico uucleanup uudemmon.admin uudemmon.cleau uudemmon.hour uudemmon.poll uugetty uusched uuxqt
/usr/admin/menu /packagemgmt/uucpmgmt	_delinittab _deviceprint _initprint _systemprint adddevice addpoll addport addsystem deldevice delpoll delport delsystem DESC devicemgmt lsdevice lspoll lsport lssystem modifyport pollmgmt portmgmt systemmgmt trysystem
/usr/options	uucp.name

Software Dependencies:

User Environment Utilities.

Windowing Utilities

Install the Windowing Utilities *after* installing any Dot-Mapped Display (DMD) software or other windowing utilities.

Purpose:

To provide the software that is required by AT&T windowing terminals. This software allows the user to create, delete, and manipulate terminal windows; query terminal windows status; and provide statistics about usage of windowing routines.

Users:

All users may use the **layers** command. Typically, experienced UNIX system users will use the other Windowing Utilities commands.

Directories and Files:

The directory structure and files are as follows:

DIRECTORY	FILES
/usr/bin	jwin ismpx jterm xtd xts xtt layers
/usr/include	windows.h
/usr/lib/layersys	lsys.8;7;3 relogin set_enc.j wtinit
/usr/lib	libwindows.a
/usr/options	windowing.name
/etc/master.d	xt
/boot	xt.o

AT&T Form and Menu Language Interpreter (FMLI) Utilities

Purpose:

The FMLI is a developer tool. It recognizes a high-level, shell-like language for defining forms, menus, and text frames, as well as screen labeled function keys, a message line, a command line, and a banner. The interpreter handles the details of frame creation, placement, navigation between frames, and processing the use of forms and menus. If you want to program an interface using FMLI or to modify the Framed Access Command Environment (FACE) Utilities, you will need the *FMLI Programmer's Guide*. This guide is available from the AT&T Customer Information Center. See the ordering information at the front of this document.

Users:

The users of this feature would be programmers who want to create forms and menus on their system. It must be used by anyone wishing to modify the FACE feature.

Directories and Files:

The directory structure and files are as follows:

DIRECTORY	FILES
/usr/bin	fmli vsig

Software Dependencies:

- Directory and File Management Utilities
- Terminal Information Utilities.

AT&T Framed Access Command Environment (FACE) Utilities

Purpose:

This package provides a friendly user interface to a variety of desktop management features through frames and menus. It can be accessed by a number of asynchronous terminals through the terminfo library. The purpose of FACE is to provide a simple interface to various UNIX system file capabilities and UNIX system based application programs. It is used for general office work such as: storing files, doing spreadsheets, text processing, etc. This is done through numerous predefined menus or through customized menus that you create. The FACE Utilities are written in the AT&T Form and Menu Definition Language, and is run by the Form and Menu Language Interpreter (FMLI) Utilities. See *FACE User's Guide* for more information.

Users:

The users for this feature are those users that are unfamiliar with UNIX system semantics.

Directories and Files:

The directory structure and files are as follows:

DIRECTORY	FILES		
/usr/admin/menu /packagemgmt/FACE	DESC addserv delserv	modserv servmgmt	usrmgmt viewsetup
/usr/vmsys/HELP	T.add T.adm T.exit T.f.propts T.h1.help T.h2.system T.h3.frames T.h41.obj T.h42.type T.h43.fold T.h51.file T.h52.other T.h531.pref T.h532.pass T.h534.dir T.h535.perm T.h537.off T.h54.serve T.h55.waste T.h56.unix T.h7.cmd	T.h94.issue T.instal T.list T.m.found T.m.frmlist T.m.office T.mail T.mod T.nmail T.rem T.sadm cancel cleanup close cmd-menu copy create delete display exit find	frm-list frm-mgmt goto help move next-frm open organize prev-frm print redescribe refresh rename run security select time undelete unix update

Descriptions of Software Utilities Packages

DIRECTORY	FILES		
/usr/vmsys/OBJECTS	Form.add Form.del Form.find Form.fold Form.mod Form.office Form.org Form.perm Form.prin Form.sec Form.send Init.vm Menu.Tmail Menu.Tserv	Menu.create Menu.find Menu.h0.toc Menu.h1.help Menu.h4.obj Menu.h5.off Menu.h53.pr Menu.h6.list Menu.h9.prt Menu.install Menu.list Menu.mail Menu.office Menu.pref	Menu.print Menu.remove Menu.sadm Menu.serve Menu.users Menu.waste Text.disp Text.ed Text.help Text.mfhelp Text.run Text.title Text.ver
/usr/vmsys/bin	basename chexec chkterm creaserve delserve	dir_copy dir_creat dir_move face listserv	mnuclick modserv suspend vmsetup vsetup
/usr/vmsys/standard /FILECABINET	.pref		
/usr/vmsys/standard /WASTEBASKET	.pref		
/usr/vmsys/standard /pref	.environ	.variables	
/usr/vmsys/standard	.profile		

Descriptions of Software Utilities Packages

DIRECTORY	FILES
/usr/vmsys	pathalias
/usr/oasys/bin	btoa identify oeupkg termtest setenv
/usr/oasys/info/OH/externals	allobjs detect.tab
/usr/oasys/info	pathalias
/usr/oasys/tmp	TERRLOG
/usr/options	vm.name

Software Dependencies:

- Directory and File Management Utilities
- Editing Utilities
- Form and Menu Language Interpreter Utilities
- Terminal Information Utilities
- User Environment Utilities.

Enhanced Peripheral Ports Controller (EPORTS) Utilities

Purpose:

The Enhanced Peripheral Ports Controller (EPORTS) Utilities provide the mechanisms that enable your 3B2 computer to use EPORTS cards.

Directories and Files:

The directory structure and files are as follows:

DIRECTORY	FILES
/dgn	EPORTS X.EPORTS
/usr/options	eports.name
/tmp/drivers	getty eports gettydefs eports.o
/temp/sdrivers	eports.o
/temp/ttygmt	gettyvalues
/tmp/ttygmt/menu	DESC mklineset lineset modtty
/etc/master.d	eports
/bin	epstty
/usr/include/sys	ep_lla.h ep_dep.h eppc.h

Multiprocessor Enhancement (MPE) Utilities

Installation Notes:

Refer to the *Multiprocessor Enhancement Feature Manual* or the *Processing Element Feature Manual* for hardware installation.

Purpose:

To provide a mechanism to use Multiprocessor Enhancement Feature Card(s) (CM527A) or Processing Element (CM524A) Feature Card(s). This utility also provides the **pmark** command. The **pmark** command provides the capability of "marking" processes so that a process and its child processes will only run on the system board. Refer to the *UNIX System V Release 3 System Administrator's Guide* for more information on the **pmark** command.

Directories and Files:

The directory structure and files are as follows:

DIRECTORY	FILES	
/boot	mpb.o	
/etc	pmark	
/etc/master.d	mpb	
/dgn	MPB	X.MPB
/usr/include/sys	bpbd.h	umpb.h
/usr/options	mpb.name	

SCSI Host Adapter Utilities

Purpose:

Controls access to SCSI devices.

Access Restrictions:

Only the system administrator can setup SCSI Host Adapter Utilities.

Directories and Files:

The directory structure and files are as follows:

DIRECTORY	FILES
/boot	SCSI sh00
/etc/scsi	mkdev rc.scsi sbusclr tc.index haversion sdevfree edittbl sdevlock
/etc/scsi/mkdev.d	disk1 9track1 qtape1 host1
/etc/master.d	scsi sh00
/etc/prtconf.d	scsi
/dgn	SCSI X.SCSI
/etd/SCSI	edtgn
/lib/pump	scsi1 scsi2
/usr/lib/scsi	format tc.index hdefix sd00.0
/usr/lib/scsi/format.d	DISK

Descriptions of Software Utilities Packages

DIRECTORY	FILES
/usr/include/sys	scsi.h sdi.h scsi_edt.h
/usr/options	scsi.name
/etc/init.d	scsi lock unlock
/etc/rc2d	S00scsi
/usr/admin/menu/diskmgmt /sharedmgmt	DESC lock reset lockdisp unlock
/usr/admin/menu/diskmgmt /sharedmgmt/lock.d	disk
/usr/admin/menu/diskmgmt /sharedmgmt/unlock.d	disk
/usr/admin/menu/diskmgmt /sharedmgmt/reset.d	disk

SCSI Cartridge Tape Utilities

Purpose:

To provide a mechanism to use SCSI Cartridge Tape unit.

Users:

Experienced users or system administrators.

Directories and Files:

The directory structure and files are as follows:

DIRECTORY	FILES
/boot	st01
/etc/scsi/	compress
/etc/scsi/compress.d	qtape
/etc/master.d	st01
/etc/scsi/mkdev.d	qtape1 qtape2
/usr/include/sys	st01_ioct1.h
/usr/admin/menu/filemgmt	hsrestore
/usr/admin/menu/filemgmt/backup.d	qtape
/usr/admin/menu/filemgmt/restore.d	qtape
/usr/admin/menu/filemgmt/store.d	qtape

Descriptions of Software Utilities Packages

DIRECTORY	FILES
/usr/admin/menu/filemgmt/hsbackup.d	qtape
/usr/admin/menu/filemgmt/hsrestore.d	qtape
/usr/admin/menu/tapemgmt/rmtape.d	qtape
/usr/admin/menu/tapemgmt/compress.d	qtape
/usr/admin/menu/tapemgmt	compress
/usr/admin/menu/tapemgmt	DESC
/usr/lib/scsi	scsivolcopy tapectl
/usr/lib/scsi/tapectl.d	qtape
/usr/lib/scsi/scsivolcopy.d	qtape
/usr/options	st01.name
/etc	finc frec

Software Dependencies:

SCSI Host Adapter Utilities.

SCSI Disk Mirroring Utilities

Purpose:

Disk mirroring increases the reliability of a 3B2 computer by keeping duplicate files on physically different but otherwise identical partitions on the same or separate hard disks. Files are written to both partitions simultaneously. When a file is read, only one of the partitions is accessed at a time. The system alternates between the mirrored partitions on each read. For example, if two files are being read from a partition that is mirrored on disks 1 and 2, and the last read was from disk 2, the first file will be read from the mirrored partition on disk 1 and the second file will be read from the mirrored partition on disk 2.

Descriptions of Software Utilities Packages

Directories and Files:

The directory structure and files are as follows:

DIRECTORY	FILES
/boot	mirror
/etc/init.d	mirdisk
/etc/rc2.d	S80restore
/etc/master.d	mirror
/etc/scsi	mirror unirror mirrestore setmirror mverify mirlist
/usr/lib/scsi	findmir
/usr/lbin	findparts
/usr/options	mirror.name
/usr/admin/menu/diskmgmt /mirrormgmt	DESC mirdisp mirsetup mirrestore rootsetup unmirror mirremove mirverify mirror
/usr/admin/menu/diskmgmt /mirrormgmt/mirror.d	disk

Further Information:

For additional information, see the *SCSI Release 3 Operations Manual*.

Software Dependencies:

Inter-Process Communications Utilities.

Job Accounting Utilities

Purpose:

Once installed and set up, Job Accounting Utilities enable you to generate accounting reports. Raw accounting data (i.e., connect sessions, disk usage, and processes run) is automatically collected and stored in accounting files. Once a day **cron** automatically initiates the **runacct** program which processes the raw accounting data and generates both cumulative summary files and daily accounting reports. The daily accounting reports can be printed using the **prdaily** program. The **monacc** program can be used to generate monthly or other fiscal reports from data in the cumulative summary files. The **monacc** command is also used to print monthly reports.

Users:

System administrators would use this feature.

Directories and Files:

The directory structure and files are as follows:

DIRECTORY	FILES
/bin	acctcom
/etc/init.d	acct
/usr/options	acct.name
/usr/lib/acct	acctcon1 acctcon2 acctdisk acctdusg acctmerg acctprcl acctprc2 acctwtmp shutacct turnacct holidays ptecms.awk ptelus.awk chargefee lastlogin acctcms monacct accton diskusg fwtmp wtmpfix nulladm ckpacct dodisk prctmp prdaily prtacct remove runacct startup

System Performance Analysis Utilities

Purpose:

These utilities enable the system administrator to collect and examine system usage data. This data can be used to perform system load balancing. It can also be useful in determining correct tuning strategies.

Users:

System administrators and software developers.

Directories and Files:

The directory structure and files are as follows:

DIRECTORY	FILES
/boot	prf.o
/etc	prfdc prfsnap prfld prfstat prfpr
/etc/master.d	prf
/etc/init.d	perf
/usr/bin	sadp timex sag tplot sar graph
/usr/lib/sa	sa1 sadc sa2 perf.name

Network Software Utilities

Purpose:

Set up administrative environment for Remote File Sharing.

Users:

System administrators.

Directory and Files:

The directory structure and files are as follows:

DIRECTORY	FILES		
/boot	log.o clone.o timod.o	tirdwr.o ptm.o pts.o	pitem.o ldterm.o
/etc/master.d	clone log timod	tirdwr ptm pts	pitem ldterm
/usr/bin	nlsadmin strace	strerr strclean	
/usr/include/sys	lihdr.h tiuser.h tihdr.h	strlog.h log.h ldterm.h	pitem.h ptms.h
/usr/include	listen.h	tiuser.h	
/usr/lib	libnsl_s.a libnls.a	libpt.a pt_chmod	
/usr/net/nls	listen	dbfconv	
/usr/options	nsu.name		

Remote File Sharing Utilities

Purpose:

Allows networked computers to share resources.

Users:

System administrators.

Access Restrictions:

Only the system administrator can set up Remote File Sharing Utilities.

Directories and Files:

The directory structure and files are as follows:

DIRECTORY	FILES	
/boot	du.o dufst.o	sp.o
/etc	rmount rmountall	rumountall
/etc/master.d	du dufst	sp
/etc/init.d	adv rfs	fumounts rumounts
/usr/bin	adv rmntstat rfpasswd rfstart rfstop fumount	fusage idload dname rfadmin nsquery unadv
/usr/nserve	rfuadmin rfudaemon nserve	rumount rmount rmntry
/usr/net/servers/rfs	rfsetup	
/usr/options	rfs.name	

Descriptions of Software Utilities Packages

DIRECTORY	FILES	
/usr/sbin	rfsrunning	
/usr/admin/menu/packagegmt/rfsmgmt	DESC	
/usr/admin/menu/packagegmt/rfsmgmt /resrcmgmt	DESC	
/usr/admin/menu/packagegmt/rfsmgmt /resrcmgmt/advmgmt	DESC advauto advnow lsadv	lsinuse unadvauto unadvnow
/usr/admin/menu/packagegmt/rfsmgmt /resrcmgmt/mountmgmt	DESC mntauto mntnow lsavail	lsmount unmntauto unmntnow
/usr/admin/menu/packagegmt/rfsmgmt /startstop	DESC isrfson setauto	startrfs stoprfs
/usr/admin/menu/packagegmt/rfsmgmt	setuprfs	
/usr/admin/menu/packagegmt /confgmt	DESC admember delmember	idmapping lsmember showconfg

Software Dependencies:

- System Administration Utilities
- Network Software Utilities
- Directory and File Management Utilities.

