ALPHA MICROSYSTEMS
RIGHT. FROM THE START.

AM-990
Universal Enclosure
Single Board Computer
Owner's Manual

DSM 00162-01

FIRST EDITION: Jan. 1992

To re-order this document, request part number DSO-00162-00

FCC NOTICE

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Canadian Department of Communications Compliance Statement

This equipment does not exceed Class A limits per radio noise emissions for digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications. Operation in a residential area may cause unacceptable interference to radio and TV reception requiring the owner or operator to take whatever steps are necessary to correct the interference.

Avis de Conformite aux Normes du Ministere des Communications du Canada

Cet equipment ne depasse pas les limits de Classe A d'emission de bruits radioelectriques pour les appareils numeriques tells que perscrites par le Reglement sur le brouillage radioelectrique etabli par le ministere des Communications du Canada. L'exploitation faite en milieu residentiel peut entrainer le brouillage des receptions radio et tele, ce qui obligerait le proprietaire ou l'operateur a pendre les dispositions necessaires pour en eliminer les causes.

Battery Warning: This equipment contains a battery which may explode if mistreated. Do not recharge, disassemble, or dispose of in fire. Replace only with an identical battery or authorized replacement. Use of another battery may present a risk of fire or explosion. Contact your Alpha Micro dealer if you need a replacement battery.

Electrical Warning: This equipment contains components that can be damaged by static electricity. Follow all electronic discharge precautions when handling the equipment. For example, touch the metal back panel of the CPU or peripheral chassis to dissipate any electrical charge before touchig the circuit boards or equipment within the chassis. After turning off power, before you open your computer chassis, unplug the cord from the electrical outlet to guard against electrical shock.

Software Security Device Identification Number: °°°°°°°°°°°°°°°°

The Alpha Micro Software Security Device (SSD) is a customized integrated circuit that can be inserted into any Alpha Micro computer system. The purpose of this device is to personalize the computer, providing identity verification for it.

Certain Alpha Micro and non-Alpha Micro software may require that your computer contain an SSD in order to run software that has been customized to run only on your computer.

Please enter the identification of your SSD above. The SSD identification number should be on your computer I.D. label under "SSD Serial No." (Another way of finding the number is to look at the SSD itself. The SSD is located in an integrated circuit location on the CPU board; its identification number is printed on the SSD itself.)

Software vendors may ask you for the SSD number if they are customizing software to run only on your computer.

This document may contain references to products covered under the following U.S. Patent Number(s): 4,530,048

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CHAPTER 1

INTRODUCING YOUR COMPUTER

Here you are, the new owner of an Alpha Micro AM-990 Universal Enclosure **S**ingle° **B**oard **C**omputer (SBC). You may own a small business and find that keeping track of inventory is taking time you could be using for product development. You may manage a department in a large company and see a need for stand alone word processing systems for the secretarial staff and a need for executive information stations. You may be an educator or scientist who needs a computer for data processing, mathematical analysis, and computer training. You may be a doctor who needs a medical billing computer for your office.

Whoever you are, there is one thing you have in common with all other Alpha Micro computer owners—you need the power and versatility a business computer can offer. And, you do not want your growth in the years ahead limited by the choices you make today.

Alpha Micro offers a complete line of 16- and 32-bit computers ranging from three to 240 users, and offering up to hundreds of megabytes of memory and thousands of megabytes of disk storage.

The SBC encompasses the kind of sophisticated, multi-user capabilities you've come to expect from an Alpha Micro computer. It gives you an upwardly compatible path for growth as your needs change.

The SBC's standard software is the same operating system and software as that supplied with all Alpha Micro 32-bit computers. This gives you these advantages:

- If you decide at a later time to move on to one of the larger Alpha Micro computers, you can transfer your application programs and files to the new computer with little or no conversion or translation necessary.

- The large number of applications packages and programming languages dealers and systems houses develop for the complete family of Alpha Micro computers are available for your SBC, too!

Read on for more information on the tool that is going to make life easier for you.

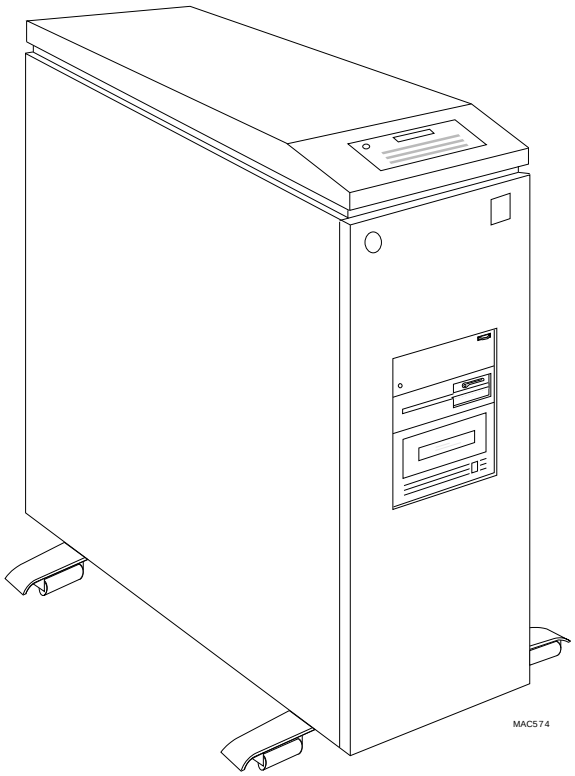


Figure 1-1. SBC Enclosure

ABOUT THIS BOOK

The purpose of this book is to get you started with your SBC. After you have followed the instructions in this book, your SBC will be set up and running. And, you will have a good idea of where to go next for information on the software you want to use on your SBC.

This chapter contains a software and hardware overview of the SBC. It also discusses the SBC configurations available, and service information.

Chapter 2 tells you how to unpack and set up your SBC. It also contains information on choosing an installation site for the SBC.

Chapter 3 discusses turning on and resetting the computer, using the terminal keyboard and diskettes, and turning the computer off.

Chapter 4 is an overview of the various software available for the SBC, and lists the Alpha Micro documentation you can order to learn more about each subject.

Chapter 5 discusses computer maintenance. It shows how to allocate computer resources by entering the system initialization file commands to set up terminals and jobs for multi-user operation.

Chapter 6 contains information on the care and feeding of the SBC.

Chapter 7 is a handbook of troubleshooting procedures you can follow to isolate the problem should something go wrong with your computer.

Chapter 8 discusses SBC status codes you may see on the front panel display.

Several appendices contain hardware specifications, technical information on constructing terminal cables, and a glossary.

Reader's Comments Form

We are very interested in making sure our documentation meets the needs of our readers. We would greatly appreciate your taking a moment after you have read this book to fill out the Reader's Comments form at the back to let us know if you found the book helpful.

Graphics Conventions

Like other documents in the Alpha Micro documentation library, this book contains a number of standard symbols to make our text easier to read and understand.

SYMBOL	DESCRIPTION
	This symbol means **STOP!**, and signals an important warning or restriction you must know about before continuing.
	This symbol marks a hint, and identifies a shortcut or an easier way to do something.
	This symbol says "Don't forget!" and signals information to remember.
AMOS Prompt: .	A dot on your terminal screen shows you're talking to the Alpha Micro Operating System, and AMOS is waiting for you to enter a command. AMOS allows you to define your own prompt symbol, so you may see a different prompt on your screen.
`text`	Text that looks like this in our examples shows the characters the computer displays on your terminal screen, such as prompts and information messages.

SYMBOL	DESCRIPTION
TEXT	Text that looks like this in our examples shows the characters you type on the computer keyboard. For example: **LOG OPR:**.
KEY	This symbol tells you when to press the indicated key on your terminal keyboard. For example: **DIR** RETURN tells you to press the RETURN key at the end of the DIR command.
CTRL/C	This combination of symbols tells you to hold down the first key indicated and press the second key. For example, to type a CTRL/C (Control-C), press the CTRL key and, while holding it down, press the C key.

This book often refers to other Alpha Micro publications. You may order books from your dealer or from the Alpha Micro Sales Administration Department. Chapter 4 lists some of the Alpha Micro manuals that may interest you.

COMPUTER OVERVIEW

All a computer does is shift electrical impulses that represent information from one internal location to another, and then transfer that data between itself and input/output devices such as terminals or printers. Granted, this electronic sleight of hand occurs incredibly quickly—millions of times a second—but, in general, the computer can't do anything you couldn't do yourself if you had a lot of paper, pencils, thick instruction books, and years of spare time. Time—that's the key word.

The purpose of a computer is not to replace people, but to free them from tedious and time consuming tasks by performing those tasks for them quickly and perfectly accurately. A computer should help you perform your everyday tasks in much less time than usual. As you use the computer more and more, and save more and more time, you may find yourself inspired to evaluate more information, prepare better looking documents, and research more information than you ever had time for in the past.

This section contains an overview of the computer components that help you do your job better and faster.

If you are not familiar with the way a computer works, you may find it a helpful analogy to compare the way a computer processes data with the way you yourself handle information.

1. You organize information into manageable groups such as files. Not by coincidence, the groups of data the computer deals with are also called "files."

2. You store information for later use by placing it in filing cabinet drawers. This permanent storage function is performed on the SBC by "disk drives."

3. You have desk top area for temporary storage of information where you can work on it. In the computer, this temporary work area is called "memory."

4. You use your hands to write information down on paper so you can file it, and your eyes to read existing information. The computer uses its input/output devices—printers and terminals—in the same way.

5. Finally, you need an entity to control and supervise all of these functions, making sure files are correctly transferred to the desk top from the filing cabinet and updated copies are returned to the cabinet when you are finished with the files. For you, your brain makes sure things are done the way you want—in the SBC this supervisor is the Central Processing Unit, the CPU, working under the direction of the operating system software, which is called "AMOS."

For example, when you edit a report, the CPU (under control of the computer operating system software, AMOS) brings a copy of the file you want to work on from the disk drive into memory. Using your terminal keyboard, you work on that file. Then, when you are finished, the CPU returns the updated copy to the disk.

Hardware Overview

The computer hardware consists of the physical components that make up your computer. These components provide the ability to process, input, display, and store data. Some of the standard hardware components provided with your SBC are:

- Several different types of 32-bit CPU boards are available in the SBC. See Appendix F for more details on your CPU specifications.

- The SBC comes with a minimum of four megabytes of memory with parity error detection. Memory expansion ranges from 32 to 64 megabytes, depending on the CPU board you order. See Appendix F for information on installing memory boards. See your Alpha Micro dealer for information on ordering memory upgrades.

- The SBC comes with at least two asynchronous RS-232 serial I/O ports. Serial port expansion ranges from 32 to 64 ports, depending on the CPU board you order. All of these ports include RS-422 compatibility.

- The time-of-day clock/calendar has a battery backup, so your SBC keeps track of the current date and time even when the computer is turned off.

- The front panel contains a status and diagnostic display to aid in system troubleshooting. See Chapter 8 for details.

- The SBC provides a self test mode you can enable when you power up the computer. See Chapter 8 and the *System Self Test User's Guide*, shipped separately with your computer.

- The computer provides both AC powerfail detection/handling and a remote reset capability.

- The SBC supports both ESDI and SCSI disk drives, as well as a number of other SCSI peripheral devices.

- The standard Video Cassette Controller Interface lets you use a VCR for data backup, file transfer, and networking (VideoNET).

- Depending on the configuration of your SBC, your computer may have one or more of these optional storage/bootup devices: an additional hard disk, a 5°1/4" or 3°1/2" diskette drive, a 1/4" streaming tape drive, or an 8mm high capacity streaming tape drive.

- The SBC enclosure also has rear panel external connectors that allow you to attach additional SCSI compatible storage devices and diskette drives.

- The optional AM-324 Parallel Printer Interface board lets you attach a parallel interface printer to your SBC.

- The optional AM-362 Ethernet board lets you attach your SBC to Alpha Micro's AlphaNET networking environment.

- There is also an optional AM-121 **V**irtual **P**ersonal **C**omputer (VPC) Co-Processor available for the SBC. The AM-121 is a small add-on board which allows you to use 68030 and 386 CPU chips in the same computer. With the AM-121 and related software installed, users will be able to switch between AMOS and DOS operating systems.

- An optional math co-processor (25MHz MC68881) is also available.

For more detailed information on the hardware components of the SBC, refer to Appendix A, "Specifications Summary," and Appendix F, "User Configurable Options."

The only thing you need to add are terminals. These allow users to input and display the data processed and stored by the components discussed above. You will also want to add one or more printers to provide printed copies of your data. Your dealer may have provided these items as part of your computer.

Software Features

Computer hardware is all potential and no action until the software programs instruct it to do something. Some of the features of the standard system software accompanying the SBC are listed below. Your dealer can provide software packages specifically suited to your needs, such as accounting software, other programming languages, mathematical packages, and so on. These packages are not included in this list. See your dealer for information on service and support for such packages.

- The operating system, AMOS, performs many functions, one of which is to manage the computer's resources so multiple users can run on the computer at the same time. The operating system also includes all support software for the hardware devices mentioned above.

- Programs called "print spoolers" let you use one or more printers at the same time without tying up a user terminal.

- The Task Manager lets you schedule multiple background tasks to run without operator control at preset times and dates.

- A sophisticated Command Language allows you to invoke a stream of commands and program input (predefined by you) by entering a single command.

- The business-oriented AlphaBASIC programming language is uniquely suited to the programming of business applications software packages.

- A screen-oriented text editor provides an easy-to-use tool for creating documents.

- A text formatting program aids in document preparation.

- AlphaMENU's interactive menu of system functions gives a user not yet familiar with the entire range of AMOS commands an easy way to select functions.

  Also, AlphaMENU lets you define your own menu of system or application functions by modifying the supplied menu or creating an entirely new one.

- ISAM (Indexed Sequential Access Method), a machine language file management system callable from AlphaBASIC or assembly language programs, provides a method for quick information organization and retrieval.

- A simple system initialization procedure allows you to quickly change the types of peripheral devices connected to the computer, change user memory allocations, and customize the computer to your exact needs.

- AMOS provides support for many different kinds of printers and terminals, and gives you the ability to define your own type of terminal or printer to the computer.

For an introduction to the SBC software, refer to Chapter 4, "Where Do I Go From Here?"

COMPUTER COMPONENTS AND AVAILABLE CONFIGURATIONS

Several different configurations of the SBC are available. These SBCs differ only in the number of terminals and printers you can attach and the types of storage devices interfaced to the computer. For exact configuration information, please see your local Alpha Micro dealer.

The following sections discuss some of the components that might make up your Alpha Micro SBC. For technical specifications on these devices, refer to Appendix A, "Specifications Summary."

Hard Disk Drive(s)

Your SBC contains at least one hard disk drive. Both ESDI and SCSI hard disk disk drives are supported. Various capacities of hard disk drives are available in the SBC. The SBC cabinet has mounting locations for 11 half-high (5 full-high) peripheral devices.

Diskette Drive

The SBC can accommodate both 5 1/4" and 3 1/2" diskette drives. A diskette drive offers the convenience of inexpensive, removable disk media that are easy to transport and store—the diskettes. See "Care of Diskettes/Video Cassettes" in Chapter 6 for important information on taking care of and storing diskettes.

Each 5 1/4" diskette can store up to 1.2 megabytes of data, and each 3 1/2" diskette can store up to 1.44 megabytes.

1/4" Streaming Tape Drive

The SBC may contain a SCSI compatible 1/4" streaming tape drive, allowing you to copy and restore files using special tape cartridges similar in appearance to audio cassettes. Storage capacities for 1/4" streaming tape drives ranges from 150 to 1000 megabytes, depending on the model of tape drive and the cartridge used.

See "1/4" Streaming Tape Drives" in Chapter 3 for information on using streaming tape devices. Also see Chapter 6 for information on care of tape cartridges and tape drives.

8mm Tape Drive

The SBC may contain an 8mm SCSI compatible Exabyte tape drive, allowing you to copy and restore files using special 8mm tape cartridges like those used in video cameras. One 8mm tape cartridge can hold up to two gigabytes of data.

See "Optional 8mm Magnetic Tape Backup Device" in Chapter 3 for information on using streaming tape devices. Also see Chapter 6 for information on care of tape cartridges and tape drives.

Video Cassette Recorder Interface

The SBCs built-in video cassette recorder interface with remote control allows you to use a standard video cassette recorder as a backup device. Although not the device the computer regularly boots from, if something does happen to your system disk, you can boot your computer from a special video cassette. You can also use video cassettes to transport data from one Alpha Micro computer to another.

You can schedule automatic backups so a copy of the data on your disk storage devices is made at a time convenient for you, such as the middle of the night when nobody is accessing the computer.

Memory Capacity Expansion Option

The SBC comes with a minimum of four megabytes of memory. You may expand this amount to either 32 or 64 megabytes, depending on the model of CPU you order. See your local Alpha Micro dealer for more information.

Front Panel Status Display

Every SBC has a status display on the front panel. This display lets you know what is going on inside the machine even when no messages appear on your terminal. Some normal functions of the machine (e.g., clearing memory when the computer boots up) cause codes to appear on the display, as do certain system errors.

In addition, the SBC self test feature uses the status display to let you know how the test is progressing, and if any errors have occurred. The SBC self test checks the major hardware components in the computer for proper operation, including memory, disk controllers and drives, video cassette recorder interface, interval timer, and the serial I/O ports. Instructions for running self test are included in the *System Self Test User's Guide*, shipped separately with your computer.

For information on all meaningful codes that can appear on the front panel display, see Chapter 8, "Front Panel Status Display Codes." That chapter also tells you how to use the SBC self test feature.

Serial I/O Capability

The SBC comes with from two to 34 or 66 serial I/O ports, depending on the model. All of these ports are RS-232 compatible and can be user configured for RS-422 compatibility if desired. See Appendix F for details. See Appendix B for a discussion of RS-232 and RS-422 cabling.

Depending on the I/O interface used, ports on the SBC use 9-pin or or 50-pin Telco shielded connectors.

External SCSI Port

The SBC includes an external SCSI (Small Computer Standard Interface) port to which you can attach additional SCSI compatible storage devices, such as additional hard disk drives or laser disk drives. The SBC supports a total of four SCSI hard disk drives.

