TRADEMARKS

The following is a listing of the trademarks that are used in this manual:

- FREON — Registered trademark of E.I. DuPont de Nemours & Co., Inc
- SCOTCH — Registered trademark of 3M
- UNIX — Registered trademark of AT&T
- WE — Registered trademark of AT&T

ORDERING INFORMATION

Additional copies of this document can be ordered by calling

Toll free: 1-800-432-6600 In the U.S.A.

1-800-255-1242 In Canada

Toll: 1-317-352-8557 Worldwide

OR by writing to:

AT&T Customer Information Center
Attn: Customer Service Representative
P.O. Box 19901
Indianapolis, IN 46219

Table of Contents

List of Figures

List of Figures

Introduction

This manual tells you how to set up and operate your AT&T 3B2/300, 3B2/310, or 3B2/400 Computer. 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 the manual a valuable reference to keep handy.

Note: Do not attempt to initially set up your computer until you have read the *AT&T 3B2 Computer Read Me First* manual that came with your 3B2 Computer.

This is one of several manuals accompanying your computer. They 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. When you know how to use the manuals, you can easily find an answer to any technical question. Separate packing lists have been included with your computer and with the UNIX* Operating System software. These packing lists include a complete list of all documentation provided with your computer hardware and software.

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 reseller or lessor for information regarding any hardware or software packages that are not AT&T products.

This chapter describes the standard hardware, software, and firmware of the 3B2 Computer. This information is followed by an explanation of key concepts and terminology used in this manual.

Note: If this is your first introduction to computers, you should first read "Key Concepts Used in This Manual." If you are an experienced computer user, you can skip this information.

---

* Registered Trademark of AT&T

Chapter 2, "Getting Started," tells you how to turn on your computer, load the operating system, and prepare the computer for use.

Chapter 3, "Security," tells you how to protect information stored on your 3B2 Computer from unauthorized access.

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, "Feature Card Installation and Removal in the 3B2/300 Series and 400 Computers," contains the procedures for installing and removing feature cards from the 3B2/300, 3B2/310, and the 3B2/400 Computers.

Chapter 7, "Clearing Trouble," contains the information you need to correct the more common operating problems.

Appendices A through F contain supplementary information on topics such as: use of floppy diskettes, use of cartridge tapes, cable connections, etc.

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

Computer Features

The 3B2/300 Computer is almost identical with the 3B2/310 Computer shown in Figure 1-1. These computers are light and compact and are easily handled by one person. You can set either of these computers on top of a desk or if you want to conserve work space, you can place them on the floor. A vertical stand is available if you prefer this option.

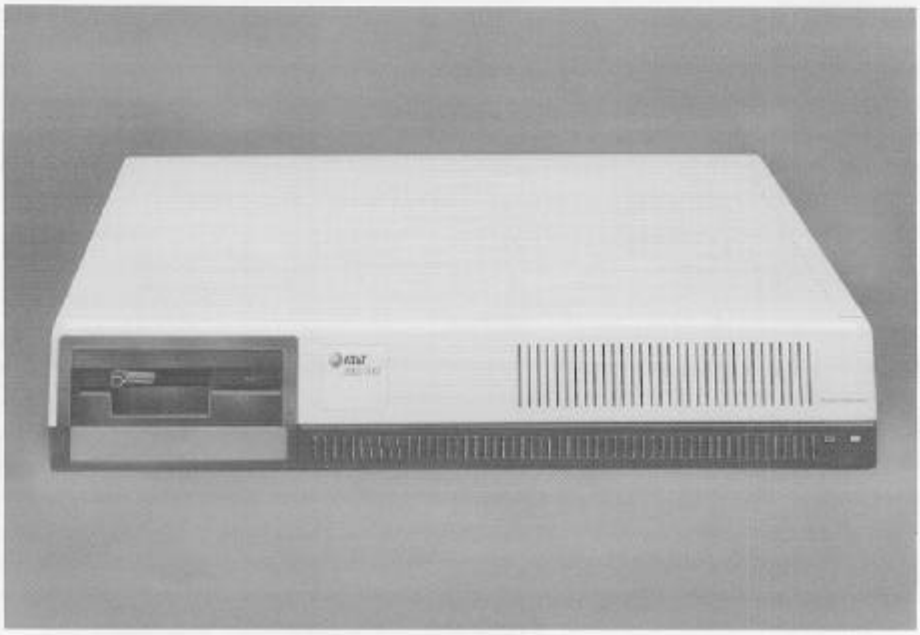

Figure 1-1: AT&T 3B2/310 Computer

The 3B2/400 Computer, shown in Figure 1-2, is about twice as tall as the 3B2/310 Computer. It is also heavier and is best handled by two people.