3.2.2 Release Upgrade Utilities

Purpose:

The 3.2.2 Release Upgrade Utilities cannot be loaded on a 3B2 computer running the UNIX System V Release 3.2.2 Operating System. These utilities are used when the Release 3.2.2 Operating System is loaded on a 3B2 computer running the UNIX System V Release 3.1.1 or 3.2.1 Operating System. Upgrading from UNIX System V Release 3.1.1 or 3.2.1 to Release 3.2.2 is described in the *AT&T 3B2 Computer, UNIX System V, Release 3.2.2 Release Notes*.

Security Administration Utilities

Note: The Security Administration Utilities package has restricted distribution and is available only with 3B2 computers sold within the United States.

Purpose:

To provide an encryption mechanism for protecting data that is being stored or transmitted. This package gives a computer additional security protection beyond that obtained through login IDs, passwords, and permission modes.

Users:

UNIX system users that wish to encrypt their data.

Access Restrictions:

The Security Administration Utilities package is available only in the United States.

Directories and Files:

The directory structure and files are as follows:

DIRECTORY	FILES
/bin	crypt
/usr/lib	libcrypt.a makekey
/usr/options	crypt.name

Chapter 6: Clearing Trouble

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Introduction

This chapter can help you resolve problems that may arise while you are setting up your 3B2 computer. The Troubleshooting Chart (Figure 6-1) enables you to identify and clear up problems related to setting up both hardware and software.

To use the chart, first look for a description of your situation under the "SYMPTOM" column. Then answer the questions in the "PROBLEM" column to identify the trouble. If you can identify your problem in this way, look under the "ACTION" column. There you will find instructions for solving the problem or a reference to another chapter or manual where you can find advice. (If you cannot identify or fix your problem, call your AT&T Service Representative or authorized dealer for assistance.)

This chapter also explains how to use error messages and diagnostic tests.

Introduction

SYMPTOM	PROBLEM	ACTION
Cannot set up hardware.	Do you have the right kind of cable for connecting your computer to your console terminal? Do you have a connector with the correct gender for your terminal?	See Appendix A, "Cables and Connectors," and Appendix E, "Pinouts." Replace your current connector with one of the opposite gender.
Cannot turn on computer.	Is the computer power cord properly connected? Is power available at receptacle?	Check power connections. Check power receptacle by plugging in another piece of equipment.
Computer is on; action of power and diagnostic indicators appears wrong.	Do these lights appear to flash longer than they should (as specified in the "Powerup Sequence Chart")?	Call your AT&T Service Representative or authorized dealer.
Computer is on; nothing appears on terminal screen.	Is terminal power on? Is the power cord on the terminal plugged in? Is the connection cable plugged into the correct port on the computer? Is the connection cable plugged into the correct port on the terminal? Is the terminal plugged into a bad power receptacle or a power receptacle with a wall switch that has been turned off?	Check power switch. Check power connection. Make sure the cable is plugged into the port labeled CONSOLE on the computer. Check the specific owner's manual for your terminal. Check power receptacle by plugging in another piece of equipment; check for a wall switch that may be turned off.

Figure 6-1: Troubleshooting Chart (Sheet 1 of 2)

SYMPTOM	PROBLEM	ACTION
Computer is on; nothing appears on screen.	Is terminal signal protocol correct?	See Appendix D.
Computer is on; see random characters on screen.	Is the baud rate on the terminal set at the console TTY setting in "getty?"	Refer to your terminal owner manual to change the baud rate.
<p>Computer displays one of the following error messages: FILE SYSTEM HAS BEEN MODIFIED — or — BOOT UNIX.</p> <p>Console getty respawning too rapidly.</p> <p>Messages 2-02 through 2-08.</p>	<p>Computer found and repaired damage.</p> <p>Computer is unable to boot the UNIX operating system.</p> <p>Cable connections between contty port (the jack adjacent to the console jack) and terminal are defective or a cable is connected to a port and no terminal is equipped.</p> <p>Computer is unable to boot the UNIX operating system.</p>	<p>No action necessary.</p> <p>Call your AT&T Service Representative or authorized dealer.</p> <p>Check connections between contty port and terminal or remove cable (no terminal is connected to the contty port).</p> <p>Refer to the <i>UNIX System V Release 3 System Administrator's Guide</i> for an explanation of these error messages.</p>

Figure 6-1: Troubleshooting Chart (Sheet 2 of 2)

Error Messages

When certain hardware problems occur, the computer notifies you by displaying error messages on the screen. An error message consists of a general statement of the problem and a reference number. The reference number enables you to look up detailed information about a problem in the *UNIX System V Release 3 System Administrator's Guide* referred to as the SYSTEM ADMINISTRATIONS UTILITIES GUIDE on the screen where error messages are listed according to the number in this guide. This information includes instructions for resolving the problems described.

SELF-CHECK

FIRMWARE ERROR

SYSTEM FAILURE: CONSULT YOUR SYSTEM ADMINISTRATIONS UTILITIES GUIDE

In addition, if you are an experienced user of the UNIX operating system, you may want to execute the diagnostic tests for the 3B2 computer.

Diagnostic Tests

Diagnostic tests are tools for identifying hardware problems in the 3B2 computer. If you can identify a problem before you call for service, your AT&T Service Representative or authorized dealer will be better able to determine which hardware parts to bring on the service call.

To perform diagnostics, you must change the operating state to firmware as shown in Figure 6-2, and execute the **dgmon** program as shown in Figure 6-3.

```
Console Login: root <CR>
Password: <password><CR>
UNIX System V Release 3.2.2 3B2 Version 3
unix
Copyright (c) 1984, 1987, 1988, 1989 AT&T
All Rights Reserved
# sysadm firmware<CR>

Running subcommand 'firmware' from menu 'machinemgmt'.
MACHINE MANAGEMENT

Once started, this procedure CANNOT BE STOPPED.
Do you want to go to firmware "express"? [y, n, q, ?] y<CR>

Shutdown started.   Wed Apr 5 12:49:31 CDT 1989

Broadcast Message from root (console) Wed Apr 5 12:49:34 ...
THE SYSTEM IS BEING SHUT DOWN NOW !!!
Log off now or risk your files being damaged.

INIT: New run level: 5
The system is coming down. Please wait.
System services are now being stopped.

The system is down.
```

Figure 6-2: Entering Firmware Mode

Diagnostic Tests

```
SELF-CHECK  
  
FIRMWARE MODE<mcp><CR>  
  
Enter name of program to execute []: dgmon<CR>  
...
```

Figure 6-3: Executing **dgmon**

If you feel comfortable running diagnostics, refer to "Running Diagnostic Tests" in the *UNIX System V Release 3 System Administrator's Guide* for further instructions.

Caution: If you do not feel sure that you can execute the diagnostic tests properly, call your AT&T Service Representative or authorized dealer.

Chapter 7: Side Card Access—Card Installation and Removal

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Introduction

The following procedures are a general guide for installing and removing feature and memory cards in a 3B2 computer having side access (3B2/500 computer) to the backplane slots.

Note: If you have not already done so, **READ** the chapter on installing and removing your card in the documentation supplied with the card.

The side card access computer has 12 backplane slots under the cover on the right side of the computer. These slots are the means for adding I/O feature cards, memory cards, or performance feature cards to your computer. Although these backplane slots are not labeled, they are dedicated to specific feature cards.

Figure 7-1 shows the assignments of the 12 card slots. The slots above the dashed line are I/O slots. These slots are used for I/O feature cards such as EPORTS, SCSI Host Adapter, Remote Management, etc. These slots are designated as slots 1 through 7. The slots below the dashed line are performance and memory slots. The performance slots are designated BUB0, BUB1, and VCACHE. The memory slots are designated MEM0 and MEM1. The performance slots are used for performance feature cards such as Virtual Cache (VCACHE) cards and multiprocessor enhancements cards, etc. The memory slots are used for Random Access Memory cards.

Feature cards installed in the I/O slots must be installed in sequential order beginning with slot 1. **The I/O slots cannot be skipped.** Factory equipped cards such as the SCSI Host Adapter and the EPORTS cards are installed in the lower numbered slots. Memory cards must also be installed in sequential order beginning with slot MEM0. Slot MEM1, for example, cannot be used when slot MEM0 is vacant. The VCACHE slot can only be used for the VCACHE performance feature card. Slots BUB0 and BUB1 must be used for performance feature cards designed for the 3B2 computer Buffered Microbus. Documentation provided with the performance feature cards indicate when these slots should be filled.

This chapter describes only the physical installation or removal of a feature or memory card in the side-access 3B2 computer. For specific information about card placement, cabling connections, software installation, unique setups, or operation of an I/O or performance feature card, refer to the instructions that came with the specific card.

For ease of reference, a summary of the 3B2 computer terminology used in this chapter is shown below:

Backplane Slot—a card slot located on the right-hand side of the computer (as viewed from the front) behind the hinged cover.

I/O Slots—card slots for the Input/Output cards.

I/O Feature Cards—cards that are used to interface with other equipment.

Memory Slots—the memory slots are MEM0 and MEM1.

Memory Cards—3B2 computer RAM cards.

Performance Feature Cards—cards that enhance the performance of the computer, for example, VCACHE.

Performance Slots—the performance slots are BUB0, BUB1, and VCACHE.

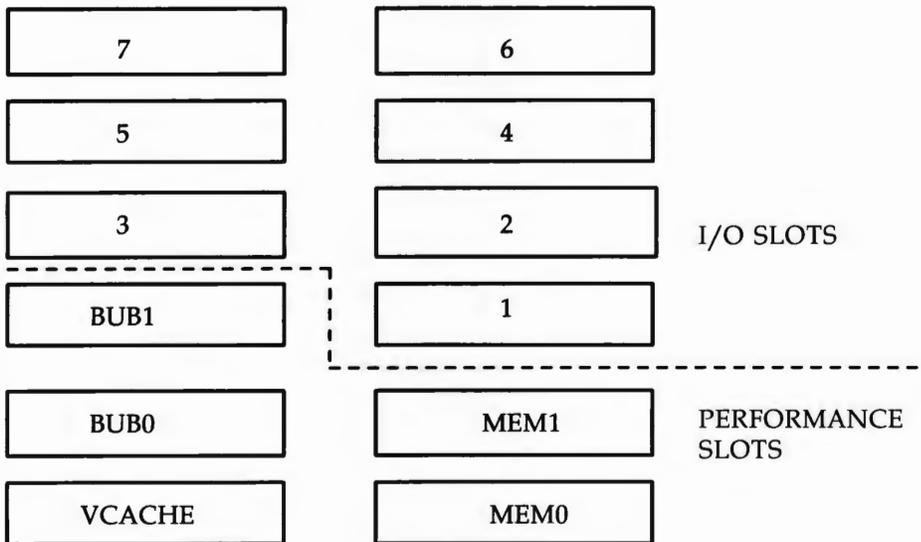


Figure 7-1: Backplane Slot Assignments

Preparation

To install or remove a 3B2 computer feature or memory card, you must first physically install or remove the card by using the guidelines set forth in this chapter. Then you must refer back to the documentation that came with that card for specific information on software setup, cabling, or any unique aspects of that card.

As previously stated, the following procedures describe only the physical installation or removal of a 3B2 computer card. The estimated time for the physical installation is about 30 minutes. However, additional time must be allowed for procedures referenced in the documentation supplied with the card.

Before installing or removing a card, obtain a small flathead screwdriver. Then read the entire installation or removal procedure and make sure you understand each step before you begin.

Installation

The general sequence to follow when installing a card is listed below.

1. Power Down System
2. Remove Ground Strap
3. Locate Backplane Slot
4. Install Card
5. Replace Ground Strap.

Power Down System

If you have not already turned off your computer, use the following procedure to turn off the computer. First, check the documentation supplied with your card to determine if anything must be done before power to the computer can be turned off.

1. Power down your computer according to the instructions in Chapter 2, "Getting Started," of this manual.

Caution: Never pull the power plug or externally remove power until the 3B2 computer completes its shutdown sequence. Data may be permanently lost if the computer is not shut down properly.

2. Wait for the computer to shut down all of its operations. The last broadcast message will indicate that the system is down, and the Power indicator will turn off.
3. Unplug the power cord.

Remove Ground Strap

1. Remove the cable access door. To remove, release the latch, lift the door, and pull up. See Figure 7-2.

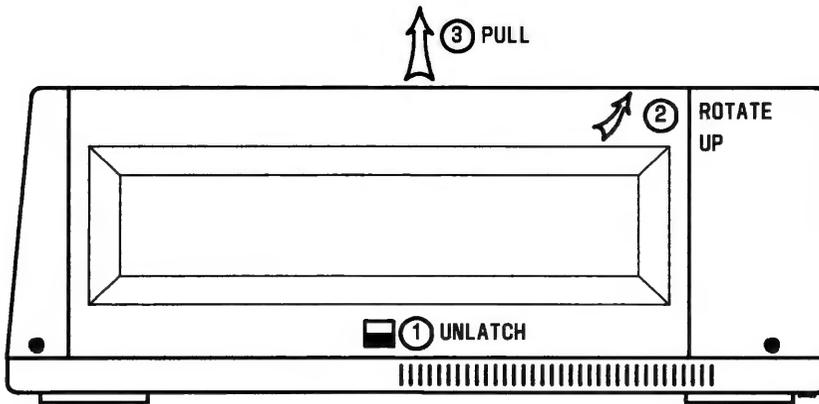


Figure 7-2: Removing Cable Access Door

2. Refer to Figure 7-3 and remove the screws holding the ground strap to the filler plates and feature cards.
3. Remove the circuit pack extractor tool.
4. Remove the two screws holding the ground strap to the chassis.