SERVICE INFORMATION

Post Sales Support

Alpha Micro provides a comprehensive post sales service and support program for its entire product line. Our service organization is structured to provide you with immediate access to support assistance and information.

Our customer commitment is maintained through the expertise and skills of our competent, professional staff whose dedication assures all Alpha Micro customers the maximum benefits of quality support.

Support is available through Alpha Micro Field Operations. Our nationwide field service organization provides direct repair services to Alpha Micro computer owners. Some of the many services available through Alpha Micro are site evaluation, computer installation, computer integration, problem diagnosis and field repair. Alpha Micro Field Engineers are factory trained to ensure continuity of product servicing. Should you select hardware service from your servicing Alpha Micro Dealer, you can be assured he or she is backed by, and in close touch with, Alpha Micro for full factory support.

For Further Assistance

If you are unable to contact your dealer, Alpha Micro will be glad to refer you to a dealer. If you relocate and want to learn the name and address of an Alpha Micro dealer near you, please call or write to Alpha Micro.

For information and the location of the Alpha Micro service location nearest you, call our toll free service number, (800) 548-4848.

CHAPTER 2

INSTALLATION

This chapter gives general installation information for your computer. It discusses the following topics:

- Unpacking the computer.
- Instructions for reshipping the computer.
- Recording the SSD identification number.
- Verifying the Boot ID switch settings.
- Preparing the site for your computer.
- Verifying AC power requirements.
- Turning on power to the computer.
- Installing the operator terminal.
- Initially testing the computer.
- Booting under AMOS.
- Installing Alpha Micro software.
- Turning the computer off.
- Expanding your computer.

UNPACKING GUIDELINES

Unpack the computer and ***save all packing material and cartons*** in case you ever need to transport the computer. The shipping material was carefully designed to provide optimum cushioning and protection. When reshipping or otherwise transporting your computer, you must use the original packaging to ensure safe shipment.

The SBC is shipped on a wooden pallet.

When moving your computer, handle it gently. The hard disk drive in the main unit has moving parts and delicate read/write heads. Rough handling could damage the drive.

If the SBC enclosure contains a diskette drive, the drive contains cardboard packing material. Do not remove this packing material until you have installed the computer and are ready to start using it. The diskette drive may be damaged if you move the computer and the drive does not contain this packing material.

Unpack the terminal which will serve as the operator terminal and set it aside for now.

What You Will Need

When you unpack your computer you should find the following items:

__ This manual and warranty cards.
__ The main enclosure.
__ One 115 Volt AC, 3-conductor AC power cord.
__ One system accessory kit.
__ One VCR cassette containing a bootable copy of the system software.
__ System Self Test User's Guide

In addition to the equipment Alpha Micro has provided and the operator terminal, you will need the following:

1. Properly configured cables for connecting your terminal and VCR (if included) to the computer.

   If you want to construct your own terminal cables, you need various tools and connectors as well as the actual cable material. See Appendix B for information on constructing terminal cables.

2. The manufacturer's operator manuals for your terminals and printers.

3. If you need to convert your computer to 230 Volt AC operation, you need a 230 Volt AC power cord with the correct plug for your geographical area. Your local dealer may already have included this power cord with your computer; if not, contact your dealer for information on where to get it.

Reporting Shipping Damage

If there is any damage to the shipping container or the main enclosure, or if you are missing any items on the unpacking checklist, please call your dealer immediately.

Instructions for Reshipping the Computer

If shipping damage has occurred or the self test indicates a problem with the computer, your dealer may recommend that you ship the computer back.

If for some reason you cannot contact the dealer you bought your SBC from, please call the Alpha Micro Marketing Department; they will give you the name and address of an Alpha Micro dealer near you who can help you.

When reshipping or otherwise transporting your computer, you must use the original packaging to ensure safe shipment. For full credit on the returned computer or component, remember to ship back everything that was in the shipping carton(s), including this manual.

Please include a note to the person who will receive the computer containing the following information: your name, address, phone number, the date you shipped the computer back, and the reason for return. Be as specific as possible about the problem you experienced—the more information you provide the easier it will be for the service technician to determine the reasons for any problems. If you performed any trouble-shooting procedures, let the person receiving the computer know exactly what procedures you have done and what the results were.

RECORDING THE SSD IDENTIFICATION NUMBER

The Software Security Device (SSD) is a customized integrated circuit located on the CPU board. The SSD uniquely identifies your computer to customized software that has been configured to run only on your computer. If you purchase customized software from Alpha Micro or other software vendors, you need to give them your SSD identification number (printed on the SSD chip itself) before they can "key" the software to your computer.

The SSD identification number is written on the System I.D. label on the back panel of the computer in the section titled "SSD Serial No." Please note the identification number of your SSD at this time and enter the number at the front of this book.

VERIFYING THE BOOT ID SWITCH SETTINGS

The Boot ID switches on the back panel of your computer are usually set for you at the factory or by your dealer. The switch settings define what hard disk drive/backup device combination your computer uses to boot from.

When you press the reset button, the computer reads the system initialization command file and the operating system to get itself up and running. You can select which device the computer reads these files from by changing the Boot ID Switches. These eight toggle switches are accessible through a small opening in the back panel of your computer.

As you look directly at the back panel, the Boot ID switches are grouped into two separate device sectors, one for your normal or "MAIN" boot device, and another for the alternate or "ALT" boot device.

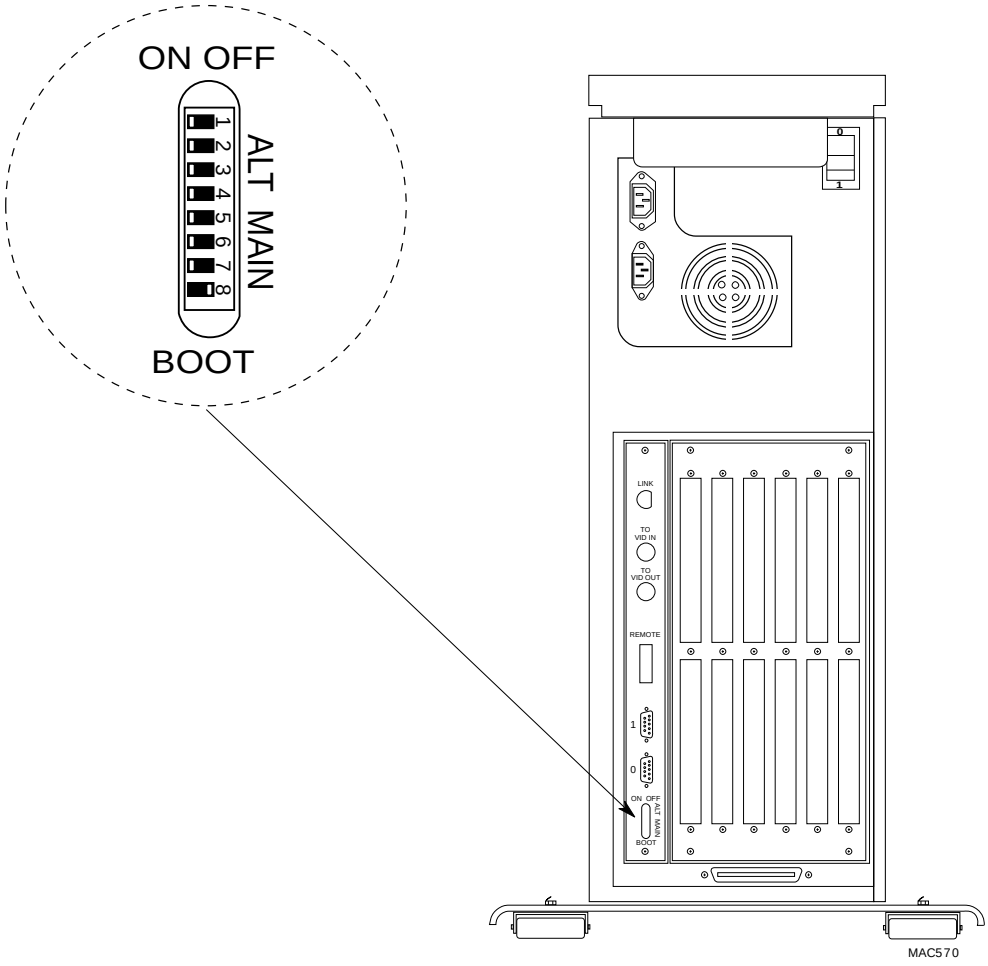


Figure 2-1. Boot ID Switch Location

The switches are numbered from top to bottom. The top four switches (1-4) are for the alternate boot device; the bottom four (5-8) select the main boot device.

The following diagrams show the various switch settings you can select.

Alternate Device

The computer tries to boot from removable tape or diskette on your alternate device *first* in case one or more necessary files on your primary device are missing. Set switches 1 through 4 for the alternate device you want, according to this table:

Switch				Device
1	2	3	4	
On	On	On	On	*No Alternate Device
On	On	On	Off	Diskette drive
On	On	Off	Off	VCR
On	Off	Off	On	Streaming Tape

* Standard factory setting

Primary Device

The primary boot device is the one you normally want to boot from. Your computer will boot from the system software on the primary device if it does not find the software it needs on the alternate device, or if no alternate device was selected. Set the primary boot device switches like this:

Switch				Device
5	6	7	8	
On	On	On	On	Diskette
On	On	On	Off	* SCSI Hard Disk
On	Off	On	On	* ESDI Hard Disk

* Standard factory settings, depending on type of disk used.

OVERVIEW OF INSTALLATION PROCEDURES

Now that you've unpacked your SBC, and have everything you need to hook it up, you can begin to physically install it. Installing your SBC is a matter of:

1. Choosing and preparing a location for it.
2. Making sure it is configured correctly for your local electrical requirements.
3. Running an initial diagnostic test to make sure the computer is working correctly.
4. Connecting terminals and printers.

Some of the sections below refer to various locations on the front and back panels of the SBC. It might be a good idea to familiarize yourself now with these areas by taking a look at the following illustrations:

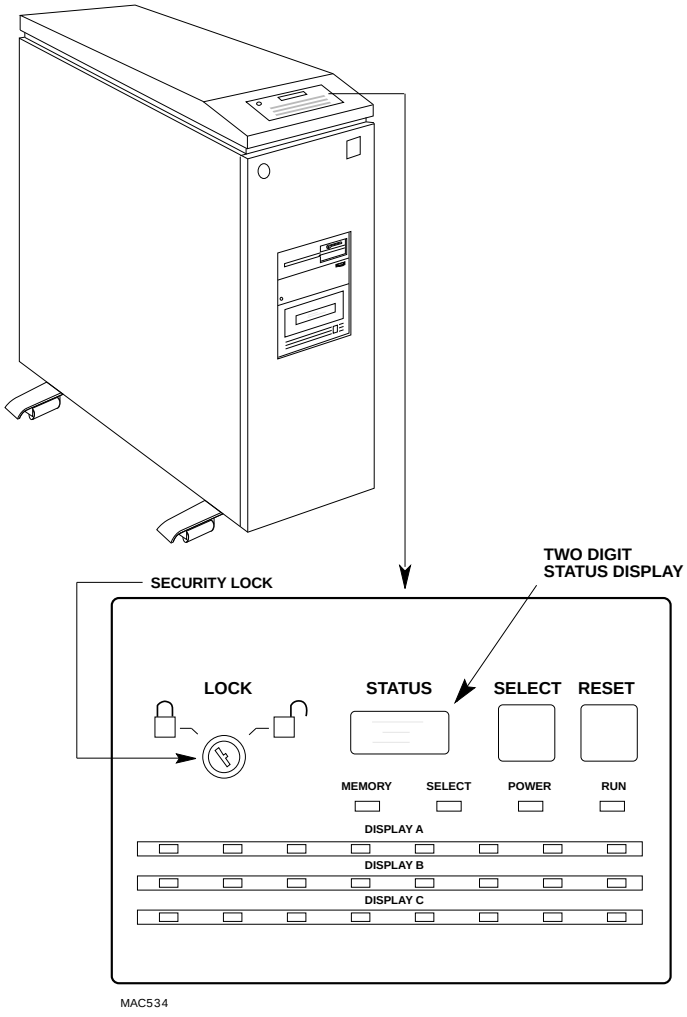


Figure 2-2. SBC Display Panel

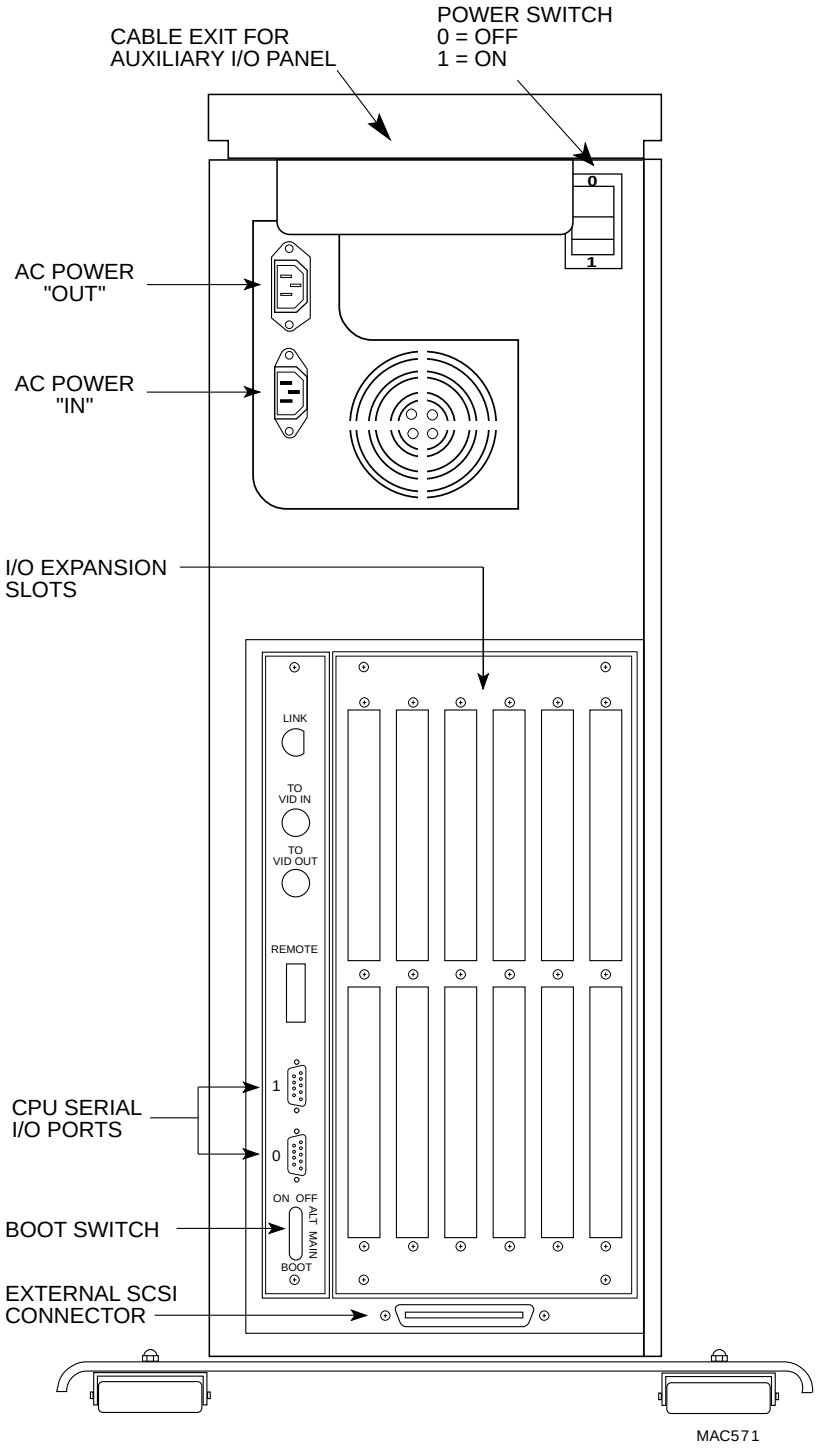


Figure 2-3. SBC Back Panel

PREPARING THE SITE

For the SBC to do its best job for you, you must place it in an environment it is comfortable in. Extreme temperature or humidity can cause system failure. The SBC is not very demanding—its environmental needs are similar to your own.

Physical Requirements

The SBC's dimensions are:

Height:	28"	(71.1 cm)
Width:	9"	(22.8 cm)
Depth:	30.5"	(77.4 cm)
Weight:	up to 100 lbs.	(45 kg)

The first step, then, is to make sure the place you want to put your SBC is large enough and sturdy enough for it. Also leave enough room for any terminals and printers you want to use.

Make sure the AC power cord will reach from the SBC back panel to an electrical outlet, and that there are enough electrical outlets for all terminals and printers. You should also make sure you have enough terminal cabling to reach from the SBC back panel to your terminals and printers. See "Power and Cable Connections" below.

Environmental Requirements

It is important to remember that the cleaner the environment, the more efficiently the SBC performs. Treat your SBC with respect. For example, do not place coffee cups or soda cans on top of the main enclosure where they can spill. If spilled liquid happens to reach the circuit boards inside the SBC, it could cause system failure.

In general, you should install your computer in an area where people do not eat, drink, or smoke, since all of these activities can cause contamination problems. For information on cleaning your computer and taking care of its components, refer to Chapter 6, "Preventive Maintenance."

When you select a location for your SBC, remember that it operates within certain temperature and humidity ranges. See Appendix A, "Specifications," for detailed requirements.

It is very important for the health of your SBC that you do not obstruct its cooling system. The SBC takes air in from the bottom and exhausts air at the top rear. Therefore, you must place it on a tile floor or an anti-static floor mat, not carpeting. The mounting "feet" of the SBC give it adequate ventilation space below. Allow **at least** six inches at the rear of the unit for ventilation. The bottom vents must be free of all obstacles and nothing should sit on top of the unit.

Static Electricity

Slight problems with the computer can often be traced to problems with static electricity or improper grounding.

If you have problems on dry and windy days when humidity is low, static electricity could be your problem.

If, however, your problems occur when equipment near the computer is powered on—for example, if your computer locks up when someone uses the photocopier—improper grounding could be your problem. See the next section.

One of the greatest enemies of computers, terminals, and printers is static electricity. The chief villain is climate: dry winds and dry seasons. You should also be aware that both carpets and the plastic mats often used under desks are a prime source of static electricity.