Figure 1-2: AT&T 3B2/400 Computer

Each of these 3B2 Computers runs the UNIX System V Operating System. This operating system software is packaged separately from your computer. Procedures in Chapter 2, "Getting Started," of this manual tell you how to load your operating system.

The 3B2 Computer was specifically designed to be used with AT&T terminals. However, you can use almost any kind of terminal with your 3B2 Computer. (See "Set up the Console Terminal" in the *AT&T 3B2 Computer Read Me First* manual for details.)

A variety of applications, including office automation, engineering research, and scientific research, are supported by the standard hardware and software supplied with the 3B2 Computer. In addition, you can configure your 3B2 Computer for many different applications by making use of the wide

variety of optional hardware and software. The optional hardware includes terminals, printers, networking hardware, modems, hard disk drives (in a variety of sizes), a memory expansion board for additional main memory, and feature cards with extra ports for adding peripheral devices. Optional software includes programming languages, workbenches, networking software, spread sheets, word processing packages, and relational data base application packages. For more information about optional hardware and software, see your AT&T Service Representative or authorized dealer.

Standard Hardware

All 3B2 Computers are equipped with the following standard hardware:

- A nonvolatile time-of-day clock. (Nonvolatile means that the clock is battery powered; it continues to run even when the computer is turned off.)
- A 5¼-inch floppy diskette drive with 720 kilobytes of storage.
- Memory.
  - Up to 2 megabytes of Random Access Memory (RAM) standard, expandable to 4 megabytes.
  - Nonvolatile RAM (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 has a battery as a secondary power source to maintain the information in memory in the event of a power failure.

3B2/300 Computer

In addition to the standard hardware previously described, the 3B2/300 Computer is equipped with the following:

- A 32-bit WE* 32100 microprocessor running at 8.2 megahertz
- One Winchester hard disk drive
- A 4-slot backplane.

* Registered trademark of AT&T

3B2/310 Computer

In addition to the standard hardware previously described, the 3B2/310 Computer is equipped with the following:

- A 32-bit WE 32100 microprocessor running at 10 megahertz
- A WE 32106 Math Accelerator Unit
- One Winchester hard disk drive
- A 4-slot backplane with at least one ports card.

3B2/400 Computer

In addition to the standard hardware previously described, the 3B2/400 Computer is equipped with the following:

- A 32-bit WE 32100 microprocessor running at 10 megahertz
- A WE 32106 Math Accelerator Unit
- One or two Winchester hard disk drives
- A cartridge tape drive
- A 12-slot backplane equipped with at least one ports card and one tape controller or one SCSI (Small Computer System Interface) Host Adapter Card.

Standard Software

All 3B2 Computers run the UNIX 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 where information is stored. The operating system is delivered separately on floppy diskettes. You will have to install it on your computer.

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 you would need to use printer spooling capabilities are collected in the Line Printer Spooling Utilities package. Like the operating system, utilities packages are delivered on floppy diskettes. Therefore, they must be installed on the hard disk before you can use them. They can be removed from the hard disk when you are finished using them. (Instructions for installing and removing Utilities are in Chapter 5, "Software Utilities Packages.")

The UNIX Operating System

The UNIX Operating System 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 advisory file and record locking
- Enables you to partition and format floppy diskettes
- Enables you to map out bad blocks (damaged areas) on the built-in hard disk
- Turns off the computer with a software-controlled "power shutdown" process that ensures system integrity.

For more information on the UNIX Operating System, refer to the *UNIX System V User's Guide* and the *UNIX System V System Administrator's and User's Reference Manual*.