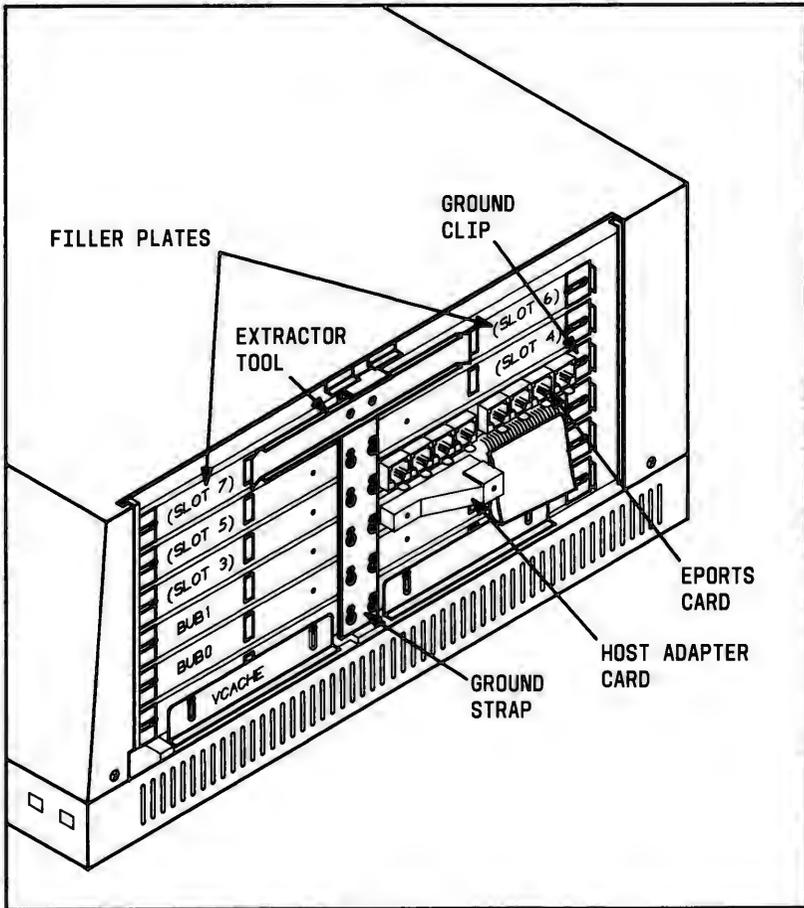


Figure 7-3: Ground Strap and Filler Plates

Locate Backplane Slot

Caution: When installing, moving, or removing an I/O feature card, a performance feature card, or a memory card, **NEVER skip a slot. If you remove a card that is not in the highest numbered slot being used, you must rearrange the remaining I/O, performance, or memory cards to fill the vacant slot.**

Note: Performance slots are card specific; that is, only certain cards may be installed in certain slots. Documentation provided with the performance feature card(s) identifies the slot(s) in which the card(s) may be installed.

1. Locate the backplane slot (Figure 7-1) where the card will be installed.
2. Remove the retaining screw(s) and remove the filler plate that covers the backplane slot you want to use.
3. If the filler plate covers two backplane slots and you only need to use one slot, perform Steps a through c:
 - a. Separate the filler plate by carefully bending it along the break line shown in Figure 7-4.
 - b. Save one half of the filler plate in case you remove the card later.
 - c. Install the other half of the filler plate over the slot not being used after the card has been installed.

Warning: **Failure to replace the filler plates over unused slots will disrupt cooling airflow and may cause radiation noncompliance with Class A limits of Subpart J, Part 15 of FCC Rules.**

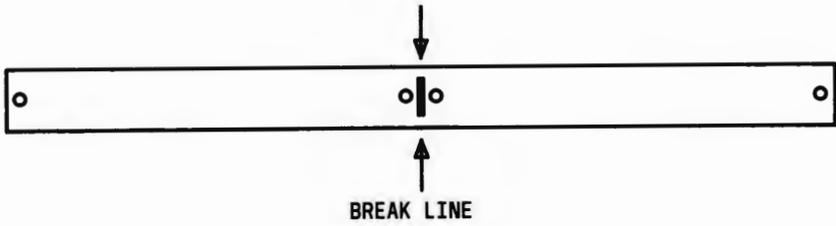


Figure 7-4: Breaking Filler Plate

Install Card

Note: Install the card in the appropriate backplane slot, with the correct side up (Figure 7-5). Refer to the document provided with the card to identify the top side of your card.

1. Make sure the edges of the card are aligned with the guides inside the computer. Insert the card by pushing it straight back into the computer. Press firmly on the card to ensure that the card is completely seated.

Warning: Handle the card as you would a record album — only by the edges. The components on the card are sensitive to static discharge and may be damaged if not handled carefully.

2. If you are going to install another card at this time, return to the “Locate Backplane Slot” procedure. Otherwise, place spare filler plate over the empty slot, if there is one, and continue on to the “Replace Ground Strap” procedure.

Installing the Electromagnetic Interference Shield

After you install a card in slots MEM0 or VCACHE (Figure 7-1), you must also install an electromagnetic interference (EMI) shield.

1. The filler plates covering the vacant MEM0 or VCACHE slot has an EMI shield attached with two machine screws. (Some computers may have a “dummy” card installed rather than a filler plate.) Remove and save the shield and screws.
2. After you install a card, position the shield on the card so that the lip faces away from the computer.
3. Secure the shield to the card faceplate with the two machine screws.
4. Be sure that the lip of the shield fits snugly against the system board when you tighten the screws.

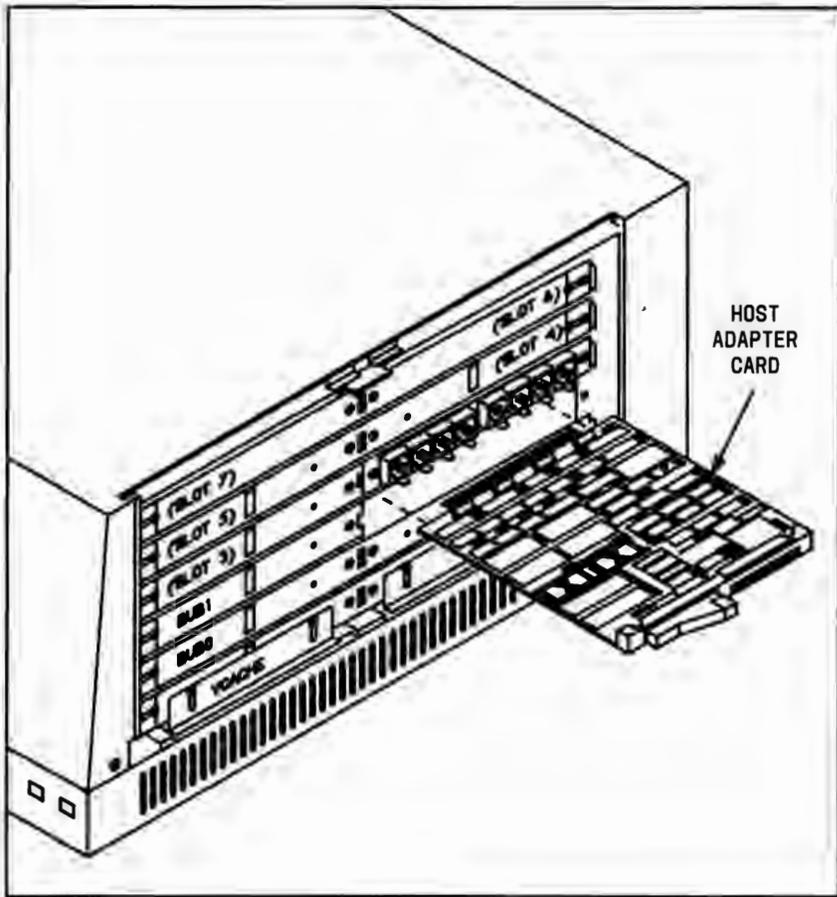


Figure 7-5: Inserting a Host Adapter Card

Replace Ground Strap

1. Install the ground strap, circuit pack extractor tool (if needed), and the ground clip provided with the feature card as shown in Figure 7-3. Start all screws before tightening any of them.

Note: Always install the ground clip at the outside edge of the card faceplate, opposite from the ground strap.

2. The card is now installed. Refer to the documentation supplied with the card for the procedures for completing the installation of the card (cable connections, powerup procedure, software installation, testing and troubleshooting, etc.).

Removing, Replacing, or Repositioning Cards

There may be an occasion when you need to temporarily remove a feature or memory card. If the removed card is not the last card in sequence, you must move one or more cards to ensure all slots are used in sequence. The general sequence to follow when removing, replacing, or repositioning a card is listed below:

1. Power Down System
2. Determine If Cards Must Be Moved
3. Remove, Replace, or Reposition Card(s).

Power Down System

If you have not already turned off the computer, use the following procedure to turn off the computer properly. Refer back to the documentation provided with the card for special instructions that you might need before turning off the power to the computer.

1. Power down your computer according to the instructions in Chapter 2, "Getting Started," of this manual.

Caution: Never pull the power plug or externally remove power until the 3B2 computer completes its shutdown sequence. Data may be permanently lost if the computer is not shut down properly.

2. Wait for the computer to shut down all of its operations. The last broadcast message will indicate that the system is down, and the Power indicator will turn off.
3. Unplug the power cord.

Determine If Cards Must Be Moved

1. The I/O feature cards, performance feature cards, and memory cards must always be installed in sequential order. **You are never allowed to skip an I/O, BUB, or memory slot.** Look at the slots to determine if any cards must be moved to meet this requirement.
2. If a card must be moved, refer to the documentation supplied with the card to see if any software must be changed or removed. Remove or change software as necessary.

Remove, Replace, or Reposition Card(s)

1. Make sure all the cables connected to the card, if any, are labeled. If they are not, label them.
2. Disconnect the cables, if any, from the card.
3. Remove the screws holding the ground strap to the filler plates and cards (Figure 7-3).
4. Remove the circuit pack extractor tool by removing the two screws that hold it to the ground strap (Figure 7-3).
5. Loosen the two screws holding the ground clip to the card (Figure 7-3).
6. Slide the ground clip away from the card.

Warning: Handle the card as you would a record album — only by the edges. The components on the card are sensitive to static discharge and may be damaged if not handled carefully.

7. Remove the card by using the circuit pack extractor tool. Insert the ends of the extractor tool into the openings on both sides of the card that you wish to remove. Gently pull straight out.
8. If you are repositioning a card and a filler plate covers the backplane slot you want to use, remove the filler plate.

9. Are you removing, repositioning, or replacing a card?

IF	THEN
Removing only	Reinstall filler plate(s)
Repositioning	Install card in new slot
Replacing	Install new card

Warning 1: The I/O, performance, and memory slots must be filled in sequential order. If you remove a card and leave a lower numbered slot vacant, the 3B2 computer will not operate properly. Therefore, you must move a card from the highest numbered slot into the vacant slot.

Warning 2: Failure to replace filler plates over unused backplane slots will disrupt cooling airflow and may cause radiation noncompliance with Class A limits of Subpart J, Part 15 of FCC Rules.

10. Install the ground strap, the circuit pack extractor tool (if space is available), and the ground clip (Figure 7-3). Start all screws before tightening any of them.

Note: Always install the ground clip at the outside end of the card faceplate, opposite from the ground strap.

11. If you have repositioned or replaced a card, plug the cables, if any, back into the appropriate connectors.

12. Refer to the documentation supplied with the card you have removed, repositioned, or replaced for further installation or removal procedures (powerup procedure, software installation or removal, cabling, testing and troubleshooting, etc.). Since the */etc/inittab* file has been set to the default values after the system reconfigures, see the System Administration documentation for information on resetting tty line settings back to their former status.

Chapter 8: Rear Card Access—Card Installation and Removal

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Determine If Card(s) Must Be Moved	8-14
Remove, Replace, or Reposition Card(s)	8-14



Introduction

The following procedures are a general guide for installing and removing feature and memory cards in a 3B2 computer with rear access (3B2/600, 3B2/700, and 3B2/1000 computers) to the backplane slots.

Note: If you have not already done so, **READ** the chapter on installation and removal of your card in the documentation supplied with the card.

You have one of two backplanes on a rear card access computer. The CM519A backplane, which is found in 3B2/600 and 3B2/700 computers, is shown in Figure 8-1. The CM519B backplane, which is found in 3B2/1000 computers, is shown in Figure 8-2. Three types of slots are located on the back of the computer, performance, memory, and I/O. These slots provide the means for adding feature and memory cards to your computer. The system board of the 3B2 computer is located in the center of the backplane. The I/O slots are located above the system board, they house the I/O feature cards (EPORTS, Host Adapter, etc.). Performance and memory slots are located below the system board. The performance slots house the performance feature cards (Processing Element, etc.). The memory slots house the memory cards.

The performance slots, which are located below the system board, are card specific; that is, cards can only be inserted into slots that they are designed to be used in. Labels, which are located on the inner edge of the computer, identify each type of performance slot. Documentation provided with performance feature cards indicate which type of slot they are used in. Only memory feature cards are installed in MEM slots. Performance cards designed to use the 3B2 computer Processor Bus (PBUS) are installed in PBUS slots (only on CM519B backplane). Performance cards designed to use the 3B2 computer Buffered Microbus (BUB) are installed in the BUB slots. Note that slots BUB1 through BUB3 are not usable on some computers with the CM519A backplane. The "Features" information in the *Read Me First* manual indicates the usable BUB slots.

All I/O slots must be used sequentially starting with slot 1. Slots cannot be skipped. For example, you cannot use slots 1 and 3 and leave slot 2 empty. Memory slots must also be used in sequential order, beginning with slot MEM0.

This chapter describes only the physical installation or removal of a feature or memory card in a rear-access 3B2 computer. For specific information about card placement, cabling connections, software installation, unique setups, or operation of an I/O or performance feature card, refer to the document that came with the card.

For ease of reference, a summary of the 3B2 computer terminology used in this chapter is shown below:

Backplane Slots—all card slots located on the back of the 3B2 computer.

I/O Slots—card slots located above the system board.

I/O Feature Cards—cards that are installed in the I/O slots. These cards must be installed sequentially starting with slot 1.

Performance Slots—card slots located below the system board on the left-hand side.

Performance Feature Cards—cards that, once installed in the performance slots, will increase the performance of the computer. These cards must be installed in particular slots.

Memory Slots—card slots located below the system board on the right-hand side.

Memory Cards—increase the RAM capacity of the computer. These cards are installed in the MEM0 through MEM3. Memory cards must be installed sequentially starting with slot MEM0.