If possible, you should place your computer in an uncarpeted area. If you must place it in a carpeted area where static electricity could be a problem, you should place the SBC on an anti-static floor mat.

Several anti-static sprays on the market can be of considerable help during days when static electricity is a problem. Also, using an air conditioner that controls humidity can greatly reduce a static electricity problem.

Power and Cable Connections

Before selecting a site for your SBC, you should determine if the area where you want to place the computer has adequately regulated AC power. If you request it, many power companies will install test equipment to determine if there is a need for additional line regulation. Testing line voltages may also be done through the use of a high speed line transient recorder. If, over a period of several days of testing, the line voltage varies more than 10 percent from the rated line voltage, you may need to install a line regulator or a new, separate line.

A "transient free," or smooth and consistent, power source and a properly installed earth ground can significantly improve the reliability of your SBC. While the computer is in use, it is important to maintain a constant line voltage free of power surges, fluctuations and impulses. Ideally, a separate power source should be available for use only by the computer. However, if this is not possible, you may need a line conditioner capable of suppressing transients or spikes to eliminate power surges and noise. Alpha Micro can provide a power conditioner or UPS (Uninterruptable Power Supply) system—contact your dealer for more information.

Be sure the power rating for the power lines the computer will be connected to is adequate for your SBC or any future computers you may be planning to install. In North America, a standard 15 amp 115 volt grounded connector-type outlet is required for the CPU chassis. In some other countries, the requirement is a 230 volt AC power source.

The maximum power requirements for the SBC are:

115 Volt AC at 5 amps, or
230 Volt AC at 2.5 amps

Additional outlets are required for each drive and/or peripheral connected to the computer. Alpha Micro computers come with a standard six-foot power cord. If this is not long enough, be sure any extension cords used are rated for the full 15 amps—otherwise, the full voltage will not reach your computer. This can affect the efficient operation of your computer.

A point to remember is that the closer you get to either end of the AC voltage power range, the less efficient the computer will be.

To avoid electrical interference, sources of electrical noise such as air conditioners, copiers, electric typewriters or cleaning equipment should not be connected to the same circuit as the computer. All outlets providing power to the computer should have a common grounding point restricted to only those connections coming from the computer installation.

Data cables should not be located near high voltage power lines, telephone cables, or in elevator shafts. They should not cross walkways. If you must cross walkways, cover the cables with a bridge.

You must also take cable lengths into consideration. Single-ended circuits are susceptible to all forms of electromagnetic interference. As line length increases beyond fifty feet, the reliability of the RS-232C cable connected to the terminal and printer decreases rapidly. If local terminals are to be located further than fifty feet from the computer, we recommend you use signal conditioning equipment to improve the signal or use RS-422 signal level options. See Appendix B for more information.

SELF-CONFIGURING POWER SUPPLY

Different parts of the world use different standards for electricity. For example, most areas of the United States use 115 Volt electricity. Many other areas of the world use 220—240 Volt electricity.

Your SBC has a self-configuring power supply that is compatible with 230 Volts or 115 Volts. It will accept 50 or 60 Hz at either voltage.

Alpha Micro ships the SBC to your dealer with one three-prong, 115 Volt AC power cord. If your dealer has not already supplied you with the proper type of power cord for your geographical area, ask your dealer for one now.

INSIDE THE COMPUTER

Figure 2-5 shows important features of the SBC. The computer cabinet has a removable top cover and one removable side panel, allowing access to your computer. The removable top cover allows access to an optional auxiliary I/O panel; the side panel, once removed, allows access to all the components located inside the computer cabinet as shown in Figure 2-6. Cables from terminals and other devices are plugged into connectors located on the computer's rear panel. The door on the front of the computer cabinet makes it easy to install or remove disk storage and backup devices. During normal operation, of course, you shouldn't need to open the computer cabinet at all.

Your computer operates at hazardous voltages. Before you attempt to remove or replace the computer's cover, observe the following precautions to protect yourself and prevent damage to delicate computer components:

- Turn off the computer power switch.
- Unplug the AC power cord.
- Remove any jewelry from your hands, wrists, and neck.
- Use only insulated or nonconductive tools.
- Static electricity can damage electronic components. The best ground is the chassis cabinet that houses the boards. Touch the cabinet prior to picking up, installing, or removing PC boards.

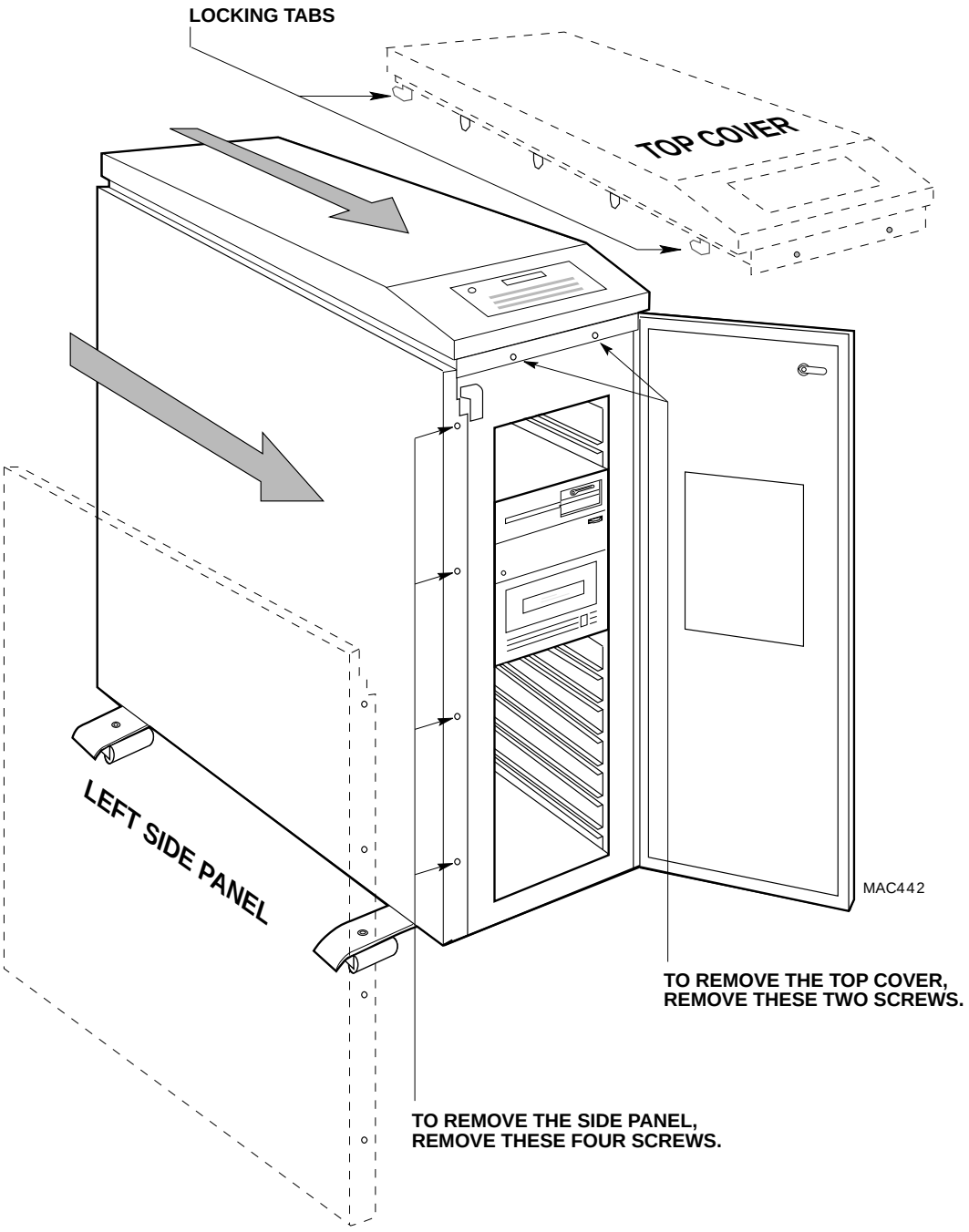


Figure 2-5. SBC Removable Top Cover and Side Panel

Opening the Front Door

The factory ships the SBC with the door locked. The keys are tiewrapped to your computer's rear panel, near the power switch. Insert the key, open the lock, and the door will swing open.

Opening the Top Cover

In order to remove the side panel, you must first remove the computer's top cover. The procedure for removing the top cover is as follows:

1. Swing the front door open to expose the screws that hold the top cover in place.

2. Using a Phillips-head screwdriver, remove the two screws that connect the top cover to the chassis as shown in Figure 2-5.

3. Don't worry about the display panel; it is not attached to the top cover. However, make sure the key for the keyboard lock is not inserted in the lock when you attempt to remove the top cover.

4. The top cover is held in place with four locking tabs, one at each corner. In order to release the locking tabs, the top cover must be slid forward as indicated by the arrow in Figure 2-5. The best way to do this is to use the palm of your hand to firmly strike the rear corners of the top cover. This will cause the top cover to slide forward.

To protect your hand, place some sort of padding over the rear corners of the top cover.

5. Once the top cover slides forward, pull straight up to remove it.

6. Place the top cover out of the way so it will not get damaged. Make sure you do not bend the locking tabs.

Opening the Side Door

To install optional cards, disk drives, backup devices, or to service the computer, you'll need to remove the left side panel as shown in Figure 2-5.

1. Remove the four screws shown in Figure 2-5 that secure the left side panel to the chassis.

2. Like the top cover, the left side panel must be slid forward in order to be removed.

3. Using the palm of your hand, firmly strike the rear edge of the side panel as indicated by the arrow in Figure 2-5.

4. Once the panel slides forward, it can be removed by lifting straight up.

5. As with the top cover, make sure none of the alignment tabs on the side panel get damaged.

Reinstalling the Top Cover and Side Panel

If you removed the top cover and side panel as described in the two previous sections, you probably noticed the panels are a snug fit. The snug fit helps the computer meet FCC requirements.

In order to avoid misalignment problems, it is very important that you do not bend any of the alignment tabs on either the top cover or side panel.

Use the following instructions when reinstalling the side panel and top cover:

Side Panel

1. Install the side panel before you install the top cover. The side panel has twelve small tabs and four screws that hold it in place. To remove the panel, you pushed it toward the front of the computer (as shown in Figure 2-5), creating about a 1/2" gap between the front lip of the side panel with the four screw holes and the threaded holes in the cabinet.

2. To reinstall the panel, hang the side panel in the forward position and press down on the panel, making sure both the top and bottom tabs slide into position.

3. At this point the panel should be in position vertically, but with a 1/2" gap between the front lip of the side panel with the four screw holes and the threaded holes in the cabinet.

4. Using the palm of your hand, firmly strike the front edge of the side panel; this will cause the side panel to slide back into its proper mounting position.

5. Reinstall the four screws.

Top Cover

1. Like the side panel, the top cover has alignment tabs to hold it in position.

2. When setting the top cover in position, make sure each tab is aligned with a corresponding slot on the top of the cabinet. Press the top cover down into position.

3. Make sure each of the tabs is fully inserted, with the top cover sitting flush on top of the cabinet.

4. Like the side panel, there will be a gap of about a 1/2" between the front lip of the top cover with the two screw holes and the threaded holes on the front of the computer cabinet.

5. Each corner of the top cover has a notched tab designed to hold the cover in its mounting position. Use the palm of your hand to push the top cover back into position, which will close the gap between the front lip of the top cover and the threaded holes in the cabinet.

6. Install the two screws that secure the top cover to the computer cabinet.

RF Shielding

The computer has several RF shields that do not appear in Figures 2-5 and 2-6. The purpose of these shields is to prevent radiated electronic noise from leaving the computer cabinet. In order to comply with FCC regulations, these shields should always be in place when the computer is operated. The shields are held in place with Phillips-head screws. There is a large shield covering the computer's motherboard, which you will need to temporarily remove when installing optional expansion cards. Similiar shields are used to cover openings in the peripheral mounting area, and to cover openings in the top of the computer cabinet designed for optional equipment. Be sure to reinstall them, when you are done making changes, to insure your computer is in compliance with FCC regulations.

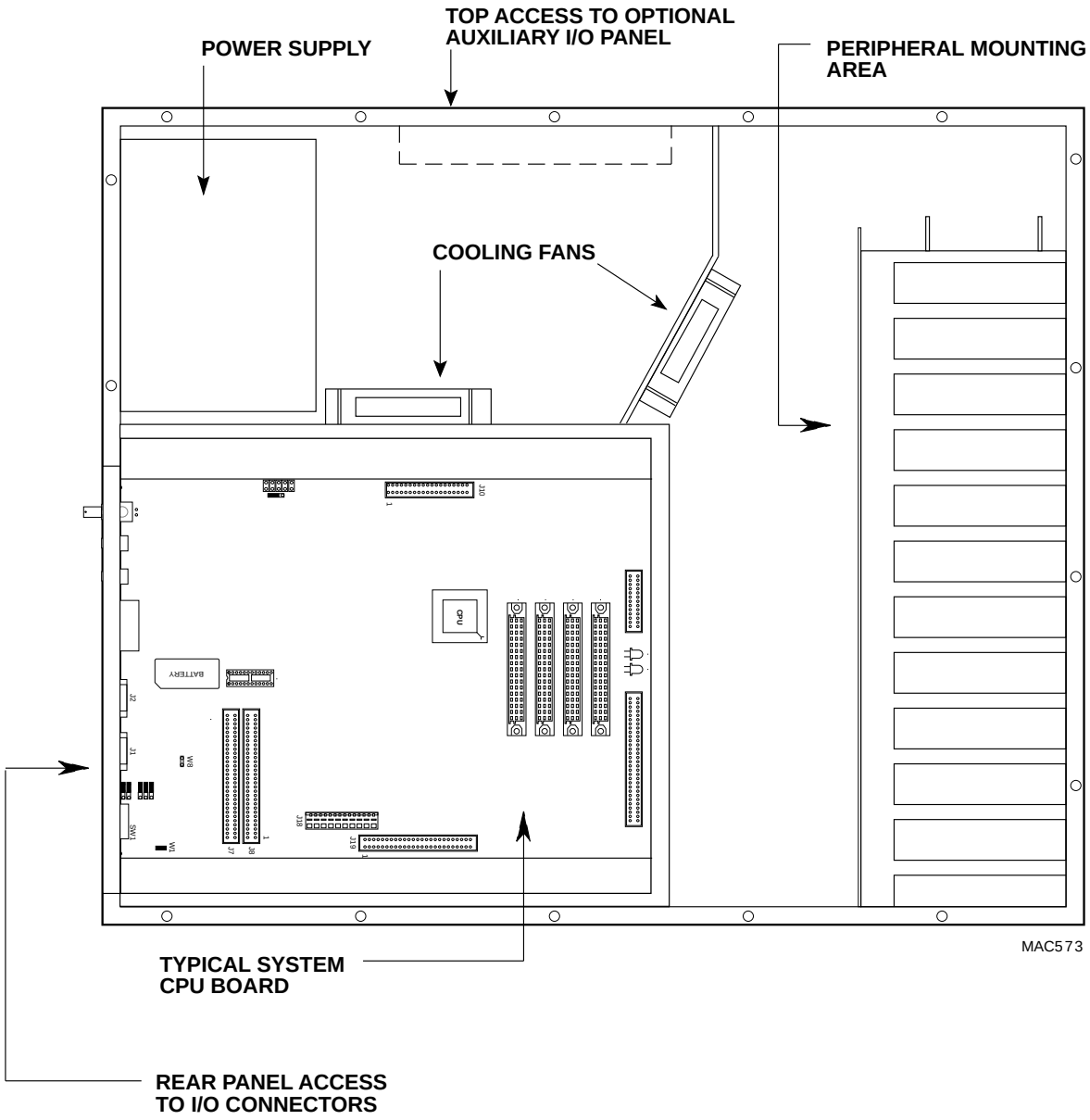


Figure 2-6. Inside the SBC Enclosure (Side View)

CONNECTING A VIDEO CASSETTE RECORDER

To use a VCR for data backup on your computer, you must have two good quality, VCR "dubbing" cables to connect the **Video In** and **Video Out** connectors on the VCR to the CPU chassis. These cables should be 75 Ohm, shielded, coaxial cables with RCA plugs on the computer end. The VCR end of the cables should contain the type of plugs (usually RCA) required by your particular VCR. Such cables are usually available where you bought your VCR.

One cable connects the **Video In** outlet of your VCR to the **To Video In** connector on the SBC, and the other connects the **Video Out** outlet of your VCR to the **To Video Out** connector on the SBC. See Figure 2-7.

It doesn't matter which of the cables you use for the video out signal and which for the video in signal. Just make sure that both ends of the same cable are used for video out, and that both ends of the other cable are used for video in. It's very important that these cables make a good connection, so press the cable connectors firmly into the outlets.

If your VCR is a Videotrax computer controlled VCR, plug the remote control cable between the recorder remote connector and the remote connector on top of the SBC. The connectors are "keyed" so they will only plug in when they are oriented correctly. See Figure 2-7 for the location of the remote connector and for connecting the cables.

The connector for the remote control cable should plug in easily. If it doesn't, ***do not force it***. You probably have the connector oriented improperly. Turn it over and try again. Forcing the connection can damage the connector and/or your computer.

Your VCR interface has been set up at the factory for NTSC video format. If your VCR is a "PAL" or "SECAM" type, you must set the CPU board within your SBC chassis to the proper format. For PAL or SECAM, set the NTSC/PAL jumper in the PAL position; for NTSC, place it in the NTSC position. See Appendix F for more information.