Software Utilities Packages

For brief descriptions of each package and instructions on installing utilities packages, see Chapter 5, "Software Utilities Packages."

For further information on the utilities packages, see the *User's Guide* and the *System Administrator's Guide*.

Standard Firmware

Firmware is a set of instructions permanently stored in the computer's Read Only Memory (ROM) chips. These instructions are used to execute two kinds of tasks: those that are done automatically and those that are done interactively. Automatic tasks, like closing files, are performed when the computer is turned off. Interactive tasks are performed when you run diagnostics.

Firmware instructions are stored in ROM (rather than on the built-in hard disk, where other software instructions are stored) because of the special functions they perform. Although the UNIX System controls most hardware and software functions of the computer, it cannot execute itself; other instructions are needed to start the operation of the UNIX System. Instructions to the computer stored in ROM perform this function.

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

- On the initial powerup, performs automatic diagnostic tests and conditions the computer for loading the operating system.
- On subsequent powerup, performs automatic diagnostic tests and automatically executes 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-configuration software can function properly.
- Provides a "floating boot" feature that allows an experienced user to designate a boot file (other than the default boot value on the hard disk) from the firmware state.

Optional Hardware and Software

You can configure your 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, cartridge tape drives, networking hardware, modems, extra hard disk drives (in a selection of sizes), an expansion board for main memory, and a board with extra ports for additional peripherals. 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 information is for first-time or novice users of computers who may be unfamiliar with some of the terms and concepts this manual uses. The first part describes the internal structure of the 3B2 Computer, particularly the components of the system board. Second, the structure and function of firmware are described to help you understand the software setup. The third part describes the operating states (also known as "run levels" or "init states") of the computer.

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 depressed 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 section alerts you to several such potentially confusing situations.

Internal Structure of the 3B2 Computer

The 3B2/300 and 3B2/310 Computers have five major components; the 3B2/400 Computer has six. These are: Winchester hard disk drive, floppy diskette drive, power supply, system board, and Random Access Memory (RAM) board; and only in the 3B2/400 Computer, a cartridge tape drive. Figure 1-3 illustrates the components in the 300 series computers. Figure 1-4 illustrates these components in a 3B2/400 Computer.

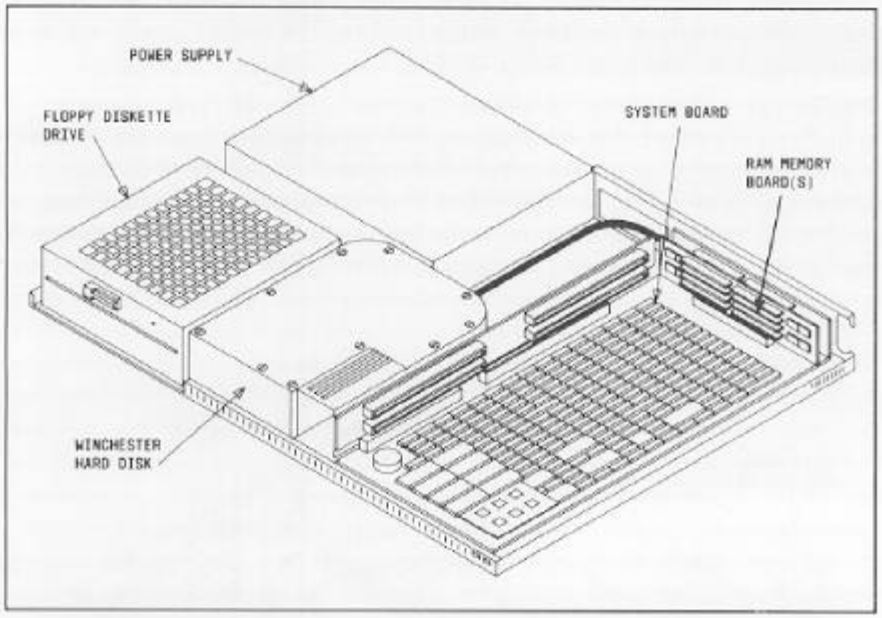

Figure 1-3: Main Internal Components of the 3B2/300 and 3B2/310 Computers

It is not necessary for you to understand in detail how the power supply and disk drives work in order to set up and use your computer. However, a general understanding of the main components of the system board 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 RAM (Random Access Memory) or ROM (Read Only Memory). 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.