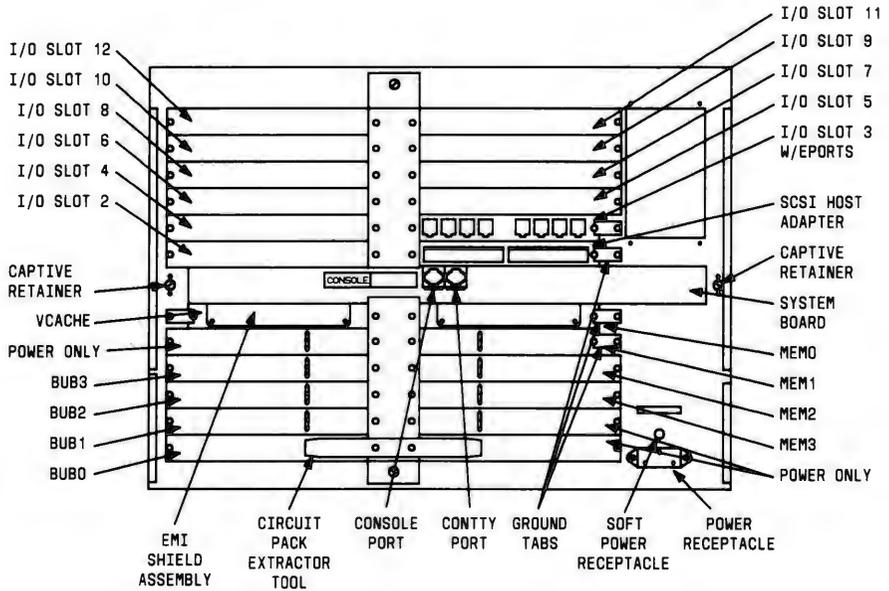


Figure 8-1: CM519A Rear Card Access Computer Backplane Slots

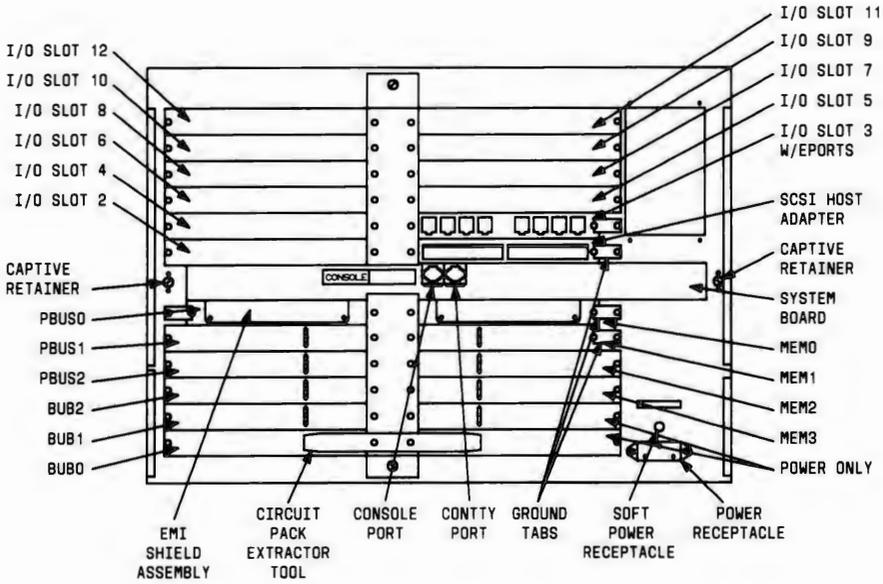


Figure 8-2: CM519B Rear Card Access Computer Backplane Slots

Preparation

To install or remove a 3B2 computer feature or memory card, you must first physically install or remove the card by using the guidelines in this chapter. Then you must refer back to the documentation that came with that card for specific information on software setup, cabling, or any unique aspects of that card.

As previously stated, the following procedures describe only the physical installation or removal of a 3B2 computer card. The estimated time for the physical installation is about 30 minutes. However, additional time must be allowed for procedures referenced in the documentation supplied with the card.

Before installing or removing a card, obtain a small slotted screwdriver. Then read the entire installation or removal procedure and make sure you understand each step before you begin.

Installation

The general sequence to follow when installing a card is listed below.

1. Power Down System
2. Remove Ground Strap
3. Locate Backplane Slot
4. Install Card
5. Replace Ground Strap.

Power Down System

If you have not already turned off your computer, use the following procedure to turn off the computer. First, check the documentation supplied with your card to determine if anything must be done before power to the computer can be turned off.

1. Power down your computer according to the instructions in Chapter 2, "Getting Started," of this manual.

Caution: Never pull the power plug or externally remove power until the 3B2 computer completes its shutdown sequence. Data may be permanently lost if the computer is not shut down properly.

2. Wait for the computer to shut down all of its operations. The last broadcast message will indicate that the system is down, and the Power indicator will turn off.
3. Unplug the power cord.

Remove Ground Strap

First determine if your card is an I/O feature card, a performance feature card, or a memory card (whether it belongs in the upper or lower slots), and then remove the appropriate ground strap using the following procedure:

1. Remove the screws holding the ground strap to the filler plates and feature or memory cards (Figure 8-3). If the lower ground strap is being removed, remove the circuit pack extractor tool by removing the two screws that hold it to the ground strap.
2. Remove the ground strap from the chassis (Figure 8-3) by pushing and turning the quarter-turn fastener.

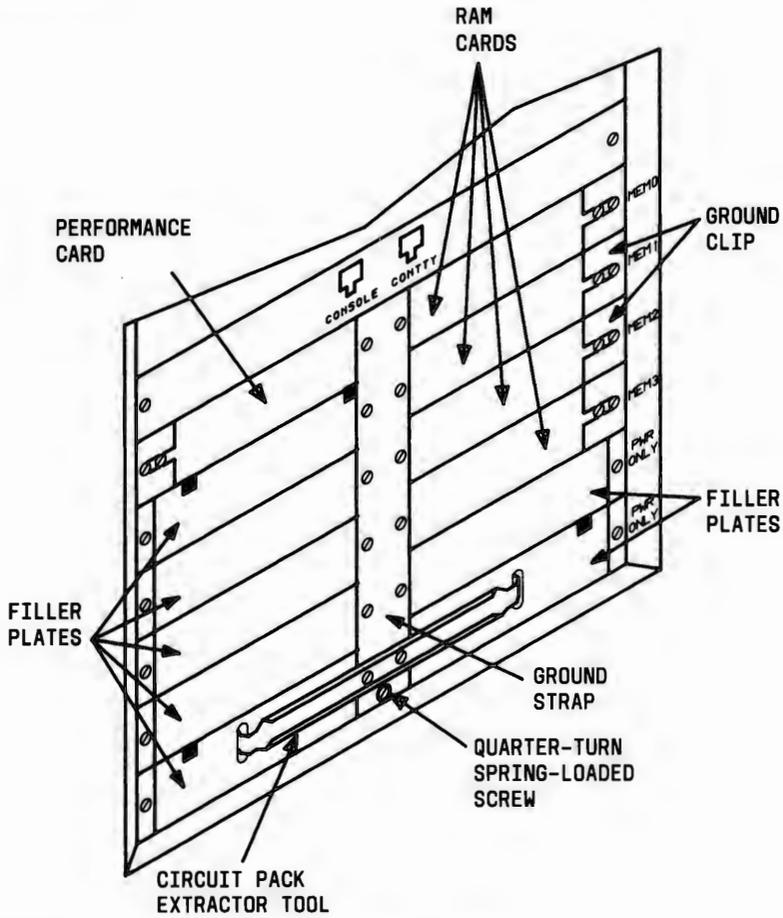


Figure 8-3: Ground Strap and Filler Plates

Locate Backplane Slot

Caution: When installing or removing an I/O feature card or a memory card, NEVER skip a slot. If you remove a card that is not in the highest numbered slot being used, you will have to rearrange the remaining I/O, performance, or memory cards to fill the vacant slot.

1. Locate the backplane slot (Figure 8-1 or 8-2) where the card will be installed.
2. Remove the retaining screw(s) and remove the filler plate that covers the backplane slot you want to use.

Note: If you are installing a memory card, you will have to remove the filler plate that is covering the slot that you want to use AND the filler plate below the slot you want to use. After the memory card is installed, replace the filler plate below the card.

3. If the filler plate covers two backplane slots and you only need to use one slot, perform Steps a through c:
 - a. Separate the filler plate by carefully bending it along the break line shown in Figure 8-4.
 - b. Save one half of the filler plate in case you remove the card later.
 - c. Install the other half of the filler plate over the slot not being used after the card has been installed.

Warning: Failure to replace the filler plates over unused slots will disrupt cooling airflow and may cause radiation noncompliance with Class A limits of Subpart J, Part 15 of FCC Rules.

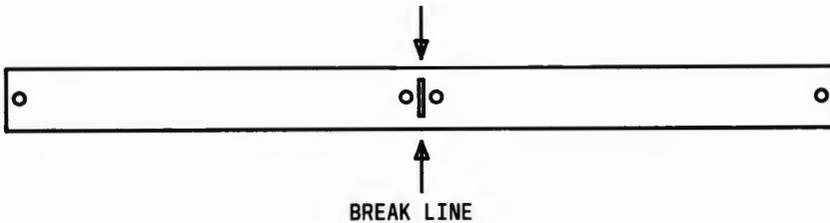


Figure 8-4: Breaking Filler Plate

Install Card

Note: Install the card in the appropriate backplane slot, with the correct side up (Figure 8-5). Refer to the document provided with the card to identify the top side of your card.

1. Make sure the edges of the card are aligned with the guides inside the computer. Insert the card by pushing it straight back into the computer. Press firmly on the card to ensure that the card is completely seated.

Warning: Handle the card as you would a record album — only by the edges. The components on the card are sensitive to static discharge and may be damaged if not handled carefully.

2. If you are going to install another card at this time, return to the "Locate Backplane Slot" procedure. Otherwise, place spare filler plate over the empty slot, if there is one, and continue on to the "Replace Ground Strap" procedure.

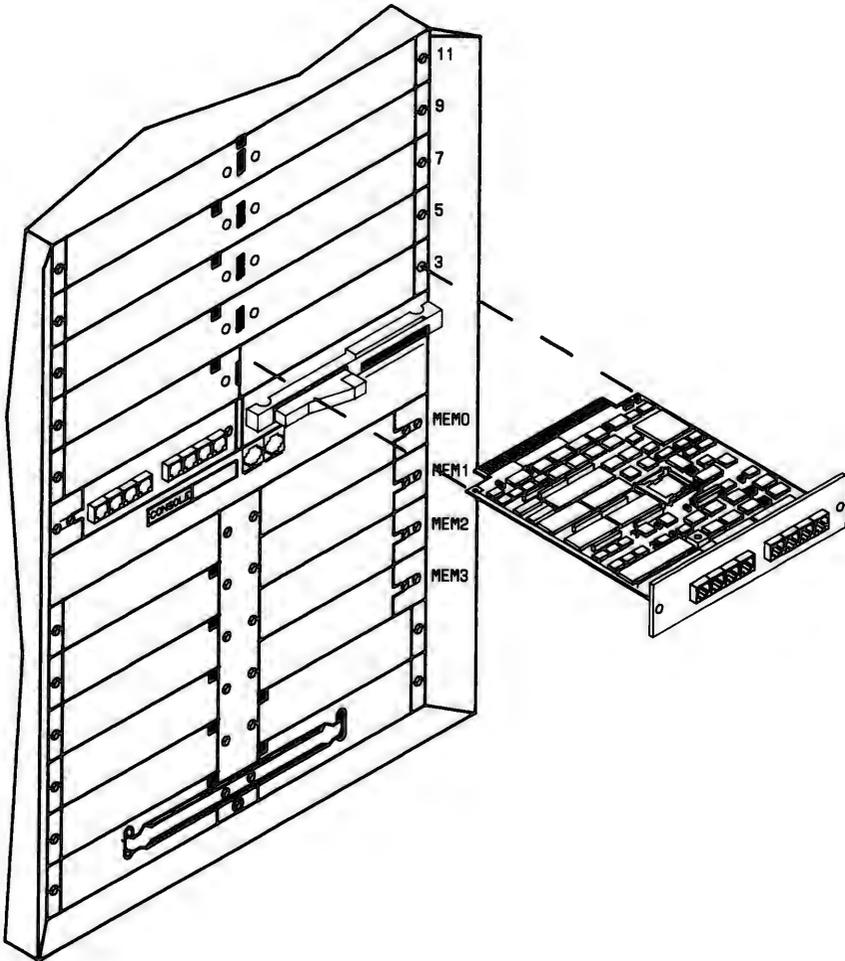


Figure 8-5: Inserting an I/O Feature Card

Replace Ground Strap

1. Install the ground strap, circuit pack extractor tool (if space is available), and the ground clip provided with the card (Figure 8-3). Start all screws before tightening any of them. (The circuit pack extractor tool should be attached to the lower ground strap on the bottom slot.)

Note: Always install the ground clip at the outside end of the card faceplate, opposite from the ground strap.

2. The card is now installed. Refer to the documentation supplied with the card for the procedures for completing the installation of the card (cable connections, powerup procedure, software installation, testing and troubleshooting, etc.).

Removing, Replacing, or Repositioning Cards

There may be an occasion when you need to temporarily remove a feature or memory card. If the removed card is not the last card in sequence, you will have to move one or more cards to ensure slots are used in sequence. The general sequence to follow when removing, replacing, or repositioning a card is listed below.

1. Power Down System
2. Determine If Card(s) Must Be Moved
3. Remove, Replace, or Reposition Card(s).

Power Down System

If you have not already turned off the computer, use the following procedure to turn off the computer properly. Refer back to the documentation provided with the card for special instructions that you might need before turning off the power to the computer.

1. Power down your computer according to the instructions in Chapter 2, "Getting Started," of this manual.

Caution: Never pull the power plug or externally remove power until the 3B2 computer completes its shutdown sequence. Data may be permanently lost if the computer is not shut down properly.

2. Wait for the computer to shut down all of its operations. The last broadcast message will indicate that the system is down, and the Power indicator will turn off.
3. Unplug the power cord.

Determine If Card(s) Must Be Moved

1. The I/O feature cards and memory cards must always be installed in sequential order. **You are never allowed to skip an I/O or memory slot.** Look at the slots to determine if any cards must be moved to meet this requirement.
2. If a card must be moved, refer to the documentation supplied with the card to see if any software must be changed or removed. Remove or change software as necessary.

Remove, Replace, or Reposition Card(s)

1. Make sure all the cables connected to the card, if any, are labeled. If they are not, label them.
2. Disconnect the cables, if any, from the card.
3. Remove the screws holding the ground strap to the filler plates and cards (Figure 8-3).
4. Remove the circuit pack extractor tool by removing the two screws that hold it to the ground strap.
5. Remove the ground strap from the chassis (Figure 8-3) by pushing and turning the quarter-turn, spring-loaded screw.
6. Loosen the two screws holding the ground clip to the card (Figure 8-3).
7. Slide the ground clip away from the card.

Warning: Handle the card as you would a record album — only by the edges. The components on the card are sensitive to static discharge and could be damaged if not handled carefully.

8. Remove the card by using the circuit pack extractor tool. Insert the ends of the extractor tool into the openings on both sides of the card that you wish to remove. Gently pull straight out.
9. If you are repositioning a card and a filler plate covers the backplane slot you want to use, remove the filler plate.