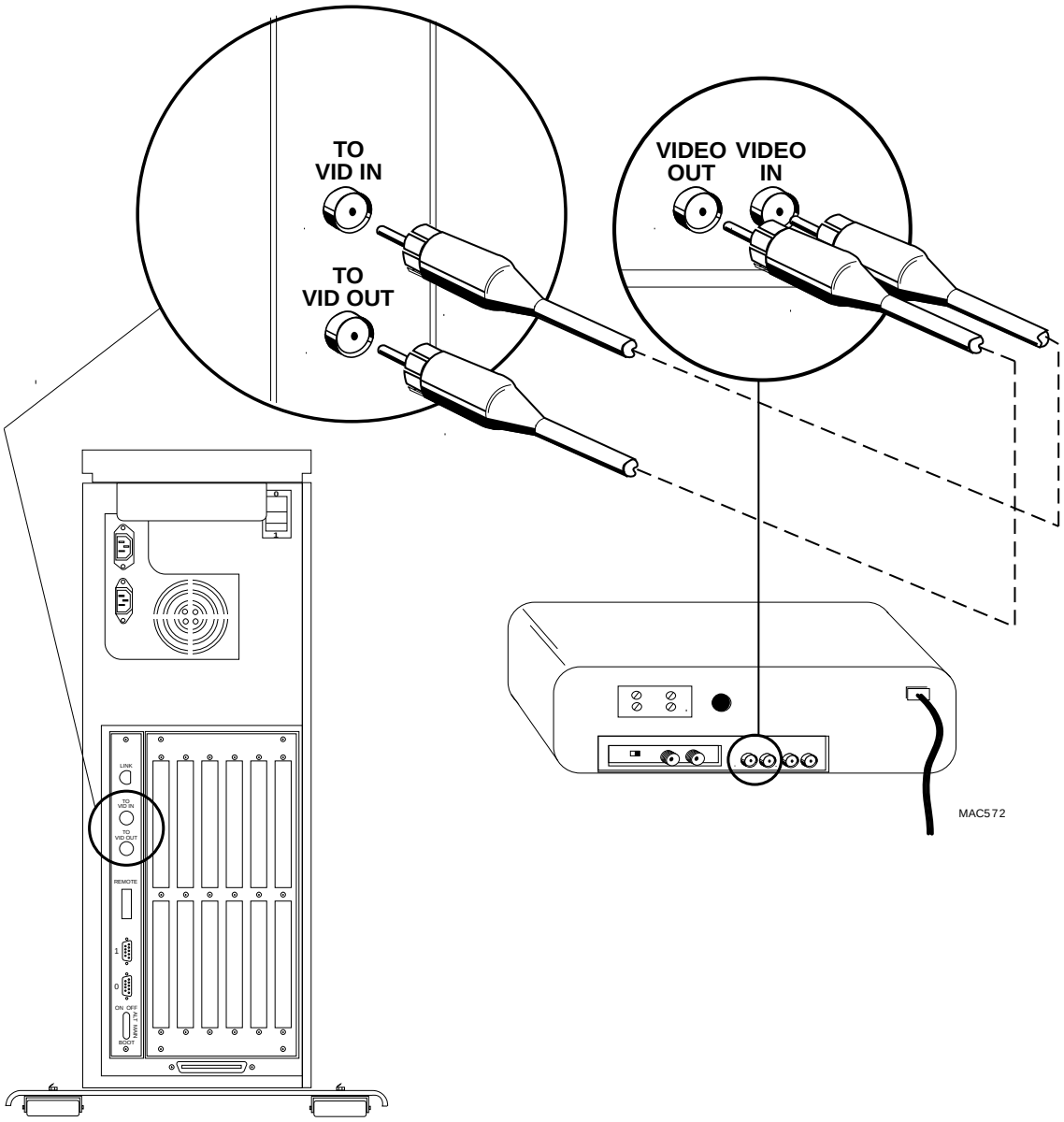


Figure 2-7. Connecting a Video Cassette Recorder

TURNING ON POWER TO THE SBC

Once you turn on power to your SBC, you must be very careful never to move the computer while power is still on; doing so could damage the disk drives inside the unit. See "Turning the Computer Off" in this chapter for information on how to correctly turn the computer off before moving it.

1. Verify once again that your computer has been configured correctly for the AC power service in your region.

2. Place the SBC in the site you have chosen for it. Insert the socket end of the AC power cord firmly over the three prongs in the power cord receptacle located at the upper left hand area of the back panel. (See Figure 2-3.) Then plug the pronged end of the cord into an electrical outlet.

3. Remove the cardboard packing material from any diskette drives. (Remember to put this packing material back into the drives if you should have to move the computer.)

4. Turn on the power by pushing the Power Switch on the top of the SBC to "On" or "1."

5. Now, check to make sure the computer is powered on:

    a. Are the Power and Run Lights on the front panel lit? (See Figure 2-2.)

    b. Is the cooling fan running? To check the fan, place your hand behind the fan opening in the back panel; you should feel air blowing out.

If the Power and Run lights and the fan are not on, you have a problem. Refer to Chapter 7 for troubleshooting help. If the fan and the Power and Run Lights are on, you can proceed with installing the operator terminal. First, turn the computer off.

INSTALLING THE OPERATOR TERMINAL

The terminal you use when installing software and running diagnostic programs is called the operator terminal.

There are two basic things you must do to install the operator terminal: set its parameters and connect a cable between it and Port #0 on the SBC.

Setting the Terminal's Baud Rate and Parameters

The AMOS system software requires an ASCII RS-232 or an RS-422 terminal attached to Port #0 on the back panel of the computer chassis.

AMOS initially assumes the operator terminal is an Alpha Micro or compatible terminal using RS-232 signal levels. It also assumes the terminal is working at 9600 baud. (The "baud rate" is the rate at which the terminal and computer transfer information between themselves; if the terminal is not set at the baud rate the operating system thinks it should be using, the text displayed on the terminal is not legible.) See Appendix A for information on the baud rates supported on the SBC. AMOS also assumes the following terminal parameters:

Data Word Length:	Eight data bits
Parity:	No parity
Stop Bit (for 9600 baud):	One stop bit

Refer to the documentation accompanying your terminal for information on setting its baud rate and the parameters above.

Once the computer is booted with a compatible terminal, you can define your own type of terminal and tell the computer to use that terminal from now on. For information on defining your own terminal to the operating system, refer to the *System Operator's Guide*.

Connecting the Cable

Refer to the FCC warning concerning electromagnetic interference at the front of this book. The terminal cables you use must be shielded to minimize such interference. Also, see the suggestions in "Power and Cable Connections" in this chapter.

Make sure you have appropriate cables for connecting the terminal to the computer. See Appendix B, "Purchasing or Constructing Terminal and Printer Cables" in this manual for cable guidelines. If you do not have the proper cables, please contact your dealer.

Plug one end of the finished cable into the proper connector on the back of the terminal and the other end into the appropriate connector on the back of the CPU chassis. Alpha Micro cables are labeled at each end to indicate which end plugs into the CPU and which end goes to the terminal.

INITIAL TESTING

Before you boot the computer under AMOS, or hook up any printers and additional terminals, you should use the SBC self test feature to verify that the computer hardware is working correctly. For full information on self test, refer to the *System Self Test User's Guide*, shipped separately with your computer. Perform self test now before proceeding to the next section.

BOOTING UNDER AMOS

Normally, the AMOS system software is installed on your SBC by Alpha Micro before the computer leaves the factory. If this is the case, all you need to do to bring the system up under AMOS is power up the computer. Follow these steps:

1. Turn on the power to your terminal and any other peripheral devices, such as a video cassette recorder.

2. Turn on the AC power switch located on top of the computer.

If the system software is already on your hard disk, within a few seconds you will see a succession of boot codes on the front panel status display, then system initialization file commands appear in rapid succession on the operator terminal screen as they are executed.

If nothing appears on the status display or the terminal screen after a minute's wait, follow the instructions in "Installing Alpha Micro Software," for loading operating system software onto your System Disk.

INSTALLING ALPHA MICRO SOFTWARE

If the AMOS software is not already installed on your hard disk, you should have received a system software tape from your dealer along with the SBC. If you did not, contact your dealer for help.

If you do have the system software tape, you need both it and the "warm boot" tape supplied by Alpha Micro in order to install your system software. Installing the software on your computer involves copying the latest system software from a tape cassette to your hard disk.

The tapes are accompanied by the *Release Notes* for the particular software release shipped with your computer. This document describes the most recent features incorporated into the software, and contains current instructions for transferring the files to your hard disk. The installation instructions in the *Release Notes* give you all the details for getting your computer up and running.

To install the system software from a VCR tape to a new SBC, you need to:

1. Make sure power to the computer is turned on. Check that the Boot ID switches are set to VCR. (See "Verifying the Boot ID Switches" earlier in this chapter.)

2. Insert the warm boot tape into the VCR. Push PLAY.

3. Press the reset button on the front panel of the computer.

4. When the following message and cursor appear on the screen about a half minute later, it means the computer booted successfully from the warm boot tape.

```
AMOS32      Version xx.x
.
```

5. Remove the warm boot tape. Insert the system software release tape. Transfer data from the tape onto the disk with this command:

VCRRES DSK0:=ALL:[] RETURN

When the installation finishes, push the reset button on the front of the SBC. The computer should boot, and you should see the system initialization file commands on the operator terminal screen, as described above.

The Warm Boot Monitor

The warm boot monitor is used in case of an emergency, when the computer cannot find the system software files it needs to boot from on the hard disk.

As you become more familiar with your computer, we strongly recommend you create several warm boot tapes. In addition, if you ever change the configuration of your computer, you will almost certainly have to generate new warm boot tapes to reflect the change.

Use the WRMGEN program to generate a warm boot monitor, and the appropriate backup command to place the monitor onto a tape. See the *AMOS User's Guide* and the *System Commands Reference Manual* for details on these procedures.

TURNING THE COMPUTER OFF

You need to power the computer down whenever:

- You add to or modify the circuit board configuration.

- You move the computer.

- Servicing is required.

To power down the computer always follow these steps:

1. Make sure all users have exited all programs and are logged off the computer.
2. Remove any backup media (such as diskettes) from the computer.
3. Turn off all external devices such as printers and terminals.
4. Turn the AC power switch on the top panel to the "OFF" or "0" position.

If you are going to open the computer chassis, first unplug the cord from the electrical outlet to guard against electrical shock.

EXPANDING YOUR COMPUTER

Once your computer is configured with the basic components, you may want to install any additional subsystems purchased with your computer. Or, you may want to change your computer configuration to add more users, change memory allocations, etc.

Part of adding new hardware to the computer involves changing the system initialization command file (AMOS32.INI) to define the new hardware to it. Changing the allocation of computer resources also requires changing the AMOS32.INI file. For information on modifying the AMOS32.INI file, refer to the documentation on the system initialization command file in the *System Operator's Guide*.

Please read that document carefully; modifying the AMOS32.INI file without understanding its elements is very dangerous—a serious mistake could damage the AMOS32.INI file and leave your computer unable to boot from your System Disk. ***NEVER*** modify the AMOS32.INI file directly. Make a copy of the file; then change and test the copy.

GETTING ASSISTANCE

If you have followed all of the instructions in this chapter, but for some reason your SBC is not working, you probably want help.

First of all, please turn to Chapter 7, "Troubleshooting," and see if one of the problems listed in "The Symptoms," is one you are experiencing. If the solution in that chapter does not cure your problem, or if your problem is not listed, it's time to get some outside help—call your dealer or the Alpha Micro service number listed in "Service Information" in Chapter 1.

CHAPTER 3

GETTING STARTED

This chapter contains two types of information: basic concepts about the way your SBC is set up and operates, and general procedures for working with it. Specific topics include:

- Booting the computer.
- Device names and the System Disk.
- Disk accounts and user names.
- Logging on to the SBC and transferring between disk accounts.
- Using the main command menu.
- Your terminal keyboard.
- Working with diskettes.
- Working with streamer tape.

BOOTING THE COMPUTER

Booting is the process the computer goes through whenever you turn the power on or press the reset button. When you boot, a pre-programmed circuit built into the SBC, called a PROM (Programmable Read-Only Memory), tells the CPU where to look on the disk for the software necessary to get the computer up and running. The CPU reads this software from the disk, loads it into the computer's internal storage area, its "memory," and executes its instructions.

Among the files transferred into system memory when you boot is the system initialization command file, AMOS32.INI. AMOS32.INI is a special command file containing commands that define to the operating system (AMOS) all the hardware connected to your computer. As the SBC boots, it reads these commands and "builds" the operating system in memory correctly for your configuration of hardware. You can change the AMOS32.INI file easily whenever you want to add more hardware to your computer.

If you want to learn more about the AMOS32.INI file and how to modify it, read Chapter 5 of this book. Read the *System Operator's Guide to the System Initialization Command File* for details.

As the SBC processes the commands in AMOS32.INI, each line of the file displays on the operator terminal. When all of the commands in the AMOS32.INI have been processed successfully, the computer is up and running. The last command in any AMOS32.INI file is "MEMORY 0." When you see that on the operator terminal, and the front panel status display goes blank, the computer has finished booting.

DEVICE NAMES

Device names are how AMOS identifies the different pieces of equipment that make up your computer. Each disk drive and other storage device has its own device name (terminals and printers are defined somewhat differently). These device names are defined in the system initialization file—AMOS32.INI—for your computer.

Alpha Micro device names conform to a specific format to make it easy for you and the computer to refer to the same piece of equipment. All device names contain three letters and a number, and end with a colon (:). For example, DSK#:, where # is a number, is usually the name for a hard disk device and STR0: is the name of a streaming magnetic tape drive.

Having names for each device lets you specify which device you want to use for a specific command. For example, you can see a list of files from just one of your disk drives, or copy data from your hard disk to a diskette.

You can set up your computer to use each hard disk drive as if it were two or more separate devices. In this case, the actual disk drive is called the "physical device" and each portion of it is a "logical device." This is an important distinction, since in most cases with AMOS you refer to the logical device name. For example, a single 145 megabyte hard disk drive could contain the devices named DSK0:, DSK1:, DSK2:, DSK3:, DSK4:, and DSK5:.

The disk device containing your AMOS32.INI file and other system software, the device AMOS "boots from," is always called DSK0:. Normally this is the first logical device on the hard disk, but if for some reason you boot from your diskette drive, the diskette drive becomes DSK0:. When you change the device you boot from, it may also change the names of other devices on your computer—since you are using a different AMOS32.INI file the devices may be defined differently.

For example, if your computer contains one 145 megabyte hard disk drive and one diskette drive:

- When your computer boots from the hard drive (the usual state of affairs), the hard drive is referenced as six disk devices named DSK0:, DSK1:, DSK2:, DSK3:, DSK4:, and DSK5:. The diskette drive is named FLV0:.

- If you modify your computer to boot from the diskette drive, the hard disk drive might be referenced as six disk devices named HRD0:, HRD1:, etc., and the diskette drive is named DSK0:.

Remember, this is only an example. Your computer may be set up to reference the hard disk as more or fewer than six logical devices.

At some time in the future you might decide to change the number of logical devices on your hard disk. This is a sophisticated procedure, so for detailed instructions, see the document "Configuring Disk Drivers" in the *System Operator's Guide*, and follow the FIXLOG reference sheet in the *System Commands Reference Manual*.

The System Disk

The System Disk is always called DSK0:. This is where the system software is stored, and where the computer looks for it when the computer boots. Usually, DSK0: is on your hard disk, but you can also set up your computer to boot from a diskette drive, in which case the diskette would be DSK0:.

If you have a video cassette recorder or streaming tape device as part of your computer, you also have the option of booting the computer from this device if you are unable to boot from your hard system disk. Booting from a tape medium is known as a "warm boot," and is usually reserved for special circumstances when it's not possible to boot the computer from your normal System Disk on the hard disk drive.

DISK ACCOUNTS

Disk accounts are an organizational feature your Alpha Micro computer uses to help you keep track of your data. Instead of making you search through one enormous list of files for the specific one you're looking for, the AMOS operating system is designed to group files into "accounts."

Accounts are identified by a two part account number. The two numbers are separated by a comma and enclosed in brackets. The first number is called the project number, the second part the programmer number. [1,2], [200,0], and [34,11] are examples of account numbers. Since they are actually octal numbers, the digits 8 and 9 aren't used, and the highest possible number is [377,376].

The two part structure of the account number allows you another level of organization. Besides grouping files into accounts, you can group related accounts in the same project. For example, all accounts containing files dealing with payroll may be in project 50 ([50,0], [50,1], etc.).

You can also assign a password to each account if you wish, as a security measure. Anyone who doesn't know the password cannot log into the account. See Chapter 5 for how to assign passwords.

Accounts are called "disk accounts" because each account is specific to a particular device—usually a disk. For example, you may have the account [63,1] on both DSK0: and DSK1:. Though these accounts have the same account number, since they are on different devices they are different accounts, and contain different files.

You can see a list of all the accounts on any device on your computer using the PPN command. Type PPN and the name of the device you want the list for. For example, to see all the accounts on DSK0:, type:

PPN DSK0: RETURN

You can also see a list of all the files in any account, using the DIR (short for directory) command. To see a list of the files in the account you are currently in, type:

DIR/W RETURN

While you can use DIR to list the files from any account, to access the files in an account, you must log into it, as described later in this chapter.

Now that you have a general idea of what disk accounts are and how to use them, you can decide how you want to organize your own files into accounts. If you want to create more accounts on your diskette or hard disk, see Chapter 5.

You can find more information on the PPN and DIR commands in the *System Commands Reference Manual*.

USER NAMES

Your user name is how you identify yourself to AMOS. The user name system helps you control system security, allows you to send messages between users, and performs other functions.

You must enter your user name when you first log on to the computer, as described in the next section. You do not have to re-enter your user name when you switch between disk accounts.

There are three user names set up when the SBC is shipped from Alpha Micro: DEMO, SYSTEM SERVICE, and NETWORK SERVICE.

For more information on user names, and instructions on adding new ones, see the *AMOS System Operator's Guide*.

LOGGING ON

The LOG command serves two purposes: it identifies you to the computer, and lets you choose what disk account you want to access. When you first log on to the computer—either after logging off or after booting the computer—you must tell the computer who you are and what account you want to use. You can do this by entering the disk account you want. For example:

LOG [25,1] RETURN

LOG then asks for your user name. Type it and press RETURN.

You can also enter your user name in the LOG command instead of an account number. This logs you into the root account defined when your user name was set up. For example:

LOG LEE JOSEPH RETURN

This logs you into Lee Joseph's root account.

You can assign passwords to both user names and disk accounts. If the name or account you enter has a password, AMOS asks you for the password before logging you in.

Once you're logged on to the computer, you use LOG to switch to a different account. You don't need to enter your user name again, just the account you want. For example:

LOG [36,14] RETURN

If the account has a password assigned, you are asked for the password before you transfer to the account.