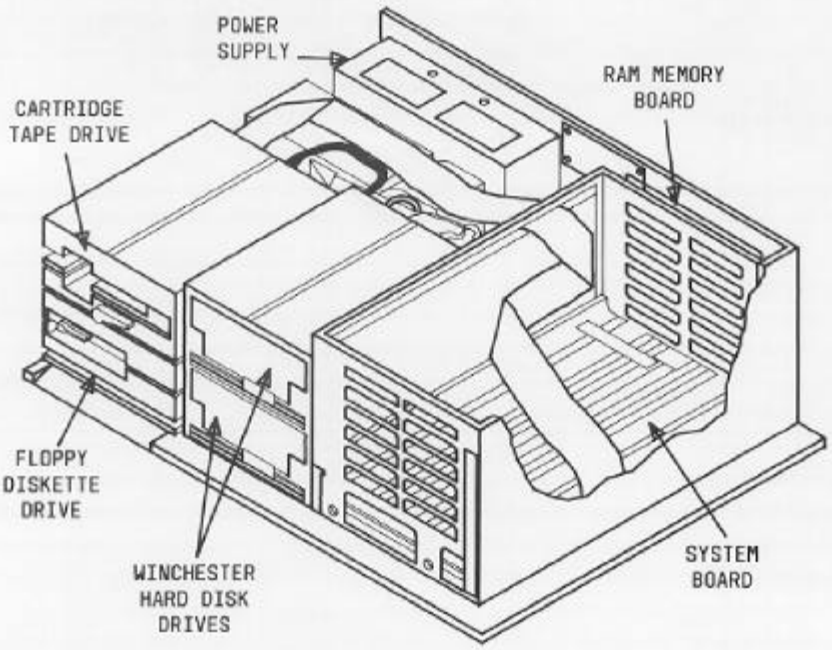

Figure 1-4: Main Internal Components of the 3B2/400 Computer

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 a program stops running or when the computer is turned off. Permanent storage for software and data is available on the built-in Winchester hard disk. The "kernel," the basic part of the UNIX Operating System, is stored on this hard disk. Once the operating system is loaded, every time the computer is turned on, the UNIX Operating System is automatically loaded 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 it cannot be used in the booting process. (The operating system is not available in memory until after the booting process has been completed.) This is why a special type of memory is needed.

These instructions are called "firmware." Firmware, as its name implies, is not volatile; turning off the computer will not affect it. It is stored in two types of chips: "Read Only Memory" (ROM) which contains programs that cannot be changed; and "Nonvolatile RAM" (NVRAM) which contains data that can be changed. ROM holds the programs that boot the system; NVRAM holds data used by those programs.

The system board also provides "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 a port on the 3B2 Computer includes an input/output (I/O) chip on the system board and a jack for plugging in a peripheral connection cable. Jacks are located on the back of the computer and on optional feature cards that can be plugged into the computer.

Firmware and the Floppy Key

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

Firmware is also used during troubleshooting and repair 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, a service representative 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.

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

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

It is important that you make a "floppy key" and then assign a new firmware password. A floppy key is a copy of the computer's serial number on a floppy diskette. If you later forget your firmware password, or if your NVRAM is damaged, you can restore the default values in NVRAM with this diskette. After you have loaded your operating system (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. However, anyone who has access to your floppy key has access to your computer. Be sure to keep your floppy key in a secure place!

Operating States

An "operating state" is a set of parameters that govern a computer's behavior. For example, there is one operating state that allows only one user (**root**) to be logged in, and another 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 different 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 operating states will make it easier for you to follow the instructions in this and other manuals provided with your computer.

The 3B2 Computer has five assigned operating states that cannot be changed by the user. The assigned operating states are:

- Powerdown state (run level 0)
- Single-user state (run level 1)
- Multiuser state (run level 2)
- Firmware state (run level 5)
- State for returning to firmware state and rebooting (run level 6).

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

See Chapter 2 for additional information.