10. Are you removing, repositioning, or replacing a card?

IF	THEN
Removing only	Reinstall filler plate(s)
Repositioning	Install card in new slot
Replacing	Install new card

Warning 1: The I/O, performance, and memory slots must be filled in sequential order. If you remove a card and leave a lower numbered slot empty, the 3B2 computer will not operate properly. Therefore, you will have to move a card from the highest numbered slot into the vacant slot.

Warning 2: Failure to replace filler plates over unused backplane slots will disrupt cooling airflow and may cause radiation noncompliance with Class A limits of Subpart J, Part 15 of FCC Rules.

11. Install the ground strap, the circuit pack extractor tool (if space is available), and the ground clip (Figure 8-3). (The circuit pack extractor tool should be attached to the lower ground strap on the bottom slot.) Start all screws before tightening any of them.

Note: Always install the ground clip at the outside end of the card faceplate, opposite from the ground strap.

12. If you have repositioned or replaced a card, plug the cables, if any, back into the appropriate connectors.
13. Refer to the documentation supplied with the card you have removed, repositioned, or replaced for further installation or removal procedures (powerup procedure, software installation or removal, cabling, testing and troubleshooting, etc.). Since the */etc/inittab* file has been set to the default values after the system reconfigures, see the System Administration documentation for information on resetting tty line settings back to their former status.

Appendix A: Cables and Connectors

To Order Cables and Connectors

To order parts for your 3B2 computer, see your AT&T Service Representative or authorized dealer.

Note: Serial and parallel printer cables are available only for AT&T products.

Mirror Image Connection Cable

The 3B2 computer is delivered with specially designed cables and connectors for printers, modems, and terminals. In the more common "straight-through" type of cable, the wires run from numbered pins at one end to pins with corresponding numbers at the other end. (The wire from pin 1 at one end runs to pin 1 at the other end; the wire from pin 2 runs to pin 2, etc.) However, the cables for the 3B2 computer terminal contain "mirror image" wiring. The wire connected to pin 1 at one end runs to pin 8 at the other end; the wire at pin 2 runs to pin 7, and so on.

If you want to use a cable other than the ones delivered with your computer, you must make sure that your cable has "mirror image" wiring. To find out which type of cable you have, line up the two ends, as shown in Figure A-1.

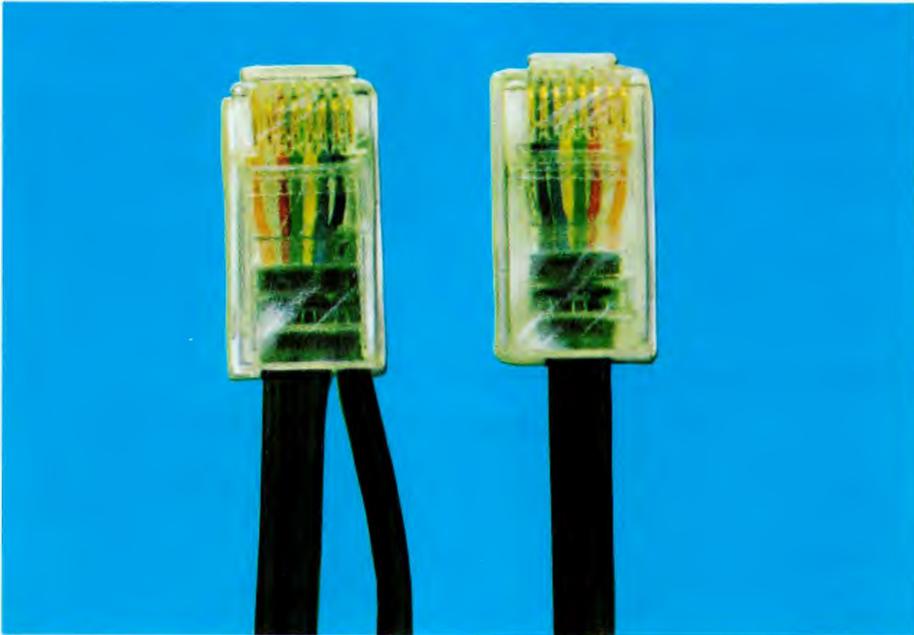


Figure A-1: Mirror-Image Wiring in a Connection Cable

Be sure that corresponding sides of the two ends are facing up. For example, on the cables delivered with the 3B2 computer, there is a plastic tab on one side of each connector. When you line up the ends of the cable, be sure that both tabs are either toward you or away from you.

Now compare the order of the wires in the two ends. In a “mirror image” type of cable, the order of the colored wires in one end is reversed in the other end. For example, in Figure A-1, the colors of the wire run from red to blue in the cable end shown on the left, and from blue to red in the end shown on the right. If the order of the wires is reversed in this way, your cable will work with your 3B2 computer.

Appendix B: Using Floppy Disks

Description of a Floppy Disk

The Security Administration Utilities software for your 3B2 computer was delivered on a floppy disk (Figure B-1). These are 5¼-inch diameter Mylar floppy disks, coated with magnetic material. Each one stores up to 728,064 bytes (1,422 512-byte blocks) of data.

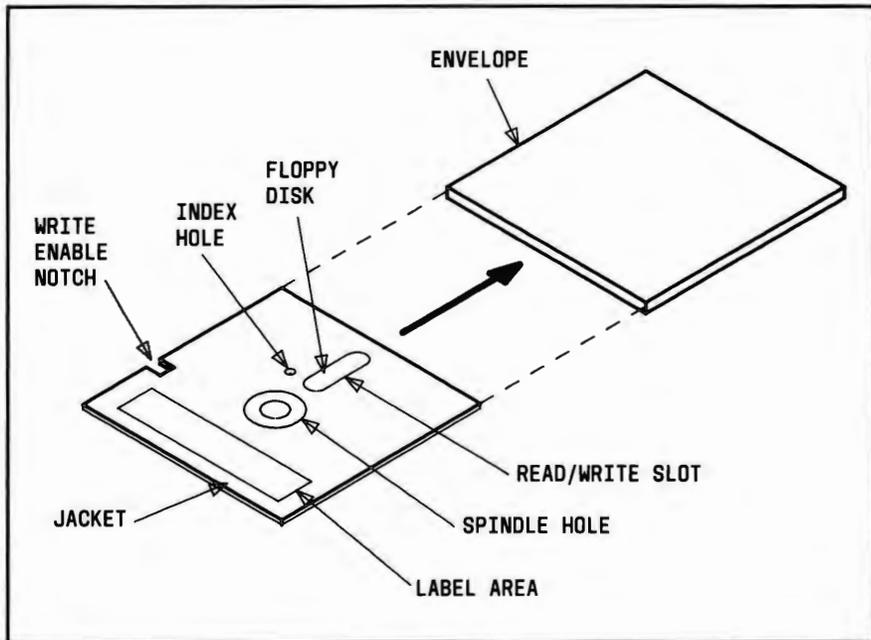


Figure B-1: Floppy Disk

Each floppy disk is permanently enclosed in a jacket and has a small notch on one side. This is the write enable notch (Figure B-1). It controls the ability of the floppy disk drive to write data on the floppy disk. (Your 3B2 computer can either write information onto the floppy disk or read information from it.)

After writing data onto a floppy disk, cover the notch with an opaque self-adhesive tab. (These tabs are normally supplied with floppy disks.) When a notch is covered in this way, the floppy disk is referred to as being “write protected.”

As long as the notch is covered, the floppy disk drive CANNOT write on the floppy disk. Even if the floppy disk is inserted into the disk drive, it will not accept new data. Your original data will remain intact. If you later decide to write new data over the original information on the same floppy disk, simply remove the tab. With the write enable notch uncovered, the floppy disk drive CAN write information on the floppy disk.

It is important to be familiar with write protection so that you can preserve programs or information that you do not want altered or destroyed. To protect floppy disks from accidentally being erased or written over, always keep the write enable notch covered.

Precautions

When handling floppy disks:

1. **DO NOT** touch the recording surface through the read/write slot or the index hole.
2. Do not write on the floppy disk jacket. Write on a label before affixing it to the label area on the jacket. If you write on a label that has already been affixed to the floppy disk, use a felt tip pen only. **DO NOT** use a ball point pen.
3. Do not bend the floppy disk.
4. Keep floppy disks away from strong magnetic fields (for example, airport X-ray machines, electric motors, and transformers), direct sunlight, excessive moisture, dust, or extreme temperature changes.
5. Keep floppy disks in their protective envelopes when you are not using them.
6. Store floppy disks in an upright position.
7. Do not leave a floppy disk in the disk drive.

Inserting a Floppy Disk

Figure B-2 shows you how to insert a floppy disk into the floppy disk drive.

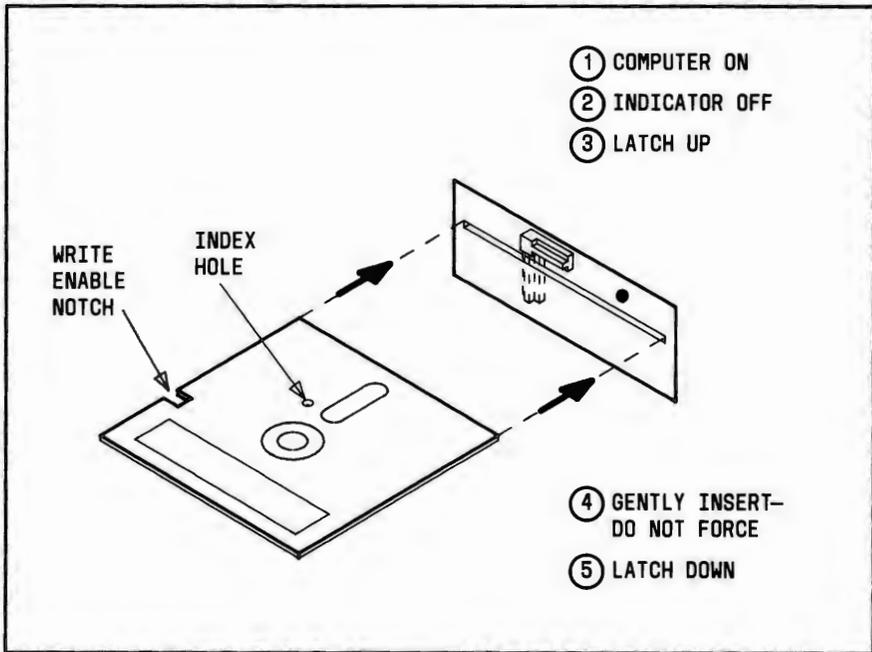


Figure B-2: Inserting a Floppy Disk

Removing a Floppy Disk

Figure B-3 shows you how to remove a floppy disk from a floppy disk drive.

Caution: DO NOT remove a floppy disk while the floppy disk drive indicator is on. You can damage the floppy disk or destroy the information stored on it.

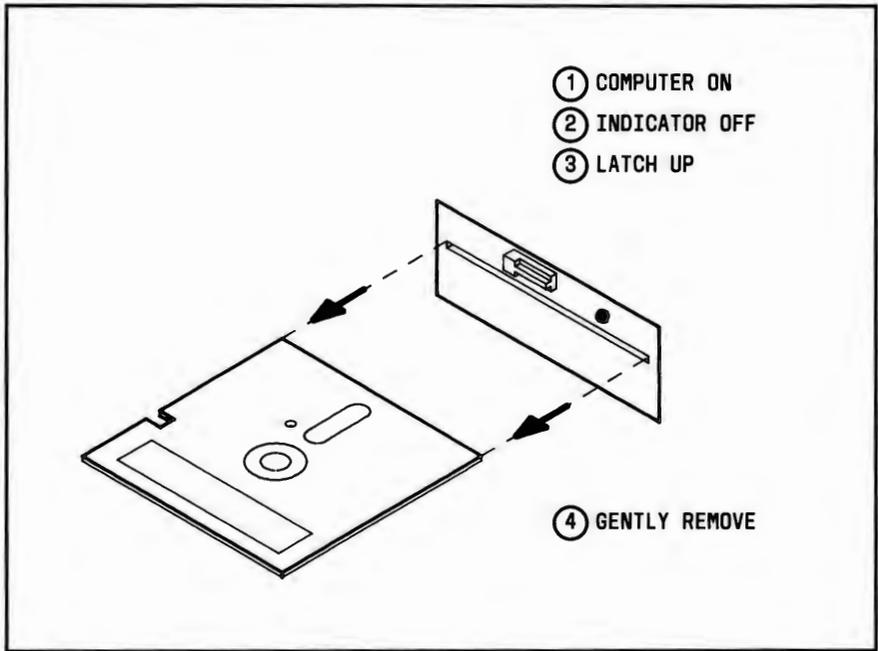


Figure B-3: Removing a Floppy Disk

Type of Floppy Disk to Use

The floppy disks that you use in your 3B2 computer should be:

- Double-density
- Double-sided
- 96 tracks per inch
- Soft sectored
- Free of defects.

Reading and Writing

See Chapter 4 in this manual or the *UNIX System V Release 3 System Administrator's Guide* for the different uses of floppy disks and procedures to read or write on them. Before new floppy disks can be written on, they must be formatted. Use the **format** subcommand under the System Administration Disk Management Menu, or use the **fmtflop** command.

Maintenance

Cleaning Your Floppy Disk Drive

It is recommended that you clean your floppy drive after every 100 hours of use with the indicator light on, or whenever you remove a floppy disk that has magnetic oxide residue. A special floppy disk that cleans floppy drives is available wherever computer supplies are sold.

Floppy Disk Replacement

Floppy disks become worn after extended periods of use. This may cause data stored on the floppy disk to be lost. Copy and replace important floppy disks after extended use. As a general rule, floppy disks supplied by AT&T should be replaced after 170 hours of use. If you use floppy disks supplied by other sources, follow the recommendation of the manufacturer.



Appendix C: Using SCSI Cartridge Tapes

Tape Operations

Precautions

Note: Proper care and use of cartridge tapes should be done in accordance with all the manufacturer's recommendations, which are supplied with the cartridge tapes.

When handling cartridge tapes, observe the following precautions:

1. **DO NOT** touch the tape surface or drive rollers.
2. Keep cartridge tapes away from X-rays and magnetic field devices, direct sunlight, excessive moisture, or extreme temperature changes.
3. When a tape is brought into your computer operating area, do not use it immediately. The temperature of the cartridge tape should be near the temperature of the tape drive. As a rule of thumb, wait 1 hour for each hour the tape has been outside your computer area, up to a maximum of 8 hours.
4. Always make sure a tape is write protected (arrow at SAFE position) unless data is to be written on the tape.
5. **DO NOT** attempt to use a damaged cartridge tape, this may result in damage to the tape drive.
6. Store the cartridge tapes in their protective cases, preferably at room temperature.