The account number list for each device on your computer is separate, so you may have duplicate account numbers on different disks. Therefore, to completely specify what account you want, you may need to enter both the device and account number. For example:

LOG DSK0:[7,12] RETURN

You only have to enter the device name if the same account exists on more than one device. If the account you enter does not exist, you see a message on your screen indicating you've typed an invalid account number.

For more details about the LOG command, see the *System Commands Reference Manual*. For information about user names, see the *System Operators Guide*.

THE MAIN COMMAND MENU

The SBC offers two ways for you to perform AMOS commands. You can either type the commands after the AMOS prompt symbol—as in the DIR and LOG examples in the preceding sections—or you can use the Main Command Menu.

The Main Command Menu is designed to make using AMOS easier for people who aren't yet familiar with all the options it offers. Instead of typing a command name, you choose the option you want from an interactive menu displayed on your screen.

Your computer may be set up so the Main Command Menu displays on your screen either when the computer boots, or when you log on. If your terminal doesn't run the menu automatically, you can call up the menu yourself by entering this command at the AMOS prompt:

SHELL RETURN

What You See

The Main Command Menu consists of six "boxes," some or all containing numbered choices. Depending on your terminal, you may see an area highlighted in reverse-video display—this is the cursor, also called the "selection marker." There is a prompt at the bottom of the screen, followed by the number of the option where the cursor is located.

```
                              AMOS Main Command Menu
Tuesday, September 5, 1991                                        10:45:09 AM
-------------------------+-------------------------+--------------------------
        Languages        !    Office Automation    !  Business Applications
-------------------------+-------------------------+--------------------------
11 AlphaBASIC            !21 AlphaVUE             !31 AlphaACCOUNTING
12 AlphaPASCAL           !22 AlphaWRITE           !
13 AlphaASSEMBLER        !23 AlphaCALC            !
14 FORTRAN 77            !24 AlphaMail            !
15 ANSI-74 COBOL         !25 Print a file         !
16 Alpha C               !                        !
-------------------------+-------------------------+--------------------------
  Maintenance Utilities  !    System Utilities     !     Communications
-------------------------+-------------------------+--------------------------
41 Backup                !51 System Status         !61 Remote Job Entry
42 Certification         !52 Device Definitions    !62 Set Configurations
43 Warm Boot Generation  !53 File Maintenance      !63 Set Carriage Control
                         !54 Account Maintenance   !
                         !55 Exit to AMOS          !
                         !                         !
-------------------------+-------------------------+--------------------------

                  Enter menu selection (type "?" for help): 10
```

Figure 3-1. The Main Command Menu

Making a Selection

There are two different ways you can select a menu option. Either:

- Type the number of the selection you want and press RETURN. The six major options are numbered 10 to 60.

- Use the arrow keys to move the cursor to the choice you want, then press RETURN.

  When you move the cursor, it "wraps" around the screen. When you press a key that would move the cursor off the screen, it goes to the opposite side of the menu. For example, pressing the down arrow with the cursor at the bottom of the menu moves it to the top. This makes it easy to reach any place on the menu with just a few keystrokes.

Whichever method you use, when you press RETURN the choice you selected is performed. Depending on the selection, this may display another menu, move you to an application program such as AlphaWRITE, or perform an AMOS command.

Getting Help

To get a display of helpful information, place the selection marker on the function you want information about (or type the number of the option), and press ?.

Exiting a Menu Display

To go back to a previous menu, press the ESCAPE key (often labeled ESC or ALT MODE). Or, hold down the CTRL key and type C. You will return to the next highest level of menu. To leave the Main Command Menu entirely and return to AMOS command level, select option 55, "Exit to AMOS."

For more information on the Main Command Menu, see the *AlphaMENU User's Manual*.

THE TERMINAL KEYBOARD

The first step in communicating with AMOS is to be able to type your instructions on the terminal keyboard. The keyboard is very similar to a standard typewriter's, but it has a few extra keys with special functions.

Take a moment to look at your keyboard so you can easily locate these keys later:

KEY	DESCRIPTION
RETURN	RETURN (sometimes labeled ENTER) is the carriage return key. Just as you type a carriage return on a typewriter to begin a new line on the page, a RETURN tells the computer you are ending a line of input and you want to begin a new line. The computer does not normally process an instruction from you until you type a RETURN to let it know you are finished with that line.
RUBOUT	RUBOUT is the deletion key; it backspaces AND deletes. It may be labeled RUB or DEL. If you make a mistake while typing an instruction to AMOS, you can erase it using the RUBOUT key.
SHIFT	The SHIFT key on most keyboards acts much like the shift key on a typewriter. By holding down SHIFT, you can type upper case letters and the symbols on the upper half of the keys with two symbols.
CAPS LOCK	While the CAPS LOCK key is locked down, letters you type appear in upper case. Keys other than letters are not affected by the CAPS LOCK key on most keyboards.
ESC	This key may be labeled ESCAPE or ALT MODE. It is used with several application programs (such as AlphaVUE) to signal the end of input, or to switch between command modes; however, you do not use ESC at AMOS command level.
CTRL	You use the CTRL (or CONTROL) key with other keys to enter a different kind of character—a "control character." AMOS and much of the software on the SBC interpret control characters as special instructions. To enter a control character, hold down the CTRL key and press the other key. For example, to type a Control-C, hold down the CTRL key and type the letter C. In this book, we indicate control characters this way: CTRL/C. Appendix D lists some of the control characters AMOS recognizes.

Correcting Typing Mistakes

You can correct any mistakes you may make while typing a command line as long as you have not yet pressed the RETURN key. You can:

- Press RUBOUT to erase single characters.
- Type CTRL/U to return the cursor to the beginning of the current line.
- Type CTRL/C to tell AMOS to ignore the line.

See the table above for explanations of RUBOUT and control characters.

If you press the RETURN key before correcting your mistake, and the command you entered was not a valid AMOS command, AMOS lets you know it did not understand the command. For example:

```
.PRIMT RETURN
?PRIMT?
.
```

(You meant to say PRINT.) After letting you know it does not understand PRIMT, AMOS displays its prompt symbol. You can now try again.

Your particular terminal undoubtedly has many features we haven't covered in this section. For complete information on using your terminal, refer to the owner's manual that accompanied your terminal.

A WORD ABOUT DISKETTES

If your computer contains a diskette drive, it uses 5 1/4" or 3 1/2" diskettes. When you buy 5 1/4" diskettes, ask for 2DD (double-sided, double-density, double-track) 96 TPI certified diskettes. When you buy 3 1/2" diskettes, ask for 2HD (high density) diskettes.

A diskette consists of a hard or flexible plastic jacket enclosing a thin disk of magnetically treated mylar on which your data is recorded. Never try to remove this plastic jacket—doing so will ruin the diskette.

Your dealer has ready-to-use diskettes available, containing software designed for Alpha Micro computers.

If you want to use empty, brand new diskettes to hold your own data, you need to perform a couple of simple steps before using an empty diskette for the first time. Please see "Formatting and Initializing a Diskette" in Chapter 5 for more information.

You should always have at least one diskette containing the AMOS system software, which you can use to boot your SBC in the unlikely event you aren't able to boot from your System Disk. This is called a "bootable diskette. Take special care of your bootable diskettes, since if you do have problems with your System Disk, they may be the only way you can boot your computer.

Diskettes have a finite lifetime, so be sure to make backup copies of your diskettes from time to time. The *AMOS System Operator's Guide* explains the procedures and commands for backing up data onto diskettes.

Using Diskettes

If you haven't used diskettes before, take a few minutes to look at one before you insert it in the drive.

If you are using 5 1/4" diskettes, notice the oval cutout in the plastic jacket—this is the window through which the disk drive reads the data on the diskette as the inner disk rotates within the plastic jacket.

Also note the small notch in the side of the diskette—this is the write protect notch. When this notch is covered with a small, self-adhesive tab, the drive cannot write on that diskette. Remember to write protect any disks that contain valuable data—such as a bootable diskette—so they are guarded against accidental erasure. If you want the drive to write on a diskette, make sure there is no write protect tab on that diskette.

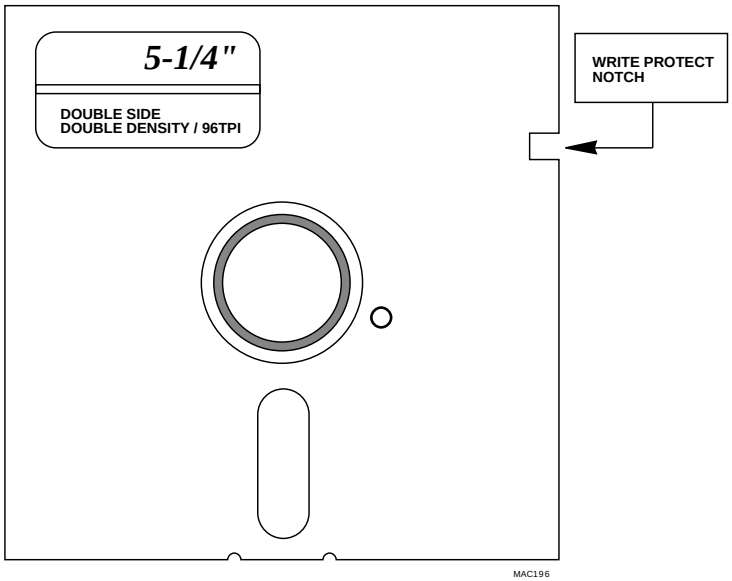


Figure 3-2. 5 1/4" Diskette

Always remember to label your diskettes by placing a self-adhesive label on them. We recommend you write on the label first, before you place it on the diskette. If you have to write on the label while it's on the diskette, use light pressure and a soft pointed writing instrument like a felt tip pen—otherwise you run the risk of damaging the diskette.

If you are using 3 1/2" diskettes, note the small sliding tab that opens or closes a small square hole in the diskette case—this is the disk lock. By sliding the tab so it uncovers the hole, you write protect the disk so it can be read but not changed. By sliding the tab so it covers the hole, you allow the disk to be written on.

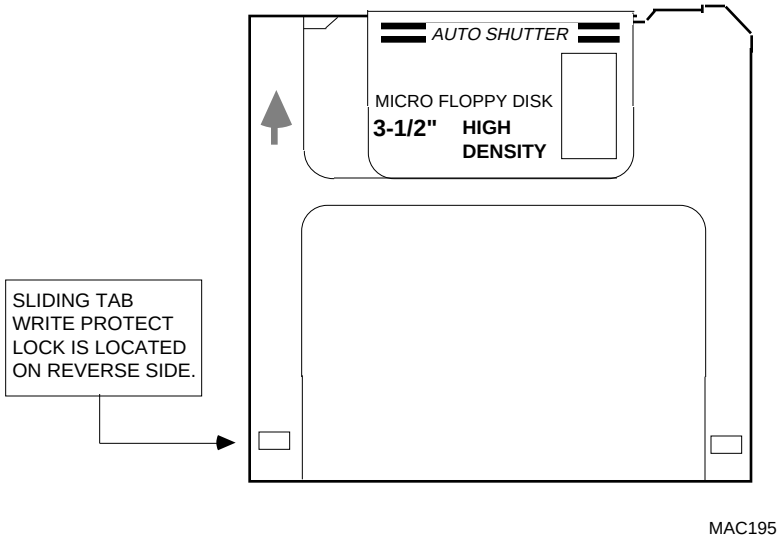


Figure 3-3. 3 1/2" Diskette

When using diskettes, be sure to follow these precautions:

- Only insert a diskette into the drive when the computer is powered up—likewise, do not leave a diskette in the drive when you turn off power to the computer. Powering the computer on and off can cause power spikes that can damage the data on your diskette.

- Whenever you insert a diskette, be sure to use the MOUNT command (discussed below) to tell your computer a new diskette is in the drive.

- Never change diskettes if the drive is busy; doing so could damage the data on the diskettes. There is a small light on the front of the diskette drive that is lit if the drive is busy.

- When you remove a diskette from the drive, store it in its envelope and place it in a box where it is protected from dust.

To insert a 5 1/4" diskette, hold it so the side with the label is up and the oval cutout is pointing away from you. Then, open the diskette drive door by turning the lever so it points toward the red indicator light. Insert the diskette so the oval cutout is on same side as the lever. Close the drive door by turning the lever 90 degrees clockwise.

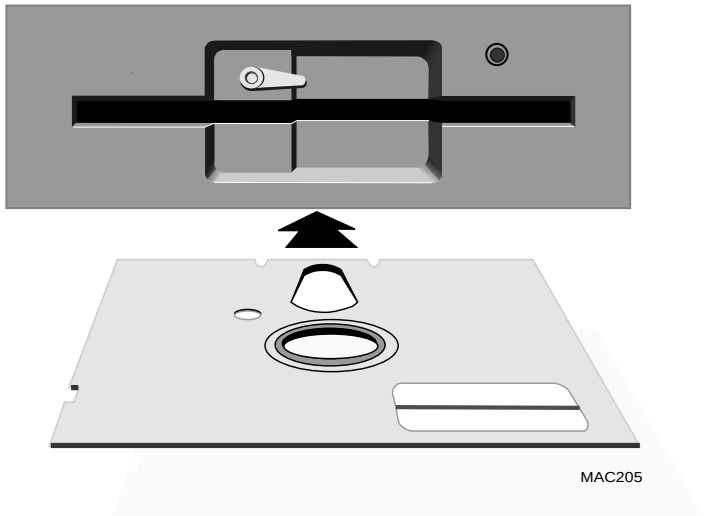


Figure 3-4. Inserting a 5 1/4" Diskette

To insert a 3 1/2" diskette, push the diskette into the door until it is seated in the drive with the label up and the sliding metal door pointing away from you. To remove the diskette, push the eject button on the front of the drive.

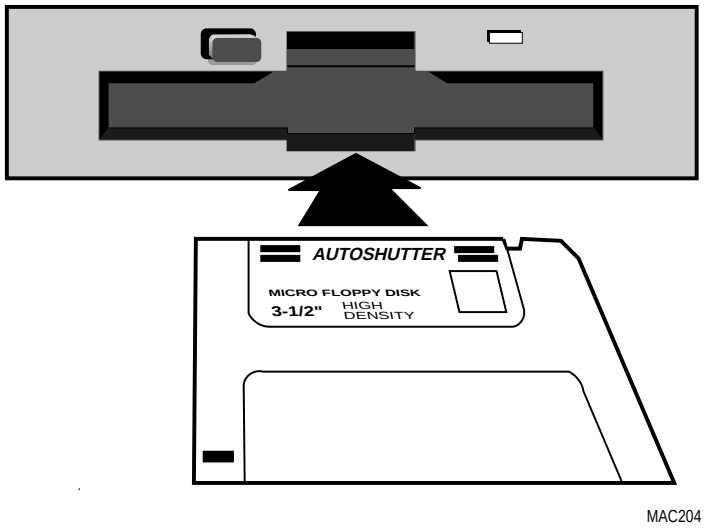


Figure 3-5. Inserting a 3 1/2" Diskette

Mounting Diskettes

Whenever you insert a diskette into the disk drive, you need to tell the computer by using the MOUNT command. This is true even if you re-insert the same diskette you just took out. If you forget to use the MOUNT command, AMOS won't know which diskette is in the drive and when you want to write on the diskette, it might scramble the data!

When you boot the computer, that process automatically mounts your boot device, DSK0:. You must mount any other disk devices in order to use them. For example, if your computer contains your boot device, DSK0:, and a diskette drive called FLV0:, you need to type the following MOUNT command at AMOS command level to access a diskette in the drive:

```
MOUNT FLV0: RETURN
```

Whenever you change the diskette in the drive, you must use MOUNT again.

1/4" STREAMING TAPE

There are three different 1/4" streaming tape drives available for the SBC, the AM-625, AM-626, and AM-627. For information on transferring data to and from streaming tape, see the *AMOS System Commands Reference Manual*. For information on cleaning tape drive heads, see Chapter 6.

1/4" Tape Drive Storage Capacity

The storage capacity is based on both the drive you have and the type of tape cartridge you use. The following table shows the different tape cartridges available and the corresponding storage capacity for the AM-625, AM-626, and AM-627 drives.

The cartridge tapes shown in the storage capacity tables are the ones specified for use by the manufacturer. Using tapes other than those recommended in the storage capacity tables may result in excessive head wear.

Device	Data Cartridge Type	Maximum Capacity
AM-625	DC6037	40Mb
AM-625	DC6150 / DC600-XTD	150Mb
AM-625	DC6250	250Mb
AM-626	DC6037	40Mb
AM-626	DC6150	150Mb
AM-626	DC6250	250Mb
AM-626	DC6320	320Mb
AM-626	DC6525	525Mb

Storage Capacity Table (cont.)

Device	Data Cartridge Type	Maximum Capacity
AM-627	DC6037	40Mb
AM-627	DC6150	150Mb
AM-627	DC6250	250Mb
AM-627	DC6320	320Mb
AM-627	DC6525	525Mb
AM-627	MAGNUS 1.0	1000Mb

Read/Write Compatibility for 1/4" Tape Drives

Streaming tape drives use many different data formats. The tape drives for the SBC can use the following formats:

- AM-625: Reads and writes in QIC-150 18-track format. Can also read QIC-120 15-track, QIC-24 9-track, and QIC-11 4-track formats.
- AM-626: Reads and writes in QIC-320 26-track and QIC-150 18-track format. Can also read QIC-120 15-track, QIC-24 9-track, and QIC-11 4-track formats.
- AM-627: Reads and writes in QIC-1000 30-track, QIC-320 26-track, and QIC-150 18-track format. Can also read QIC-120 15-track, QIC-24 9-track, and QIC-11 4-track formats.

This information is based on hardware capabilities. Some software may have further restrictions on tape format.

Loading and Unloading Tape Cartridges

To load a tape cartridge into the drive:

To avoid static discharge which could damage your computer, always ground yourself by touching the metal chassis before loading or unloading a tape cartridge.

1. Press the button on the drive's front panel to open the tape door.
2. Hold the cartridge with the metal side down. The end of the tape cartridge with the write-protect switch will enter the drive first.
3. Insert the cartridge into the drive. Keep pushing until the cartridge stops, and then close the door. After the door closes, the drive performs a quick tape positioning routine, after which it is ready for use.

Before unloading the tape cartridge, be sure the tape activity light is out. To unload, press the tape door release button and remove the tape from the drive.