Inserting Cartridge Tapes

Warning: To avoid equipment damage due to static electricity, be sure to touch the cabinet of the 3B2 computer before inserting the cartridge tape into the tape drive.

Remove any cartridge tape that may be in the tape drive before power is applied to your computer. The following steps describe how to insert a cartridge tape into the SCSI Cartridge Tape Drive:

1. Hold the cartridge tape so the tape door opening is facing to the left. (See Figure C-1.)
2. Place the cartridge tape into the front loading slot.
3. Push the cartridge tape into the drive until the latching mechanism operates (Figure C-2).
4. Release the cartridge and it will spring forward slightly and stop just outside the front of the drive.

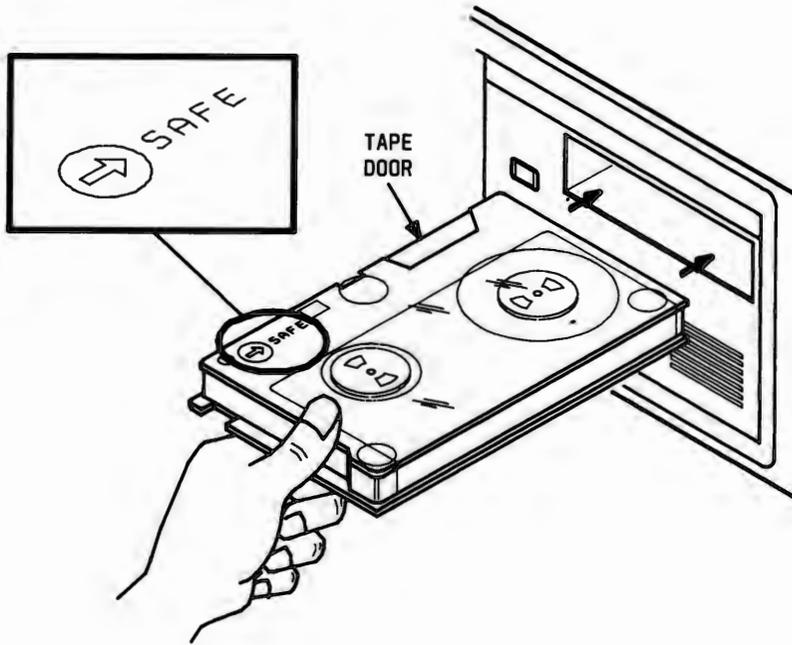


Figure C-1: Positioning a Cartridge Tape

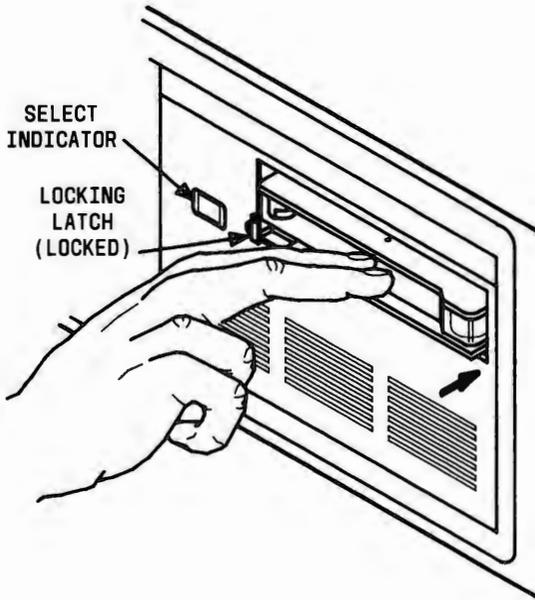


Figure C-2: Inserting a Cartridge Tape

The cartridge tape is now locked into place. After loading a cartridge tape, the drive moves the tape to the beginning of tape position.

Removing Cartridge Tapes

The following steps describe how to remove a cartridge tape from the SCSI Cartridge Tape Drive:

1. Make sure the "Select" indicator on the cartridge tape drive is off before you remove a cartridge tape.

Caution: Removing a cartridge tape while the indicator is on may result in lost data.

2. To remove the cartridge tape, push the cartridge into the tape drive to release the locking mechanism. You will hear an audible "click" when the latch releases (Figure C-3).
3. Carefully pull out the cartridge tape until it clears the tape assembly.
4. Remove the cartridge tape and return it to its plastic case.

Types of Cartridge Tape to Use

A SCOTCH^{*} DC600A data cartridge or equivalent is recommended.

* Registered trademark of 3M

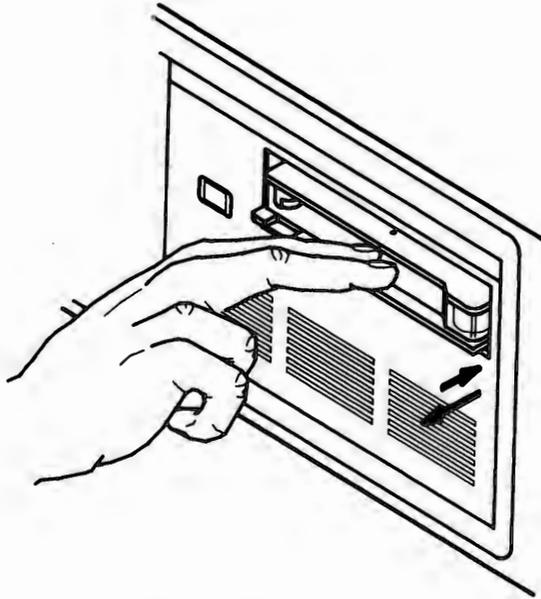


Figure C-3: Removing a Cartridge Tape

SCSI Tape Maintenance

The following is a list of suggested preventive maintenance activities that apply to the SCSI Cartridge Tape Drive and associated tapes.

Tape Drive

- Clean the tape head once every 24 hours of use or after a reported tape error. Use the “Cleaning Procedure” in this section.

Note: The tape head may need cleaning more frequently if new tapes are being used.

- Inspect the tape head for any buildup or wear that could cause tape damage.

Note: Demagnetizing of the tape head and associated tape path is not required on this unit.

Cartridge Tape Care

- Store in tape container when not being used.
- Keep tapes in clean environment.
- Keep written tapes away from strong magnetic fields, such as large motors or microwave ovens.

Cleaning the Tape Head

Periodic cleaning of the head assembly is the only preventive maintenance required on the SCSI Cartridge Tape Drive. The head needs to be cleaned after every 24 hours of actual tape operation. However, you may need to clean the head more often if the read/write errors increase abnormally fast or if the number of errors varies greatly from pass to pass. When a new tape is used, the head should be cleaned after the first two hours of use.

Establishing a Cleaning Schedule

Since the SCSI Cartridge Tape Drive will be used primarily as a backup device, the cleaning schedule should be based on the time the tape module is used during backup and how often backup is performed.

Appendix C: Using SCSI Cartridge Tapes

For example, assume a 3B2 computer has six file systems, and each file system takes approximately 15 minutes to back up. If we also assume that backup is performed twice a week, this means the tape drive would be used 3 hours each week, and that the head should be cleaned every 8 weeks.

If a new tape is used for each file system in this example, the head should be cleaned in the first week and every 8 weeks thereafter.

Cleaning Procedure

The following materials are required to clean the head assembly:

- Lintless cotton swab
- FREON* TF tape cleaner.

Warning: Clean only the tape head and tape cleaner blades with the FREON cleaner. DO NOT clean the capstan with the head cleaning solution as severe damage may result.

To clean the tape drive, do the following:

- Step 1: If a cartridge tape is in the tape drive, remove the cartridge.
- Step 2: Turn off the 3B2 computer.
- Step 3: Push the carriage plate until the tape load latch triggers.
- Step 4: Locate the head assembly (Figure C-4).

* Registered trademark of E. I. Dupont de Nemours & Co., Inc.

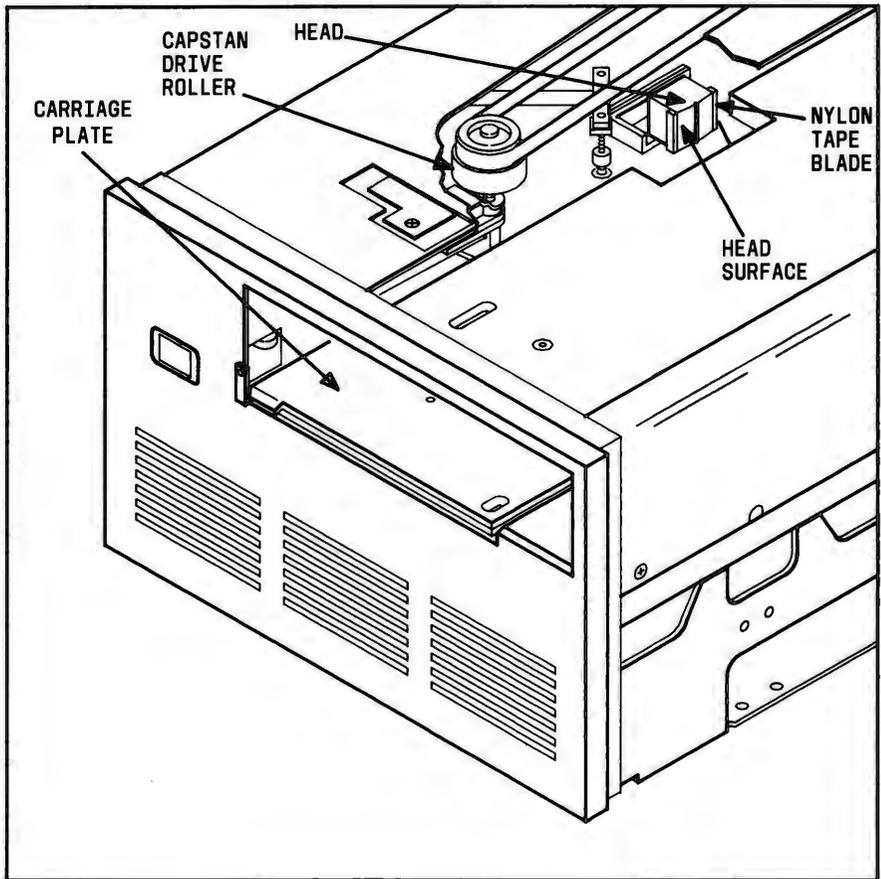


Figure C-4: Cleaning a Cartridge Tape Drive

- Step 5: Slightly moisten a swab with the cleaning solution, and rub the swab up and down across the surface of the head.
- Step 6: Next, rub the swab along the white nylon tape blade on both sides of the head.

Appendix C: Using SCSI Cartridge Tapes

- Step 7: If the capstan roller needs cleaning, use a clean cotton swab moistened with water only.
- Step 8: Wait approximately 10 seconds for the wet surface to dry.
- Step 9: Push the carriage plate in until it stops and the latch is released.
- Step 10: Turn the 3B2 computer back on.

Appendix D: Setting Up a New Console

Before connecting the new console terminal to the computer, ensure that your computer is shut down properly and that the following parameters are set:

- Full duplex
- 8-bit ASCII interface
- Parity of "none" or "space" (depending on the terminal)
- Baud rate of 9600 (initially)

Note: There are many combinations of baud rates for the "CONSOLE" and "CONTTY" ports. Some of the combinations will NOT work; therefore, the proven baud rate combinations of 1200, 4800, and 9600 are suggested.

- If XON/XOFF software handshaking is an option, set it to DC1/DC3.

Note: Your terminal screen may show other options that you need to set. Set these options according to your application; operation of the 3B2 computer does not depend on these settings.

Double-check your settings. If your terminal is one of the following, you can check your settings by comparing your screen to the appropriate figure below:

AT&T 4410	see Figure D-1
AT&T 4425	see Figure D-2
AT&T 5620 DMD	see Figure D-3
AT&T 610 BCT	see Figure D-4
AT&T 615 MT	see Figure D-5
AT&T 620 MTG	see Figure D-6
AT&T 630 MTG	see Figure D-7
AT&T 510D Personal Terminal	see Figure D-8
AT&T 510A Personal Terminal	see Figure D-9

1.1 OPTIONS	
SPEED	9600*
RETURN KEY	CR
PARITY	NONE*
REC' VD LF	INDEX
DUPLEX	FULL*
CURSOR	BLINK
SCREEN	80
AUTOWRAP	ON
TRANSPARENT	OFF
KEY CLICK	OFF
PROGRAMMABLE FUNCTION KEYS	
f1
f2
f3
f4
f5
f6
f7
f8

* REQUIRED VALUES

Figure D-1: Signal Protocols for the AT&T 4410 Terminal

CURRENT OPTIONS

Speed 9600 *	Return Key cr	Transmission char
Duplex full *	Newline On LF no	Line Send keyed
Send Parity space *	Autowrap on	Block Send all
Check Parity no	Cursor	Send Form cursor
132 Columns off	Keyclick off	Edit Keys local
Memory Access scroll	Margin Bell	Send Attributes no
Clock async	Dialer no*	Auto Answer no
Wait For DSR no *	Answer On Connect no*	VT52 no
"Enter Key" <input type="text" value="←"/>	Field Separator <input type="text" value="▶"/>	Block Terminator ex