Write-protecting a Tape Cartridge

The tape cartridge has a write-protect switch you can set to avoid inadvertently writing over data already on the tape. To enable this feature, turn the write-protect switch so the arrow points to SAFE. You can use a paper clip or a coin to do this. When the arrow points the other way, data can be written on the cartridge.

OPTIONAL 8MM MAGNETIC TAPE BACKUP DEVICE

The AM-645 8mm high capacity SCSI tape drive incorporates helical scan technology which affords a very high recording density and data storage capacity. It uses an industry standard 8mm tape cartridge which is removable and rewriteable. The cartridge stores approximately two gigabytes of user formatted data. The drive conforms to industry standard form factor specifications for full-height 5°1/4" devices. The order number, which includes the drive, mounting kit, and installation instructions is PDB-00645-10.

All operator controls are located on the front panel of the drive. The following sections discuss the various controls and indicators.

Unload Button

The unload switch is a button located on the front of the drive. It rewinds, unloads, and ejects the data cartridge.

Drive Status LEDs

There are two status LEDs on the front panel of the drive:

- **Power-up Initialization Indicators**

  During power-up initialization, the RED and GREEN LEDs are both turned on indicating the drive is performing power-on self-test diagnostics. The time required to complete self-test diagnostics and initialization routines is 120 seconds maximum. When the diagnostics are complete, both LEDs are turned off. If self-test fails, both the GREEN and RED LEDs flash.

- **Power-Up Indicator**

  After completion of the self-test diagnostics, the GREEN LED indicates the drive status. When a tape is loaded and the drive is ready for use, the GREEN LED will be on.

Cartridge Load Procedure

To load the 8mm cartridge into the drive:

1. Ensure the write protect tab on the 8mm tape has been set correctly for the desired operation. The next section describes the write protect switch.

2. If the tape door is closed, press the UNLOAD button to open the tape door located on the front of the drive.

3. Insert the 8mm tape, label side up, with the pivoting lip that protects the tape facing the drive.

4. Gently close the drive door. The tape will do a quick tape positioning routine and the GREEN LED will come on.

Write Protect Tab

The 8mm tape cartridge is equipped with a "write protect switch" to prevent accidental writing to the tape. The write protect switch is a small sliding tab located on the rear of the tape cartridge. When the red tab is visible in the recessed area of the write protect switch, this indicates the tape is write protected. Slide the tab in the opposite direction and the tape is write enabled.

CHAPTER 4

WHERE DO I GO FROM HERE?

Your Alpha Micro computer is extremely versatile—it can do so many different things that, at this point, you might be somewhat undecided as to where to start.

Your next step is to learn something about the software you can run on your SBC. This chapter deals with some of the questions you may be asking:

- What software is available for Alpha Micro computers?
- What Alpha Micro documents should I read next?

INTRODUCTION TO AMOS SOFTWARE

This section will give you an idea of some of the software available for your SBC.

The Operating System, AMOS

AMOS, the Alpha Micro Operating System, supervises all of the programs that run on your computer. Regular updates to the AMOS operating system and its accompanying system software are available from your dealer.

Programming Languages

The AlphaBASIC programming language is a standard part of the software for your SBC. AlphaBASIC is an enhanced version of BASIC, and contains many business oriented features not found in standard BASICs, such as mapped variables which allow record definition, automatic string/numeric mode conversion, and easy to use random and sequential file handling. AlphaBASIC also provides an ISAM (Indexed Sequential Access Method) interface. AlphaBASIC PLUS, which is available with AMOS 2.0 and later, contains even more features such as sophisticated data structures and program control constructs.

Please see your dealer for information on other programming languages available for your SBC, such as AlphaCOBOL 74, AlphaFORTRAN 77, AlphaC, and AlphaPASCAL.

Text Preparation

If you are going to be creating documents on your computer, you will be interested in the word processing programs available. AlphaVUE, a screen-oriented text editor, allows you to use your terminal to create and change documents. You see the text of your letter or report on the terminal screen as you enter it on the keyboard. With AlphaVUE, you can move quickly through the document, correcting and adding words, inserting or deleting lines, moving paragraphs, and so on.

The TXTFMT program processes the documents you create using AlphaVUE, and automatically formats them according to your commands. TXTFMT provides features such as right margin justification, page numbering and titling, automatic list creation, and automatic index and table of contents creation.

Also, see the section on "Office Information Products" below for information on the AlphaWRITE word processing package.

Utility Programs

The standard AMOS release contains over 150 utility programs and device drivers. In addition, because of the unique way AMOS handles commands, you can easily create your own utility programs.

Some of the standard utility programs allow you to do such functions as: copy, rename, and erase files; sort the data inside files; use a task management system to schedule and perform background tasks that run without operator control; print files while you perform other tasks at the same time; use the ISAM system to organize and retrieve information quickly; and back up data automatically at a convenient time when nobody is using the computer (in the middle of the night, for example).

Application Programs

Your local Alpha Micro dealer has a variety of programs available for your SBC, many of which are aimed at specific business needs such as: general accounting, dental office, legal office, real estate management, manufacturing inventory control, educational learning systems, restaurant management, medical office billing, laboratory analysis, and many others. Please see your dealer for details.

Office Information Products

Several Office Information Products are available separately from your local Alpha Micro dealer. The Office Information Products series includes:

- AlphaCALC, an electronic spreadsheet program that prepares "what if" financial models quickly and easily.
- AlphaWRITE, a sophisticated word processing package that provides spelling checking, hyphenation, form letter preparation, automatic outlining and much more.
- AlphaNET is a low-cost way to transfer files, exchange information, and share resources between different Alpha Micro computers.
- AlphaMAIL is an electronic mail system for sending and receiving messages and reminders among multiple users.
- MULTI is a window-based environment manager, letting you use multiple programs on one terminal at the same time, and providing a number of desk accessory features, including a phone list, alarm clock, notepad and others.
- AlphaOFFICE combines many of these products into an easy to use system that allows you to easily switch between functions.

See your dealer for more information on these and other Alpha Micro Office Information Products.

ADDITIONAL DOCUMENTATION

Now that your system is up and running, you are ready to start exploring the world of Alpha Micro. Your guide to the new territory is the Alpha Micro software documentation. This section gives you an idea of which documentation to consult for directions depending on the path you want to take.

Your SBC is a member of the AMOS family of Alpha Micro computers, and the software documentation that applies to other AMOS based computers applies to yours, too.

You may purchase any book mentioned in this chapter separately; in addition, a multi-volume software documentation library is available containing all the AMOS software manuals listed below. You can order any of these books by calling your dealer.

Here’s an idea of what to look at next:

"I Want to Start at the Beginning"

If you are new to Alpha Micro computers, we recommend you read the *AMOS User's Guide*. This book is a practical introduction to the Alpha Micro computer, containing instructions for many of the procedures you'll use everyday. It expands on many of the topics discussed in Chapter 3.

"I Want to Learn How to Maintain My Computer"

If you are going to be responsible for making data backups, adding new terminals or printers to the computer, running disk diagnostics, and otherwise managing and maintaining the system, we highly recommend you read the *System Operator's Guide*, and obtain a copy of the *System Commands Reference Manual*.

The first book explains how to perform the maintenance and diagnostic procedures required by the Alpha Micro system software. The second book will prove an invaluable reference tool—it contains short reference sheets on over 150 AMOS programs.

"I Want to Use a VCR for File Backup"

For instructions on using a Video Cassette Recorder to back up your data, see the *AMOS Video Cassette Recorder Backup Software* manual.

"I Want to Do Text Processing"

If you want to use your computer to prepare documents, there are several manuals you should look at:

The *AlphaVUE User's Manual* for information on the AlphaVUE screen-oriented text editor; the *TXTFMT User's Manual* for information on the TXTFMT text formatting program; and the *AlphaVUE/TXTFMT Training Guide*, a tutorial manual on document preparation for the computer novice.

Although AlphaVUE and TXTFMT are the text processing programs included with the standard AMOS software, you may want to investigate the other word processing packages your dealer has available for your computer, such as AlphaWRITE.

"I Want to Write Computer Programs"

If you have programmed in BASIC before, and want to learn how to use the Alpha-BASIC programming language, refer to the *AlphaBASIC User's Manual*.

If you are an experienced assembly language programmer who wants to write machine language programs for your Alpha Micro computer, we recommend you read these manuals:

- *Alpha Micro Instruction Set*, which contains information on the assembly language instruction set used by the Alpha Micro computers.

- *AMOS Assembly Language Programmer's Manual* which contains information on the assembler, linkage editor, object file librarian, and global cross reference program used by the assembly language programmer.

- *AMOS Monitor Calls* which contains information on the interfaces to the AMOS operating system available to the assembly language programmer.

- *AlphaFIX User's Manual* which contains information on the screen oriented debugger program, AlphaFIX.

CHAPTER 5

SYSTEM ADMINISTRATION

Many of our manuals refer to the "System Operator," and you may wonder who this person is. "System Operator" is the title we give the person whose job it is to make sure the computer runs efficiently, and who has access to the files and programs that comprise the system software.

AMOS provides many program tools to support system administration functions. This chapter covers many of these procedures, including:

- Allocating disk accounts.
- Modifying the system initialization command file, AMOS32.INI.
- Defining logical devices.
- Backing up your data.
- Disk diagnostic procedures.
- Formatting and initializing diskettes.

DISK ACCOUNTS

Theoretically, everyone could store their files on the disk without any type of organization. A list of all the files—the system software, your special application programs, memos, everything—might be several pages long and would be a nightmare to decipher.

As discussed in Chapter 3, a better technique to organize your files is to create "accounts" in which to store as many files as you wish. An account is just an arbitrary designation for a group of files. Your system software is already organized into various accounts, and you can add as many or as few additional ones as you need. The following paragraphs describe how to add accounts to your disks.

Passwords

You can assign a password to any account, if you wish. The password acts as a mild security measure to prevent a casual user from accidentally logging into the wrong account. Passwords do not prevent files from being copied into or out of an account, and can be easily changed or erased using the SYSACT command described below.

Organizing the Disk

Because there is the danger of logging into the wrong account if you have accounts with the same account numbers on different disks, you may want to establish a numbering scheme to prevent duplicates. You may want to reserve accounts [1,*] through [77,*] for DSK0:, accounts [101,0] through [200,377] for DSK1:, and so on.

If you find assigning and remembering account numbers cumbersome, you can substitute a predefined "ersatz" name for the account number. One of the files in your system software is called ERSATZ.INI. It's located on DSK0: in account [1,4], and contains several predefined ersatz names, but you can add more of your own, if you wish. For example, one of the predefined ersatz account names is OPR: for DSK0:[1,2]. So whenever you need to log in the account DSK0:[1,2], you can type LOG OPR: instead. The *AMOS User's Guide* contains more information on ersatz names and how you can use them.

Adding New Accounts

There is no specific number of accounts you must have; you can add as many as you wish, as long as there is room on the disk. When your computer is brand new, the only accounts are the ones the system software is stored in. You'll want to add more accounts from time to time as your business grows. To do so, use the SYSACT command, following these steps:

1. If you want to see a list of the disk devices on your computer, type SYSTAT and press RETURN. The end of the display lists the available disk devices. Decide what device you want to add the accounts to.

2. Log into account [1,2] on any hard disk device (for example, DSK0:). Type:

   LOG DSK0:[1,2] RETURN

   If you weren't already logged into another account, you'll need to enter your user name after the LOG command. If there's a password for this account, you'll be asked for it, too.

3. Type the SYSACT command followed by the name of the device you want to add the accounts to. For example:

   SYSACT DSK1: RETURN

4. SYSACT responds with its prompt symbol, an asterisk. If you'd like to see a list of all the things SYSACT can do, type H (for Help) and press RETURN:

   *H RETURN

5. From the list you see next, you can select different functions to perform. You want to add a new account, so type A and the account number you want to add. For example:

   *A 100,5 RETURN

6. SYSACT responds:

   ```
   Password:
   ```

   SYSACT asks if you want to protect the new account with a password. You can enter a password of up to six characters, or you can just press the RETURN key if you don't want to assign a password. If you do enter a password, whenever anyone tries to log into that account, they have to type the password. If they don't know the password, they aren't allowed to log in.

7. You can see a list of all the account numbers on the disk device and their passwords by selecting the L (List) function, like this:

   *L RETURN

8. When you are finished using the SYSACT command and are ready to return to AMOS command level, select the E (end) option:

   *E RETURN

   SYSACT returns you to AMOS command level and the AMOS prompt symbol appears on your screen.

For complete information on using the SYSACT command, see the SYSACT reference sheet in the *System Commands Reference Manual*.

MODIFYING THE AMOS32.INI FILE

The system initialization command file for your computer is named AMOS32.INI. This special file in account DSK0:[1,4] defines to the AMOS operating system all of the devices connected to your SBC, the jobs that will run on the computer, and special programs which need to be loaded into system memory. As requirements change or as devices are added on to your computer, you must modify the AMOS32.INI file.

A very simple sample AMOS32.INI file is shown below. You will become more familiar with it as you read the discussion following it.

Warning: Do not change any lines in the AMOS32.INI file other than those discussed here until you're familiar with the documentation on the system initialization file in the *System Operator's Guide*.

```
:T
;
JOBS 5
;
JOBALC MASTER,JOB2
;
TRMDEF TERM1,AM140=0:9600,ALPHA,100,100,100
TRMDEF TERM2,AM140=1:9600,ALPHA,100,100,100
;
VER
PARITY
;
DEVTBL DSK1,DSK2,DSK3,DSK4
DEVTBL TRM,RES,MEM
DEVTBL /VCR0
;
BITMAP DSK,3540,0,1,2,3,4
;
ERSATZ ERSATZ.INI
;
SYSTEM SYSMSG.USA
SYSTEM CMDLIN.SYS
SYSTEM SCNWLD.SYS
SYSTEM
;
SETJOB JOB2,TERM2,512K,JOB2.INI
;
MEMORY 0
```

Changing User Memory

Exactly how many jobs are defined on your computer is determined by the JOBS command, and how much of the computer's total supply of memory is assigned to each job is determined by the MEMORY command. If you or the System Operator of your computer decide to add jobs or alter memory allocations, you should first refer to the *System Operator's Guide*.

To see a display of the current memory allocations on your computer, type the SYSTAT command:

SYSTAT/N RETURN

In addition to many other pieces of information about the status of the computer, SYSTAT shows how much memory is assigned to each job. The SYSTAT command is explained in detail in the *System Commands Reference Manual*.

If you decide to change the amount of memory allocated to a job, you can modify the AMOS32.INI file following the instructions below.

NEVER change the AMOS32.INI file directly! Always make a copy of it and modify the copy, as described below.

Briefly, here is a summary of what you need to do:

1. Log into DSK0:[1,4] and make a copy of the AMOS32.INI file:

   COPY TEST.INI=AMOS32.INI RETURN

2. Use the AlphaVUE text editor to see the contents of the test file:

   VUE TEST.INI RETURN

   If you are unfamiliar with AlphaVUE, refer to the *AlphaVUE User's Manual*.

3. Scan through the file until you come to the ATTACH statement that attaches the terminal to the job whose memory you want to change. Following the ATTACH statement are several other statements, among which is the MEMORY statement.

   The number after the MEMORY statement is the amount of memory currently allocated to the job. You can increase this number or decrease it as long as you keep in mind how much total memory your computer has, and how much memory the other jobs on the computer need.

4. The last statement in the AMOS32.INI file is MEMORY 0. This statement allocates to the System Operator's job all the memory not specifically assigned to other jobs. Therefore, if you want to increase the amount of memory assigned to the job attached to the operator terminal—the terminal the computer boots on, connected to Port #0—all you need to do is subtract memory from some other job.

5. When you've changed the MEMORY statements, you need to reboot the computer to put them into effect. When everyone who might be using the computer is either logged off or at AMOS command level, press the ESC key to get to AlphaVUE command level, type the letter G, and press RETURN. The computer automatically reboots using the TEST.INI.

6. After the computer finishes booting, use the SYSTAT command to see how much memory is assigned to each job on the computer. If it meets with your approval, log back into DSK0:[1,4] and rename the TEST.INI to AMOS32.INI:

   RENAME/D AMOS32.INI=TEST.INI RETURN

   Be careful not to rename your TEST.INI too soon. You might want to let the computer run awhile to test out the new memory allocations before you rename it. Then, if you decide you don't want to keep the new memory allocations, you can always press the RESET button to reboot with your former AMOS32.INI file.

Adding Jobs

When you increase the number of terminals connected to your computer, you also need to modify the AMOS32.INI file so the system software knows what ports they are connected to and what jobs they are attached to.

1. To add jobs to your computer, once again log into DSK0:[1,4] and make a copy of your AMOS32.INI file:

   COPY TEST.INI=AMOS32.INI RETURN

2. Use the AlphaVUE text editor to look at the TEST.INI file:

   VUE TEST.INI RETURN

3. At the beginning of the TEST.INI file is a JOBS statement. The number following the JOBS statement represents the total number of jobs on your computer.

   If your computer has three jobs now and you want to add two more jobs, change the number in the JOBS statement to 5 or more. For example:

   JOBS 5

4. On the lines following the JOBS statement, there are one or more JOBALC statements. You can define each job in a separate JOBALC statement, or you can define several jobs in the same JOBALC statement by separating the jobnames with commas. For example:

   JOBALC JOB4,JOB5

   Each jobname—which can have up to six characters—defines a job on your computer. The total number of jobs defined in the JOBALC statements must be equal to or less than the number in the JOBS statement above.

5. You also need to define the terminals you're going to attach to these jobs. The TRMDEF statement defines the terminal characteristics and tells the computer which port on the back panel it's connected to.

   Here is a sample TRMDEF statement:

   TRMDEF TRM4,AM140=4:9600,AM65,100,100,100

   Using this sample, let's go over the kinds of information you must tell AMOS about a terminal.

   - **TRM4** is the terminal name.

- **AM140** is the name of the interface driver for the circuit board the terminal is connected to. See Appendix F for details on what interface drivers to use on the SBC. Whenever you define a new terminal, use the AM140 interface driver.

- **4** is the I/O port address for the interface controller board the terminal is attached to.

- **9600** is the baud rate of the terminal. See Appendix A for information on the baud rates supported on the SBC.

- **AM65** is the type of terminal.

- **100,100,100** are buffer sizes, expressed in number of characters.