Answerback

AUXILIARY PRINTER OPTIONS

Printer Model	FLOW CONTROL DC1DC3*
Speed	ALARM

PREVIOUS
FIELD

NEXT
FIELD

STEP

DEFAULT
VALUES

SAVED
VALUES

SAVE
ALL

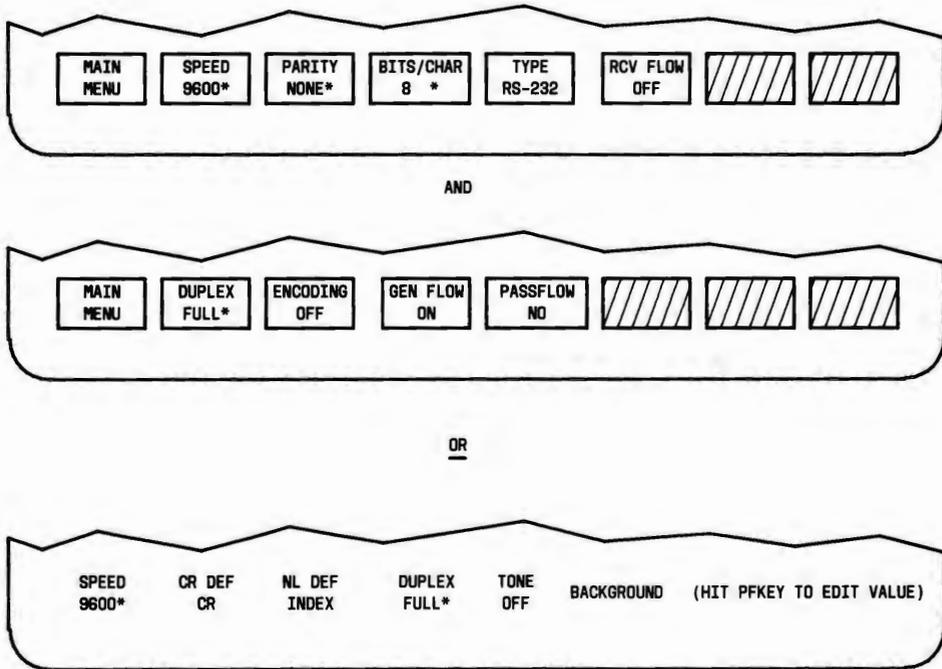
PRINT
SCREEN

MONITOR
MODE

* REQUIRED VALUES

Figure D-2: Signal Protocols for the AT&T 4425 Terminal

Appendix D: Setting Up a New Console



* REQUIRED VALUES

Figure D-3: Signal Protocols for the AT&T 5620 DMD Terminal

OPTIONS SETUP

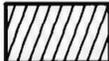
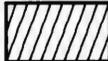
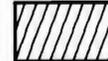
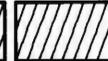
COMMUNICATIONS		USER PREFERENCES	
I/O CARD	IDLE	CARTRIDGES	USED
SPEED	9600 *	COLUMNS	_80_
SEND PARITY	NONE *	SCROLLING	JUMP
CHECK PARITY	_NO_	REVERSE VIDEO	_NO_
LOCAL ECHO	_OFF *	VOLUME	_4_
MONITOR MODE	_OFF	KEY CLICK	_OFF
AUTOWRAP	_ON_	CURSOR TYPE	BLCK
NEWLINE ON LF	_NO_	CURSOR BLINK	_NO_
RETURN KEY	_CR_	LABELS	_ON_
ENTER KEY	<...>		

DONE 610/BASIC-1.1



* REQUIRED VALUES

Figure D-4: Signal Protocols for the AT&T 610 BCT Terminal

OPTIONS SETUP			
COMMUNICATIONS		USER PREFERENCES	
I/O CARD	IDLE	CARTRIDGE	USED
SPEED	9600 *	COLUMNS	_80_
SEND PARITY	NONE *	REVERSE VIDEO	_NO_
CHECK PARITY	_NO_	VOLUME	_4_
LOCAL ECHO	OFF_ *	KEY CLICK	OFF_
ENCODING	OFF_	SCROLLING	JUMP
GENERATE FLOW	_ON_	SCROLL SPEED	MED_
RECEIVE FLOW	OFF_		
PASS FLOW	YES_		
MONITOR MODE		CURSOR TYPE	BLCK
AUTOWRAP	_ON_	CURSOR BLINK	_NO_
NEWLINE ON LF	_NO_	LABELS	_ON_
RETURN KEY	_CR_		
ENTER KEY	CR..		
DONE		VERSION	
			
			

* REQUIRED VALUES

Figure D-5: Signal Protocols for the AT&T 615 MT Terminal

OPTIONS SETUP			
COMMUNICATIONS		USER PREFERENCES	
I/O CARD	IDLE	REVERSE VIDEO	_NO_
SPEED	9600 *	VOLUME	_4_
SEND PARITY	NONE *	KEY CLICK	_OFF
CHECK PARITY	_NO_	MOUSE MOVEMENT	_1:1
LOCAL ECHO	_OFF *	MOUSE LEFT/RIGHT	_R_
ENCODING	_OFF	PRINTER TYPE	NONE
GENERATE FLOW	_ON_	PRINTER ALARM	_NO_
RECEIVE FLOW	_YES	PRINTER SPEED	1200
PASS FLOW	_YES	PRINTER PARITY	NONE
MONITOR MODE	_OFF	CURSOR TYPE	BLCK
AUTOWRAP	_ON_	CURSOR BLINK	_ON_
NEWLINE ON LF	_NO_	LABELS	_ON_
RETURN KEY	_CR_		
ENTER KEY	<***		
TO EXIT: PRESS THE CTRL AND SETUP KEYS			620/BASIC

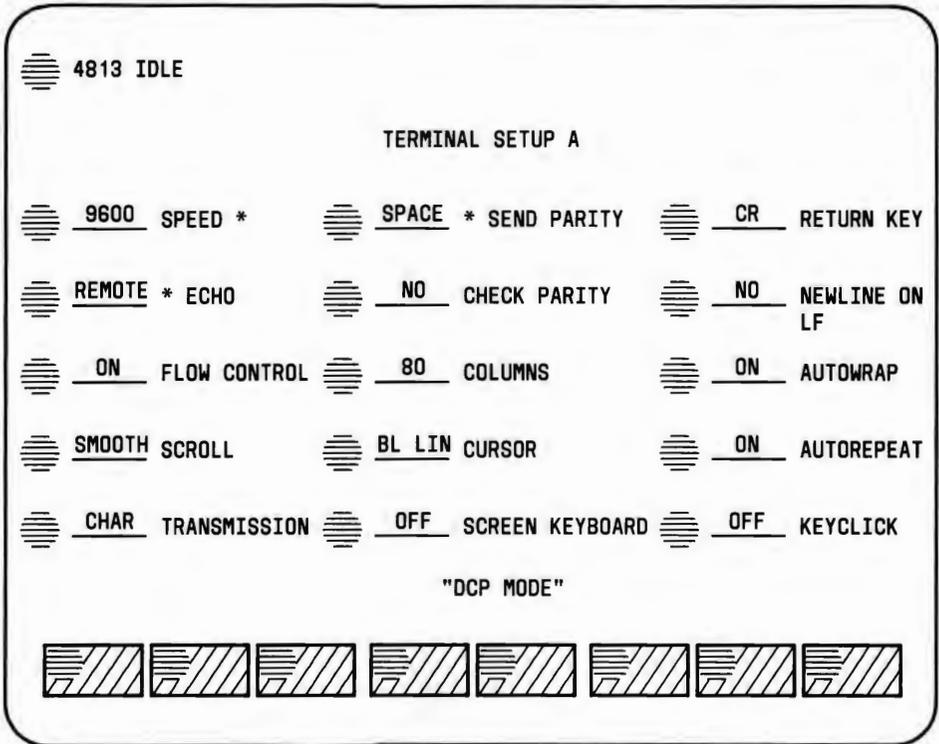
* REQUIRED VALUES

Figure D-6: Signal Protocols for the AT&T 620 MTG Terminal

OPTIONS SETUP			
COMMUNICATIONS		USER PREFERENCES	
SPEED	9600*	BACKGROUND	DARK
PARITY	NONE*	CURSOR	NO BLINK
BITS/CHAR	8*	CONTROLS	VISIBLE
RCV FLOW	OFF	WINDOWS	ENHANCED
LOCAL ECHO	OFF*	BUFFER ENABLE	YES
ENCODING	OFF	REFRESH RATE	60 Hz
GENERATE FLOW	ON		
RETURN KEY	CR	KEY CLICK	OFF
RECEIVED NEWLINE	LF	VOLUME	4
FONT SIZE	LARGE	REPEAT RATE	15 cps
LAYERS WINDOW COL	80		
LAYERS WINDOW ROW	24	MOUSE ACCELERATION	OFF
NON-LAYERS WIN. COL	80	MOUSE HAND	RIGHT
NON-LAYERS WIN. ROW	60		
FIXED NON-LAYERS		PRINTER SPEED	9600
WIN.	YES	PRINTER PARITY	NONE
		PRINTER BITS/CHAR	8
		PRINTER EXPAND TABS	YES
		PRINTER FILTER	
		ESCAPES	YES

* REQUIRED VALUES

Figure D-7: Signal Protocols for the AT&T 630 MTG Terminal



* REQUIRED VALUES

Figure D-8: Signal Protocols for the AT&T 510D Personal Terminal (Digital)

IDLE	LINE 2: IDLE	FR NOV 1 1986 10:15A	
COMMUNICATION SETUP			
OFF MODEM AUTOANSWER	3 RINGS ON AUTOANSWER	TCHTON PHONE SIGNALLING	NONE* PRINTER
** MANUAL DATA CALL & AUTOANSWER **		** EIR PRINTER/DATA PORT **	
1200 SPEED	NO CHECK PARITY	9600* SPEED	NO* CHECK PARITY
FULL DUPLEX	CR RETURN KEY	FULL* DUPLEX	CR RETURN KEY
XONXOF FLOW CONTROL	NO NEWLINE ON LF	XONXOF FLOW CONTROL	NO NEWLINE ON LF
EVEN SEND PARITY	ON AUTO-WRAP	SPACE* SEND PARITY	ON AUTO-WRAP
----Exit saves setup----			

* REQUIRED VALUES

Figure D-9: Signal Protocols for the AT&T 510A Personal Terminal (Analog)

Connect the Computer and Console Terminal

Once you have adjusted the signal protocols on your terminal, you are ready to connect the terminal to the computer. Use one of the shielded cables provided with the 3B2 computer.

Warning: Be sure that you turn off the power to the terminal before you connect it to your computer.

Note: You must connect your console terminal to the computer before connecting other terminals or peripheral devices.

- Step 1: Connect the end of the cable with the ground lead to the console jack on the back of the computer by doing the following: align the telephone-style plug on the cable with the console jack on the computer and push it in until you hear a click (Figure D-10).



Figure D-10: Console Terminal Connected to the Computer

Appendix D: Setting Up a New Console

- Step 2: Connect the ground lead to the metal tab below the console jack.
- Step 3: If your terminal is an AT&T model, attach a male RS-232-C adapter to the other end of the cable.
- Step 4: Connect the RS-232-C adapter to the terminal by aligning the adapter with the connector on the back of the terminal and pushing it in.

Note: Be sure to connect the cable to the correct jack on the terminal. If you have an AT&T terminal, use the MODEM jack (not the one labeled AUX). If you are not using an AT&T terminal, see your terminal manual for instructions on cable connections.

Fasten the RS-232-C adapter firmly to the terminal by tightening both captive screws on the adapter.

Now you are ready to turn on your 3B2 computer.

Appendix E: Pinouts

The following figures illustrate the pinouts for the cables and connectors that are delivered with your computer.

Appendix E: Pinouts

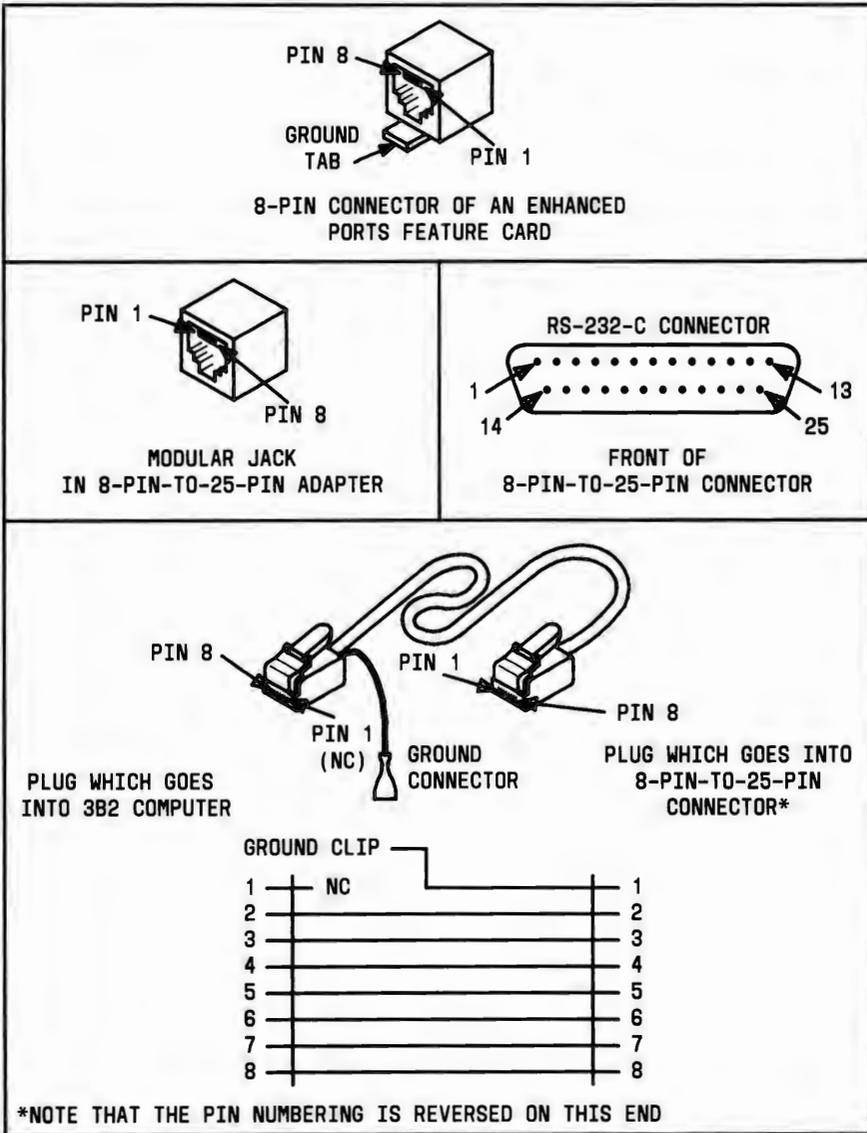


Figure E-1: 3B2 Computer Connectors

8-PIN MODULAR JACK DEFINITION			
Pin	Lead	Direction	Explanation
1			Reserved
2	CTS	In	Clear to Send
3	TXD	Out	Transmit Data
4	DTR	Out	Data Terminal Ready—This signal, when active, connects the modem to the telephone line or denotes to a terminal or printer that the expansion port is ready to begin sending/receiving data.
5	RXD	In	Receive Data
6	DCD	Out	Data Carrier Detect—This signal is active when the modem detects a signal capable of being demodulated or the terminal/printer is ready to accept/transmit data.
7	SG		Signal Ground
8	RTS	In	Request to Send

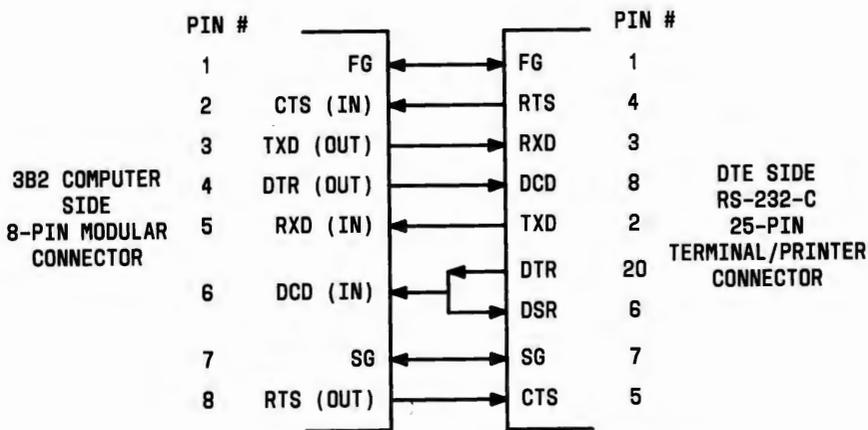
Note 1: These signals are RS-232-C compatible operating at 12-volts positive or negative.