For a more extensive explanation of what each of these items represents, see the part of the *System Operator's Guide* on the system initialization command file.

6. Now you can use the SETJOB statement to attach the terminal defined in the TRMDEF statement with the job defined in the JOBALC statement.

```
SETJOB JOB4,TRM4,512K,JOB4.INI
```

This statement attaches JOB4 to TRM4, assigns JOB4 512K bytes of memory, and tells the operating system to execute the commands in JOB4.INI. The format for the JOB4.INI file would look like this:

```
FORCE JOB4
LOG DSK6:[200,2]
JOHN SMITH
VER
```

The JOB4.INI file uses the FORCE command to log JOB4 into a user account. This is followed by the user name applicable to that account. The user name is followed by the VER command, which unlocks the keyboard.

You will need to repeat this process for each of the jobs you wish to add to your computer.

If everything goes all right, and the new terminals and jobs work to your satisfaction, you can rename the TEST.INI to AMOS32.INI:

```
RENAME/D AMOS32.INI=TEST.INI RETURN
```

If there was something wrong with the changes you made, do not rename the TEST.INI file. Press the reset button to reboot the computer with the original AMOS32.INI file. Now you can use AlphaVUE to correct the TEST.INI and try again.

BACKING UP YOUR DATA

Once you begin using the SBC, you will soon find yourself operating it with confidence and ease. However, no matter how smoothly everything goes, please remember one important thing—you must keep current copies of the data you are working on! This copy is your "backup."

Computers and data storage devices are very reliable, but nobody can guard against an unforeseen occurrence like a power outage, spilled cup of coffee, fire, or hardware malfunction. Such disaster can happen to anyone.

Your data is probably one of your most valuable possessions. How long would it take to re-enter the entire company payroll, all of your accounts receivable invoices, or your research journal article if they were lost? And, what if you could not reconstruct the information no matter how much time you had?

All SBC's come with some type of data backup device. Whether your backup device is a video cassette recorder, diskette drive or streaming tape drive, learn to use it! Develop regular backup procedures and follow them! If disaster strikes, you'll be glad you had a little foresight.

You should back up some or all of the data on your computer at regular intervals. How often you need to back up depends on how often you add or change data. If you add important data every day, you should back up your system each night. If the data changes only once a week, back up once a week, etc.

As mentioned in Chapter 2, you should be especially sure to make at least one copy of your System Disk onto a medium that will let you boot your system if, for some reason, you cannot boot from your System Disk. Keep this "warm boot" tape in a safe place in case you need it.

You can use the WRMGEN program to create a warm boot monitor streamer tape or VCR cassette. For more information on the VCR and on warm boot monitors, see the *System Operator's Guide* or the manual *AMOS Video Cassette Recorder Backup Software*.

Because both backup and diagnostic procedures—discussed below—usually must be done when only one job is accessing the disks, it is wise to run them when other users are off the system (for example, at night or on weekends). By using the Task Manager or the SLEEPR command within a command file, you can run backups and tests in the middle of the night when they won't interfere with other users. See the *Task Manager User's Manual* for details on how to do this.

ANALYZING THE DISK

A disk diagnostic program reads data from a disk. If it cannot read an area of the disk, it reports the problem to you. Checking your system frequently with disk diagnostic programs helps prevent data loss—the sooner you catch a malfunction, the less data is likely to be affected.

The type of problem found by disk diagnostics is known as a "hard error," because it means data is lost. A "soft error" means the computer had trouble reading the data, but data was not lost. Disk diagnostics do not report soft errors.

If a diagnostic program indicates problems, you may need to restore data from a backup copy or reconstruct the data on a damaged disk. If you have this type of problem, consult the section "Recovering From Disk Errors" in the *System Operator's Guide*.

Before running any of the disk diagnostic tests, especially if you suspect a problem, it is a good idea to use the SET DSKERR command:

SET DSKERR RETURN

SET DSKERR causes the system to report the location of any hard errors the diagnostic program finds. If you don't use SET DSKERR, the diagnostic tells you only that an error occurred, not where on the disk it happened. You must run the diagnostic program from the same job where you used SET DSKERR.

The next two sections discuss two very useful diagnostic programs, REDALL and DSKANA.

You can find more information on disk diagnostic programs in the *System Operator's Guide* and the *AMOS User's Guide*.

The REDALL Command

REDALL reads every block of data—or the number of blocks you choose—on the disk you specify, and reports any hard errors. It does not alter the data on your disk.

REDALL works on both hard disks and diskettes. It is a good idea to run REDALL for each disk on your SBC occasionally, possibly once a week. That way, if any disk problems develop, you can be sure of detecting them quickly.

To use REDALL, perform these steps:

1. To read all the blocks on a disk, enter REDALL followed by the device name of the disk you want to read. For example:

   REDALL DSK2: RETURN

2. If you don't want REDALL to read all blocks on the disk, follow the disk specification with the number of blocks you want read:

   REDALL DSK2:100 RETURN

   Do not put a space between the device specification and the number of blocks. The command above tells REDALL to read the first 100 blocks on DSK2:.

3. REDALL now tells you the number of blocks it is reading. For example:

   ```
   REDALL DSK2: RETURN
      Reading 13800 blocks
      EXIT
   ```

4. REDALL ends when it finishes reading the blocks. If any errors occur, REDALL displays the appropriate error message on your screen.

The DSKANA Command

The DSKANA command is an important part of your disk maintenance routine. DSKANA analyzes the data on a specified disk and reports lost and mislinked disk blocks, inconsistent block counts, and other file errors.

Each file on the disk is stored in one or more disk blocks. AMOS keeps track of which disk blocks are currently used in files and which are not by means of a special structure called a "bitmap." Each disk has its own bitmap.

DSKANA compares the information in the bitmap with the actual data on the disk to make sure the bitmap is accurate. For example, if DSKANA finds a disk block that is part of a file, but the bitmap shows the block not in use, DSKANA reports an error. When DSKANA finishes analyzing the disk, it usually rewrites the bitmap.

Use DSKANA frequently on all of your disks. It is a good practice to use DSKANA on every disk just before you back up the files on that disk.

For more information on DSKANA, see the *System Commands Reference Manual*.

NEVER use DSKANA (unless you are using the /C option described below) while other users are accessing the specified disk; doing so may damage the bitmap and the files on the disk.

To use DSKANA, follow these steps:

1. Log into OPR: by typing:

   LOG OPR: RETURN

2. Type DSKANA followed by the device name of the disk you want to analyze. For example, to analyze DSK1:, type:

```
DSKANA DSK1: RETURN
```

3. You now see:

```
[Begin analysis of DSK1:]
```

As DSKANA checks the disk, it displays the disk account numbers and, when it finishes, it displays the results of its analysis. For example:

```
DSKANA DSK1: RETURN
[Begin analysis of DSK1:]
[1,2]
  .
[100,20]
[The following blocks were marked in use but not in a file]
 1767   1772   2562   3456   6265

[The following blocks were in a file but not marked in use]

[Rewriting BITMAP]

No file errors
```

If you see the "No file errors" message, the file structure on the disk is intact. If DSKANA lists a number of file errors, there is a problem with the disk's file structure. Your next step is to run DSKANA again, using either the /L or /E option—discussed below—to see where the errors are on the disk.

For the complete procedure to follow if DSKANA finds any file errors, see "Recovering From Disk Errors" in the *System Operator's Guide*.

DSKANA Options

DSKANA has several options, allowing you to select exactly what information you want to see. Your choices are:

OPTION	FUNCTION
None	Displays account numbers on disk and summary only.
/C	Same information as default, but does not rewrite bitmap.
/E	Lists files and blocks in which any errors occur.
/L	Lists all files and blocks on the disk.

To use one of these options, place it after the DSKANA command like this:

```
DSKANA DSK1:/C RETURN
```

As mentioned above, you need to use the /L or /E option to find the location of any file errors DSKANA detects. The /C option is discussed in the next section.

To see the list of DSKANA options, type DSKANA without specifying a device name.

The CHECK Option and Automatic Backups

At times, you may want to have DSKANA examine a disk without re-writing the bitmap, especially when using an "automatic" backup method such as a command file or the Task Manager to perform the backup.

The reason for this is simple: assume you run DSKANA at night as part of an automatic backup procedure. If anyone on your computer leaves a file—such as an AlphaVUE or AlphaWRITE document—open on the device DSKANA is checking, DSKANA doesn't take the open file into account when it rewrites the bitmap for the device. When the person returns in the morning and writes the file to the disk, it causes a bitmap error, because the system didn't know the file was open. This could corrupt the disk, causing you to lose data.

To run DSKANA without rewriting the bitmap, use the /C option switch. You see DSKANA's normal display when you use the /C option, except for the `[Rewriting BITMAP]` message.

FORMATTING AND INITIALIZING A DISKETTE

Before you use a new diskette for the first time, you must format it. Formatting configures the diskette so it is ready to receive and hold data in the pattern your SBC uses. Then you must initialize the diskette, which sets up its initial account structure.

Follow the steps below to format and initialize a diskette.

These steps erase any data already on a diskette! Make sure the diskette is empty or does not contain files you need before you format it. You can use the command **DIR Devn:[°]**, where **Devn:** is the device name of the diskette drive, to see if there are files on the diskette.

1. Use the LOG command to log into the System Operator account account [1,2] on DSK0:. Type:

   LOG OPR: RETURN
   ```
   Logged into OPR:
   ```

   If you weren't already logged in, enter your user name when the prompt for it displays.

2. Insert the diskette into the drive as described in Chapter 3. Do not use the MOUNT command. Instead, enter:

   FMTFLP Devn: RETURN

   where Devn: is the name of your drive—probably FLV0:. (Chapter 3 discusses device naming conventions.)

   You now see the message:

   ```
   BEGIN FORMATTING
   ```

   When it is finished, FMTFLP displays:

   ```
   EXIT
   ```

   The diskette is now formatted. Before you can use the diskette, you need to initialize it.

3. Now, use the SYSACT command to initialize the diskette. Type:

   SYSACT Devn: RETURN

4. You now see the SYSACT prompt symbol, an asterisk. Type an I (the SYSACT Initialize command) and press RETURN:

   *I RETURN

SYSACT now asks you to confirm this command:

```
Initializing the disk clears all files - enter Y to confirm:
```

Initializing the diskette erases any data on it, so be sure the correct diskette is in the drive and *you entered the correct device name* before you answer.

Type a Y and press RETURN. Now SYSACT asks you:

```
Reserve space for how many accounts?
```

The default is 64 accounts, which is probably more than enough. Press the RETURN key to accept this number.

5. Finally, on AMOS 2.0 and later systems, SYSACT asks:

```
Create extended directory structure?
```

Type **Y** RETURN to use extended disks, or **N** RETURN to use traditional-format disks.

6. Now, use the E command to leave SYSACT:

**E* RETURN

You have now left SYSACT and are at AMOS command level.

The diskette is now ready to use. In order to log into the diskette and write data to it, you need to add accounts to the diskette. Use the SYSACT command again and use the A (Add) option as described earlier. For example, to add accounts [100,2] and [120,0] on the diskette in device FLV0:, type the following commands:

SYSACT FLV0: RETURN
**A 100,2* RETURN
Password: RETURN
**A 120,0* RETURN
Password: **MINE** RETURN
**E* RETURN

In this example, one of the new accounts, [100,2], is not protected by a password, and the other, [120,0], is protected by the password MINE.

For more information on FMTFLP, LOG, and SYSACT, refer to the *System Commands Reference Manual*. For more information on disk accounts, see the *AMOS User's Guide*.

CHAPTER 6

PREVENTIVE MAINTENANCE

The SBC requires little care. However, preventive maintenance is an integral part of keeping any computer system running at peak efficiency. To safeguard your investment, we recommend you establish a regular maintenance schedule for your equipment.

This chapter contains some recommended maintenance procedures for:

- Diskettes, video cassettes, streaming tape cartridges.
- The video cassette recorder, disk drive, tape drive.
- The main enclosure.

CARE OF DISKETTES/VIDEO CASSETTES

Because they are both magnetic recoding media, diskettes and video cassettes are somewhat similar in the kind of care and environment they require.

Here are some hints to remember:

1. The recording surface for both cassettes and diskettes is contained within a protective enclosure—never try to remove this enclosure or touch the recording media within.
2. Treat cassettes and diskettes gently. Fingerprints, scratches, spills, and dirt can ruin them.
3. Keep diskettes stored in their paper or plastic envelopes and in a box. Keep cassettes stored in their cardboard or plastic cases. This helps them stay clean.
4. Never expose diskettes or cassettes to an electromagnetic field—doing so could cause your data to disappear! For example, do not leave diskettes on top of the SBC since various items within the SBC enclosure emit a strong magnetic field.
5. Avoid temperature extremes. Do not expose diskettes and cassettes to temperatures below 50 degrees Fahrenheit (10 degrees Celsius) or above 125 degrees Fahrenheit (52 degrees Celsius).

The diskettes and cassettes should be at about the same temperature as your SBC or spurious device errors could result. So, if the place you store the media has a very different temperature than the area where your SBC is installed, place the diskette or cassette near your SBC and give it a few minutes to adjust to the new temperature before using it.

CARE OF STREAMING TAPE CARTRIDGES

Cartridge tapes can store data from an entire disk, so they are worth taking care of properly. Here are a few tips:

- Keep cartridges in their boxes when not in use.
- Cartridge tapes should be acclimated to computer-room conditions before use. Substantial differences in temperature or humidity may cause problems. If the cartridge has been stored out of the computer room, it should be returned to the computer room at least eight hours before use. (If the cartridge has been in a different environment for less than eight hours, it should be kept in the computer room for at least as long as it was outside it.)
- Don't expose a tape to extreme temperatures (above 110 degrees Fahrenheit or below 40 degrees) or humidity (above 80% or below 20%).
- Store cartridges with the write-protect switch in the SAFE position.
- Keep magnets away from your tapes. Even weak magnets, such as those in paper clip holders, can erase data on a cartridge tape.

DISKETTE DRIVE/VIDEO CASSETTE RECORDER MAINTENANCE

Both the VCR and the diskette drive require periodic cleaning of the read/write heads. A regular cleaning schedule can prevent problems, such as data loss, which can result from dirty heads. If you do start noticing data loss with either of these two devices, cleaning the heads will probably take care of it.

You can clean diskette drives using a special head-cleaning kit available from computer supply stores.

Although products are available from video stores for cleaning VCR heads, we recommend you follow the head cleaning procedure suggested in the manufacturer's manual that accompanied your VCR.

1/4" STREAMING TAPE DRIVE CLEANING PROCEDURES

It is very important to clean the read/write head of your tape drive periodically. Cleaning the tape drive read/write head is the user's responsibility. If you use your cartridge tape drive to do one or more backups per day you should clean the heads at least once a week. For more frequent use, keep in mind the following guidelines:

- When you use new tapes exclusively or often, clean the head after every two hours of tape drive running time.

- If you reuse tapes most of the time, clean the head after every eight hours of running time.

For the AM-625 and AM-626 streaming tape drives, follow these cleaning procedures: The head is a brass-colored metal square that can be seen in the tape slot. Use a lint-free cotton swab dipped in isopropyl alcohol (at least 91% strength) to rub the surface of the head. Then rub the head with a dry swab to prevent residue buildup. Do not use 70% rubbing alcohol.

CLEANING THE AM-645 TAPE DRIVE READ/WRITE HEADS

Exabyte, the drive manufacturer, recommends cleaning the read/write heads after every 30 hours of tape motion, which is approximately every 30 to 50 gigabytes of data transferred. Following this program using the special Exabyte 8mm Cleaning Cartridge will result in a cleaner drive resulting in fewer read/write problems.

The Exabyte Cleaning Cartridge is available through Exabyte's direct sales. To order a cleaning cartridge, use the following address and telephone number:

Exabyte Corporation
1685 38th Street
Boulder, Colorado 80301

1-800-767-TAPE

MAIN ENCLOSURE

The SBC main enclosure is sturdy painted sheet metal. You can clean it as you would any other painted surface, using a gentle detergent. Remember, however, that if any liquid makes its way inside the enclosure, severe damage to the system could result. So, a light dusting is the safest cleaning procedure, and probably all the main enclosure will require.

CHAPTER 7

TROUBLESHOOTING PROCEDURES

We believe you will find your Alpha Micro computer easy to install and use, and be pleased with its exceptional reliability. However, if a problem should occur, look at the list of symptoms below to find practical information on diagnosing and correcting the problem. Some of the problems below are the result of improper installation, while others can occur through user error.

To make troubleshooting your computer as simple as possible, we have defined several procedures to use in tracking down problems. These procedures should either guide you to finding and fixing the problem, or take you to a point where you can verify a major hardware failure or software problem has occurred.

A hardware failure should be handled by your dealer.

A software problem, on the other hand, might be something you can handle yourself. However, we do not give software checkout procedures in the sections below. This is because such procedures require you to be a fairly experienced user of the computer. With experience, you should have no problem in tracking down and fixing such problems. For information on software procedures, refer to the *AMOS System Operator's Guide*. For now, we recommend you contact your dealer if you have a software problem you cannot fix easily.

THE SYMPTOMS

Symptom #1: No Display on the Operator Terminal Screen

If you see no characters on the screen at all when you boot the computer, perform the following troubleshooting procedures in the order given:

[ ] Check Power/Run/Memory Lights (Procedure #1)
[ ] Check the Computer Status Codes (Procedure #2)
[ ] Powerup/Reset (Procedure #3)
[ ] Check Terminal/Printer (Procedure #4)
[ ] Self Test (Procedure #5)
[ ] Alternate Boot (Procedure #6)

Symptom #2: Scrambled Characters on the Terminal Screen

If the characters you see on the screen after you boot up are not legible text, perform the procedures listed below in the order given:

[ ] Check Power/Run/Memory Lights (Procedure #1)
[ ] Check the Computer Status Codes (Procedure #2)
[ ] Check Terminal/Printer (Procedure #4)
[ ] Powerup/Reset (Procedure #3)
[ ] Self Test (Procedure #5)
[ ] Alternate Boot (Procedure #6)

Symptom #3: Computer Does Not Finish Booting

The operator terminal displays the system initialization command file, AMOS32.INI, as the computer boots. The last command in AMOS32.INI is "MEMORY 0." If the terminal display stops before reaching MEMORY 0, and more than a minute or so goes by, the computer did not finish booting. Perform these procedures in the order given:

[ ] Check Power/Run/Memory Lights (Procedure #1)
[ ] Check the Computer Status Codes (Procedure #2)
[ ] Powerup/Reset (Procedure #3)
[ ] Self Test (Procedure #5)
[ ] Alternate Boot (Procedure #6)

Symptom #4: Job on Computer Locks Up After Bootup

If, after the computer has finished booting, it does not respond to your commands, we say it has "locked up" or "crashed." Perform these procedures in the order given:

[ ] Check Power/Run/Memory Lights (Procedure #1)
[ ] Check the Computer Status Codes (Procedure #2)
[ ] Powerup/Reset (Procedure #3)
[ ] Self Test (Procedure #5)
[ ] Check Terminal/Printer (Procedure #4)
[ ] Alternate Boot (Procedure #6)

THE TROUBLESHOOTING PROCEDURES

The following pages define the various troubleshooting procedures listed in the previous section. We assume you are familiar with the placements of various buttons and switches on the computer—such as the reset button and the Power Switch; if not, refer to the illustrations in Chapter 2.