Note 2: Frame ground (FG) and SG are physically the same when the shield of the port cable ground lead is attached to the computer.

Note 3: FG is made through the ground clip/tab connection.

Note 4: CTS and RTS are not available on the CONSOLE port, connty port, or PORTS cards.

Figure E-2: Definition of an 8-Pin Modular Jack (EPORTS)



EIA STANDARD FOR DATA TERMINAL EQUIPMENT (DTE)

Figure E-3: Pinouts of 8-Pin Modular Jack to 25-Pin RS-232-C Terminal/Printer Male Adapter (DTE)

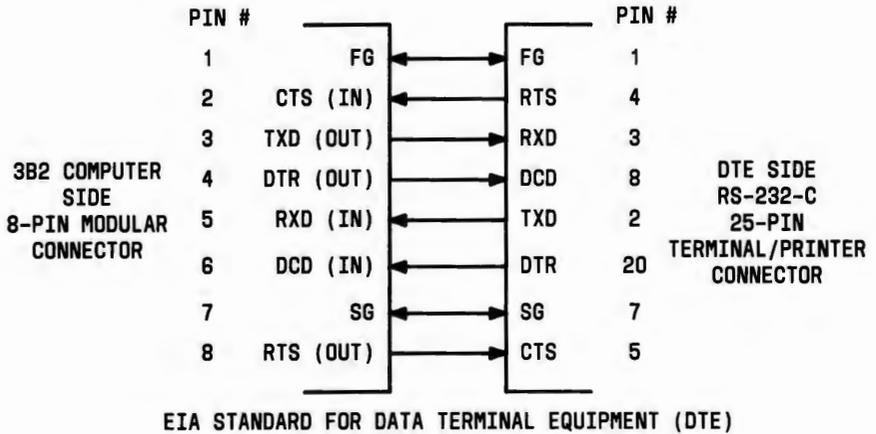


Figure E-4: Pinouts of 8-Pin Modular Jack to 25-Pin RS-232-C Terminal/Printer Female Adapter (DTE)

Appendix E: Pinouts

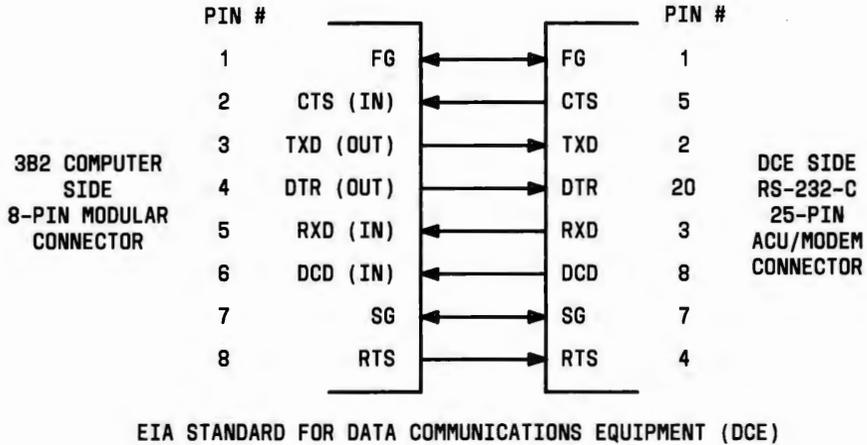


Figure E-5: Pinouts of 8-Pin Modular Jack to 25-Pin RS-232-C Automatic Call Unit (ACU)/Modem Adapter (DCE)

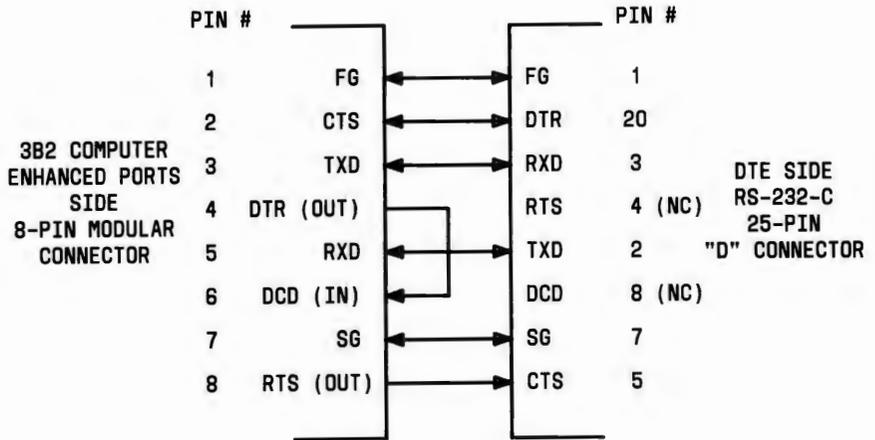


Figure E-6: Pinouts of 8-Pin Modular Jack to 25-Pin RS-232-C DTR Hardware Flow Control Adapter

Appendix E: Pinouts

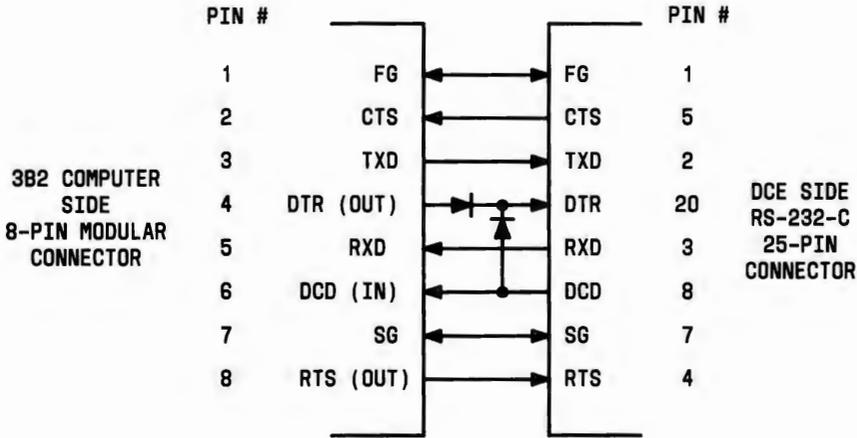


Figure E-7: Pinouts of 8-Pin Modular Jack to 25-Pin RS-232-C Remote Console Adapter

Appendix F: Air Filter Maintenance

Inspect the air filter located in the door of the rear card access computer (3B2/600, 3B2/700, and 3B2/1000 computers) every 60 days. Wash the air filter in water with a mild dish washing detergent when it becomes dirty. Rinse in cool water, and allow it to dry before reinstalling it. See your AT&T Sales Representative or authorized dealer to order replacement filters. The ordering comcode is 845755610.



Glossary

The following is a glossary of terms used in this document.

8-bit ASCII interface

An interface standard that allows 8-bit coded data to be transmitted between computers or between a computer and a terminal.

ASCII Code

American Standard Code for Information Interchange — An 8-bit code that is used when transmitting data between computers or between a computer and a terminal.

asynchronous terminal

A terminal that transmits and receives characters at irregular intervals.

baud

A unit of measurement for data transmission speed, such as bits per second.

bit

One binary digit (0 or 1).

block

One or more bytes treated as a unit for reading and writing data, usually 512, 1024, or 2048 bytes.

boot or bootstrap

To perform a routine that starts the UNIX operating system running a computer. The main steps are loading the UNIX operating system from the hard disk into main memory, configuring the system, and starting the system running.

byte

8 bits — The equivalent of one character of text. See "Kbyte" and "Mbyte."

cartridge tape

A cartridge containing magnetic tape used for storing information.

cartridge tape drive

A mass storage device that uses removable cartridge tapes.

command

A word or string of letters and/or special characters that tells the computer what to do.

Glossary

command line

A set of commands and arguments that tell the computer to perform one or more processing tasks. Commands always begin immediately after the shell prompt and are separated with semicolons. They can continue for several (terminal) lines, up to 256 characters.

console terminal

The terminal from which your 3B2 computer is controlled. The console terminal is connected through the CONSOLE jack on the back of the computer. This terminal is normally used by the system administrator.

contty

Name of the unlabeled serial jack (located next to the CONSOLE jack) located on the back of a 3B2 computer.

default

A fixed value that is used when a value is not assigned to a variable.

diagnostics

A series of tests your 3B2 computer performs to check its operation.

directory

A special type of file containing the names of other files (including directories) and a pointer to a control block used to access these files.

disk

Abbreviated name for a floppy disk.

DUART

Dual Universal Asynchronous Receiver Transmitter — Two integrated circuits that each perform serial-to-parallel and parallel-to-serial conversion of digital data.

Electronics Industries Association

An organization that maintains standards for the electronic industry.

encrypt data

To scramble data so that it cannot be read without the key.

EPORTS

Enhanced Peripheral Ports Controller (EPORTS) card containing eight RS-232-C ports. This card is the principal 3B2 computer-to-peripheral serial interface.

feature card

Any add-on circuit board inside a 3B2 computer that expands its capabilities.

file

A collection of data that has a name.

file system

A file arrangement on a segment of hard disk that can be mounted or unmounted. (Mounting a file makes it available to the user.)

firmware

Microprograms, usually in Read Only Memory (ROM).

firmware state

The operating state of the 3B2 computer that allows you to make a floppy key, run diagnostics, change the firmware password, dump the system image to a floppy disk or hard disk, test hardware and firmware, and display the system generic version.

floppy disk

A flat, flexible disk on which programs and data can be stored.

floppy disk drive

A device that allows your 3B2 computer to read and write information to and from floppy disks.

floppy key

A floppy disk used to reset NVRAM to a default state when your firmware is damaged or when you forget your firmware password.

formatted floppy

Removable storage media that has been subdivided by a computer program so that data can be read from and written to those media.

full duplex terminal

A terminal that can send and receive data independently and simultaneously.

hard disk (drive)

A device used to store large amounts of data in a short amount of time.

hardware

The physical components of a computer.

inode

A file control block that contains file information such as the number of directory entries linked to the inode (information node), list of data blocks, size, etc. The inode tunable parameters specify how many inode table entries to allocate.

initialize

See "boot."

K or Kbyte or Kilobyte

Abbreviations for the number 1024. The "K" comes from kilo, meaning one thousand. Therefore, one Kilobyte or Kbyte equals 1024 bytes. A full 8½-inch by 11-inch page contains about 2000 characters or 2 Kbytes of data.

login

A string of letters and/or numbers that lets the 3B2 computer know with whom it is communicating.

M or Mbyte or Megabyte

Abbreviations for million. One Mbyte or megabyte is 2^{20} (1,048,576) bytes when you are considering Random Access Memory. However, it is 10^6 bytes when you are considering SCSI hard disks.

modem

A device used to transmit digital data over voice telephone lines. (The word "modem" derives from MODulate and DEModulate.)

modular connector

Modular telephone jacks or plugs. The 4-pin modular connectors are used for telephone connections, and 8-pin modular connectors are used for data connections.

mouse

A device connected to a terminal that enables you to move a cursor or enter commands without typing them on the keyboard.

multiuser state

The operating state of the 3B2 computer that allows more than one person to use the computer simultaneously. Also called "run level 2."

NVRAM

Nonvolatile RAM — A type of RAM used to save essential information that would otherwise be lost when power is removed.

operating state

An "environment" (defined internally by the computer) in which the computer must be running for specified functions to be performed. The 3B2 computer has seven operating states (0-6): powerdown state (0), single-user state (1), multiuser state (2), two unassigned states (3 and 4), firmware state (5), and reboot state (6). Also called "run levels."

parallel

More than one bit at a time.

parity

A method of detecting certain data transmission errors.

partitioning

A way of dividing a large memory range into more manageable pieces to facilitate structuring of a device. Device partitions are applicable to floppy disks, cartridge tapes, and hard disks (NOT main memory).

password

Passwords are encrypted strings of characters that a user must enter to identify himself or herself to the computer. Passwords can be any mixture of numbers, special characters, or alpha characters (uppercase or lowercase).

peripheral devices

Devices such as terminals, printers, or modems that can be connected to a computer.

port

The architectural term for a connection between a computer and an input/output device (such as a terminal) through which data is transferred. The physical connection between the computer and another device is made through a modular jack on the computer.

PROM

Programmable Read Only — A type of ROM that can be programmed.

prompt

A symbol (or a string of letters and/or numbers) that the computer prints on the terminal screen as a signal that it is waiting for input (such as a login or a command) from you. The \$ is the UNIX system shell default prompt.

queue

A list of the processes and/or data (in sequential order) that are being saved for processing.

RAM

Random Access Memory — A type of memory in which you can directly access any location in memory.

reboot

Perform a routine that restarts the UNIX operating system. The main steps are loading the UNIX operating system from the hard disk into main memory (present contents are overwritten), configuring the system, and restarting the system.

removable storage media

Floppy disks and cartridge tapes.

ROM

Read Only Memory — A type of memory chip that can be read but cannot be written. It is used in microcomputers that always execute the same program.

root directory

The highest ranked directory in a UNIX operating system file system. Root is the directory in which all other file systems are created. It is represented by the symbol `/`.

root login

The login ID that you must use when you want to do system administration tasks or work that requires you to shut down the machine. Also called "super-user login."

RS-232-C

The standard serial interface adopted by the Electronics Industries Association.

run level

See "operating state."

serial

One bit at a time.

shell

A UNIX system program that processes communication between a user and a 3B2 computer. The shell is also known as a command language interpreter because it translates user commands into a language understandable by the computer.

software

Programs that enable a computer to perform its functions.

spooling

The process of controlling jobs (through scheduling, queuing, etc.) to be done by the computer.

spool directory

A directory containing files that are to be transmitted over a network.

super user

See "root login."

System Administration menus

A special set of menus listing interactive commands that help you perform system administration tasks on a 3B2 computer.

system board

The card holding the main logic circuits that comprise the processing center of a computer.

user terminal

A device with input capability similar to that of a typewriter allowing you to communicate with a computer. This terminal is normally connected through an EPORTS or PORTS card. Refer to "console terminal."

UNIX system

A multiuser, multitasking operating system developed by AT&T.
(Refer to "shell.")



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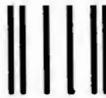
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