Procedure #1: Check Power/Run/Memory Lights

A. Are the Power Light and fan on? If yes, go to Step B. If the fan is on but the Power Light isn't, your Power Light may be burnt out. Go to Step B.

1. Turn the power switch off.

   Make sure the power cord is not damaged and is the correct type for your geographical area. Make sure it is plugged in firmly on both ends. If there is a problem with the cord, correct it and go to "Procedure #3: Power-up/Reset." If the computer comes up correctly, your problem is fixed.

2. Check the electrical source by plugging something else into the outlet, such as a lamp. If there is a problem with the outlet, correct it and go to "Procedure #3: Powerup/Reset." If the computer comes up correctly, your problem is fixed.

3. Check to make sure your computer is configured for the proper input voltage by checking to see the voltage setting is correct on the voltage switch on the back panel of your computer.

   Caution: If you have operated the computer with the improper input voltage, you may have damaged the computer.

   If your computer is configured incorrectly, change the voltage switch to the proper setting, and perform "Procedure #3: Powerup/Reset" only ONCE. If the computer not come up correctly, shut off the power and contact your dealer for help; stop. If it does, your problem is fixed.

   If your computer is configured correctly, proceed:

4. If the voltage configuration is correct, and the power cord is OK and in place correctly, but the Power Light is still not on, call your dealer for help. Stop.

B. OK, the Power Light is on. Is the Run Light on? If so, skip down to Step C.

1. If the Run Light is off, then perform "Procedure #2: Check the Computer Status Codes." If the procedure does not find and correct any problems, proceed.

2. Perform "Procedure #3: Powerup/Reset," ONCE. If that procedure does not correct the problem, proceed.

3. Perform "Procedure #5: Self Test." Call your dealer with the results of your self test and ask for help. Stop.

C. The Power Light and the Run Light are both on. Is the Memory Light on? If the Memory Light is **not** on, skip to D, below.

1. **Note:** If the Memory Light is on more than once in a great while, contact your dealer—you probably have memory problems.

   If the Memory Light is on, perform "Procedure #3: Powerup/Reset" ONCE. If that procedure does not clear the Memory Light, proceed.

2. Perform "Procedure #5: Self Test." Call your dealer with the results of the self test and ask for help. Stop.

D. No problem was found in this section. Please perform the next procedure on your checklist.

Procedure #2: Check the Computer Status Codes

The section below assumes your computer is not running the self test. For information on the status codes you can see when running the self test, refer to the *System Self Test User's Guide*, shipped separately with your computer.

Look at the front panel Status Display:

A. If the Status Code is blank, everything is normal. (As the computer boots itself, a series of status codes appears on the display panel in rapid succession. None of the codes should remain on the display longer than a second or two without being replaced by a blank display) No problem was found in this procedure. Return to the current procedure or continue with the next procedure on your checklist.

B. If one of the Status Codes 20, 21, 22, or 2E remains on the display panel, the computer did not boot because of a problem with the boot PROM. Perform "Procedure #6: Alternate Boot." If the computer does not come up correctly, something serious may be wrong. Call your dealer for help. Stop.

C. If Status Code 23, 2F, 33, or 3F remains on the display panel, you might have a problem with your boot device selection. Verify that the Boot Device Selector Switches on the back panel of your computer are set correctly according to the instructions in Chapter 2. Perform "Procedure #3: Powerup/Reset." If the computer does not boot normally at this point, call your dealer. Stop.

D. If Status Code 24 through 28 or 34 through 39 remains on the display panel, your System Disk might be the source of the problem. Perform "Procedure #6: Alternate Boot." If the computer boots up correctly, then you can suspect something is wrong with the System Disk. Your dealer can help you restore your System Disk. If the computer does not boot up, something more serious may be wrong. In either case, call your dealer for help. Stop.

E. If you see Status Code 29 on the display panel, the computer is trying to warm boot from a tape device and is searching for a label on the tape. If this status code remains on the display panel for more than a minute or so, verify the correct tape is mounted in the drive. If you have a known good warm boot tape in the drive, and the computer will not boot from it, contact your dealer for help. Stop.

F. If Status Code 2A, 2b, 3A, or 3b remains on the display panel, your computer is having a problem loading or executing the system monitor program. Perform "Procedure #6: Alternate Boot." If the computer boots correctly, you might have a problem with the files on your System Disk. Your dealer can help you restore these files. If the computer does not boot from the alternate device either, something more serious may be wrong. Again, contact your dealer for help. Stop.

G. If Status Code 2d or 3d remains on the display panel, your computer has encountered an error, perhaps due to faulty memory or addressing. Perform "Procedure #5: Self Test." If your computer does not pass the self test, call your dealer with the information from the test. Stop.

H. If the status code is 80 through 8C, you are in the self test mode. Perform "Procedure #3: Powerup/Reset." If the computer boots normally, your problem is fixed; if it doesn't, call your dealer.

I. If the Status Code is a number not discussed above, your computer is probably a victim of random noise on the power lines or a software error.

Perform "Procedure #5: Self Test." If the computer does not pass the self test, call your dealer with the information from the test.

If the computer passes the self test, perform "Procedure #3: Powerup/Reset;" if the computer comes up normally, your problem is probably fixed. If it does not come up normally, call your dealer.

Procedure #3: Powerup/Reset

A. If the computer is already powered up, skip down to Step B. To power up the computer, follow the instructions in Chapter 2. Remember—DO NOT hold in the reset button while you turn the Power Switch on or you will enable the self test.

The computer should now boot up. Skip down to C, below, for instructions on how to tell if the computer is up.

B. To reset the computer:

1. Before you reset the computer, make sure everybody is at AMOS command level—they see the AMOS prompt, usually a dot. If you reset while someone is working on the computer, they will lose whatever they were in the middle of. Also if any files are being written or transferred to the disks, wait until that process is finished—if you reset while data is being written to the disk, you might damage the data on that disk.

If anyone has files open, and cannot exit the program because his or her terminal is locked up, go ahead and reset the computer. Then, after you are up and running, run DSKANA on the disk they were working on to check for disk errors. See Chapter 5 for instructions on using DSKANA.

2. Now, push the reset button.

C. Check to see if the computer is up. If you see the system initialization command file displayed on the operator terminal, and the last command is "MEMORY 0," the computer has booted.

To make sure, type the following command:

SYSTAT RETURN

Your terminal should display computer status information.

If "MEMORY 0" was the last command in the system initialization command file and the SYSTAT command works, the computer booted successfully, and you can return to the procedure you are performing or to the next procedure on your checklist.

D. If the computer did not boot successfully, try powering the computer down and powering it up again:

1. If your computer has a diskette drive, remove any diskette in the drive.

2. Turn off the power to any terminals, printers, and other peripheral devices connected to the computer.

3. Turn off the computer and wait a few seconds.

4. Turn on all of the terminals, printers, and peripheral devices connected to the computer.

5. Turn on the computer. Do not hold in the reset button while you do so.

6. Return to Step C, above, to see if the computer is up and running.

Return to the current procedure or go on to the next procedure on your checklist whether or not the computer is up and running.

Procedure #4: Check Terminal/Printer

Note: Various steps in the procedure below tell you to reset the computer. If you are not familiar with this procedure, refer to Step B in "Procedure #3: Powerup/Reset."

A. Make sure each terminal is turned on:

1. For video display terminals, do you see anything on the screen? If so, the power is on—skip to B, below.

For printers, is the Power Light on? If so, the power is on—skip to B, below.

2. See the terminal manufacturer's manual to find out how to troubleshoot power or fuse problems for the device.

   Correct the problem and reset the computer. If it comes up normally and your terminals seem to work all right, your problem is fixed.

B. If you do not see anything on the screen, type CTRL/Q, then CTRL/C. If you see ^C on the screen, your computer is communicating with the terminal. Type:

   SYSTAT RETURN

   If you see a status display, your computer is probably up and running fine and your problem is fixed.

C. Checking terminal cables:

   1. Make sure the terminal cables are firmly connected to the correct ports. The terminal the computer boots on is usually connected to Port #0.

   2. Make sure the cables are firmly connected to the terminals. If a terminal has two ports, make sure the cable is plugged into the correct one—usually labeled MAIN—not the AUX or PRINTER port.

   3. For printers, make sure the correct ends of the cable are attached to the computer and the printer—cable ends are usually not interchangeable for printers.

   4. If there is a problem with the terminal cables, correct the problem and reset the computer. If it comes up normally and the terminals seem to work all right, your problem is fixed.

D. Disconnect all terminals except the terminal you are testing.

E. Reset the computer. If it comes up normally, and there is no problem with the terminal, you know one of the other terminals may be the problem.

F. Connect another terminal and go to Step D again. Repeat until you find the problem terminal.

G. Check the terminal option settings against the terminal manufacturer's manual. Check for:

   1. Correct baud rate. **Note:** The SBC as shipped from Alpha Micro assumes the terminal it boots on is set for 9600 baud.

   2. Set for full duplex (not half duplex) operation.

   3. Set for remote (not local) operation.

4. Set for a data word length of 8 data bits.

5. Set for no parity.

6. Set for 2 stop bits if the terminal works at 110 baud; 1 stop bit if it works at any other baud rate.

7. Set for conversational (not block) mode.

8. For a printer, make sure it is "on-line."

If the option settings are wrong, correct them and reset the computer. If it is up and running and the terminal works all right, your problem is fixed.

H. If you have a known good terminal similar enough to the problem terminal to work in its place, substitute it for the questionable one and reset the computer.

If the computer is up and running and the terminal works all right, you know the problem lies with the terminal, not the terminal cable. Put the original terminal back on and proceed to Step J.

If the problem is still there with the new terminal, put the original terminal back on and reset the computer. Continue with Step I.

I. Check the terminal cable. If you suspect it might be damaged, try substituting another cable and resetting the computer. If it comes up normally and the terminal works, you can assume the original cable is bad.

Remove the cable hoods from both ends of the bad cable and look for broken wires. If you feel comfortable doing so, review the cable constructions in Appendix B to see if there are any errors in cable construction.

If there is a problem with the cable, repair it or call your dealer for help. If you have repaired the cable, try hooking the terminal up again and performing "Procedure #3: Powerup/Reset." If the computer comes up normally and the terminal works all right, you have fixed the problem.

J. If the terminal has a self test mode, use it to determine the problem with the terminal. Use the manual provided by the terminal manufacturer for instructions on interpreting the terminal self test. If the test mode tells you what the problem is, correct the problem and reset the computer. If it comes up normally and the terminal works all right, you have fixed the problem.

K. You were not able to find a specific problem with the terminal. Call your dealer if you still suspect a problem with your terminal.

L. Return to the current procedure or go on to the next procedure on your checklist.

Procedure #5: Self Test

The diagnostic routines that make up your computer self test are incorporated into the SBC's boot PROMS. You can bring up self test when you turn on power to the computer. In order to understand both the front panel display codes and the terminal output displayed by self test, you need to follow the instructions in the *System Self Test User's Guide*, shipped separately with your computer. The *System Self Test User's Guide* contains detailed information about diagnostic routines, error codes, and test looping. The self test document is included with the documentation shipped with your computer.

Procedure #6: Alternate Boot

You perform this procedure when previous procedures indicate something may be wrong with the software on your System Disk. The object of this procedure is to see if the computer can boot off some other device—whether or not you are successful in booting tells your dealer quite a bit about what might be wrong with your computer.

First, verify the Boot Device Switches on the back panel of the computer are set for the correct alternate device. Refer to Chapter 2 for the Boot ID switch settings. When you are sure the switches are set for the device you want to attempt the boot from, proceed.

A. If your computer does not contain a diskette drive, skip to Step B.

   If your computer contains a diskette drive, and you usually boot from a hard drive, place a diskette containing the system software—usually labeled "System Disk"—in the diskette drive. Push the reset button.

   If the computer boots, there is probably some scrambled data on your hard disk preventing the computer from booting from it. Although once you are familiar with the computer you can easily restore the System Disk yourself, we recommend that as a new user you contact your dealer for help. Stop.

   If the computer does not boot, you may have a more serious problem. Contact your dealer for help.

B. If your computer does not contain a diskette drive, you need to perform a "warm boot" from the VCR or streaming tape drive: For a VCR:

   1. Load the "warm boot" video cassette you received from Alpha Micro into your video cassette recorder. Rewind the cassette, checking it visually to make sure it is rewound all the way to the clear plastic tape leader. Make sure all video cable connections are tight.

   2. Push the VCR PLAY button and immediately push your computer's reset button. In about 30 seconds you should see a message giving the version number of the operating system. Then you see a dot, the AMOS prompt symbol.

If you do see the operating system message and a dot, you have successfully warm booted. Because this is a "warm boot" you do not see the system initialization command file on the operator terminal. Go to the next step.

If you do not see the operating system message and a dot, try performing the "warm boot" once more. If you still do not see the message, call your dealer for help. Stop.

3. Enter the following command:

DIR SYS:AMOS* RETURN

If your terminal displays a list of files including two with .INI and .MON extensions, you know at least some of your System Disk is intact.

Although once you are familiar with the computer you can easily restore the System Disk yourself, we recommend that as a new user you contact your dealer for help at this point. Stop.

For a streaming tape:

1. Load the "warm boot" tape you received into your tape drive.

2. Push your computer's reset button. In about 30 seconds you should see a message giving the version number of the operating system. Then you see a dot, the AMOS prompt symbol.

If you do see the operating system message and a dot, you have successfully warm booted. Because this is a "warm boot" you do not see the system initialization command file on the operator terminal. Go to the next step.

If you do not see the operating system message and a dot, try performing the "warm boot" once more. If you still do not see the message, call your dealer for help. Stop.

3. Enter the following command:

DIR SYS:AMOS* RETURN

If your terminal displays a list of files including two with .INI and .MON extensions, you know at least some of your System Disk is intact.

Although once you are familiar with the computer you can easily restore the System Disk yourself, we recommend that as a new user you contact your dealer for help at this point. Stop.

CHAPTER 8

FRONT PANEL STATUS DISPLAY CODES

The SBC provides various tools for you to use to assure yourself your system is healthy and operating as it should. For instance, your computer is capable of testing itself and checking most of its own internal components for proper operation.

Besides letting you know when things are working correctly, if a problem should occur these tools help you find the cause. This chapter describes these diagnostic tools:

- Status codes: normal and error status codes that appear on the front panel display when you boot your computer system or run the self test.
- The self test feature: a powerup diagnostic test that checks all major hardware components in the main chassis.

FRONT PANEL STATUS DISPLAY CODES

During normal operation, when you are not using the self test, the front panel status display is blank. When you boot your computer, a series of codes appears in rapid succession on the display as the AMOS operating system gets itself up and running. If an error occurs during booting, one of these codes may remain on the status display. This can tell you what was happening when the error occurred.

In Table 8-1, the first digit of many status codes is shown as "x". This digit is either 2 or 3, and identifies the device the computer is attempting to boot from:

- 2 = The alternate boot device.
- 3 = The primary boot device.

If you have an alternate boot device selected, the first few status codes will always begin with 2 since the computer checks the alternate device first. If there is a bootable tape or diskette in the alternate boot device, the first digit of the status codes remains 2. If there is no bootable medium in the alternate device, the computer boots from the primary device and the first digit of the status codes changes to 3.

Table 8-1. Front Panel Status Codes

CODE	MEANING
Blank	System is functioning normally. Although you see a blank display, this is actually Status Code 00.
4	System is out of QUEUE blocks.
8	A/C power dropped below an acceptable level.
.9	Memory parity error.
10	An interface driver (.IDV) defined in a TRMDEF statement in the system initialization command file was not found in account [1,6] on the boot device.
11	A terminal driver (.IDV) defined in a TRMDEF statement in the system initialization command file was not found in account [1,6] on the boot device.
12	AMOSL.INI on AMOS/L based systems, or AMOS32.INI on AMOS/32 based systems, was not found.
F	System is now clearing and sizing memory.
20	The system is beginning to execute the boot PROM. An error at this point indicates your computer has a faulty PROM. Contact your dealer.
21	The system is transferring the instructions from the PROM into its Random Access Memory (RAM). If an error occurs here, your computer might have a bad PROM or bad memory.
22	The system is generating a checksum of the instructions in Random Access Memory. If this calculated checksum doesn't match the checksum coded into the instructions themselves, you see a "2E" error code.

Table 8-1. Front Panel Status Codes

CODE	MEANING
x3	The system is initializing the boot device. If the boot stops at this point, it may indicate a hardware problem with the boot device. For disk devices, when turning power on, this code might remain on the display for a short time while the disk drive spins up to operating speed.
x4	The system is reading the Master File Directory (MFD) from disk. An error at this point indicates disk problems.
x5	Searching for the User File Directory (UFD) account [1,2] on the boot device.
x6	Searching for BADBLK.SYS. Valid only on disk drives that use a BADBLK.SYS file.
x7	Loading BADBLK.SYS. Valid only on disk drives that use a BADBLK.SYS file.
x8	The system is searching for account DSK0:[1,4]. An error at this point may indicate disk problems. Try reloading the latest version of the system software.
x9	The system is looking for the system monitor file, AMOS32.MON, in DSK0:[1,4]. If this file is missing, reload the latest version of the system software.
x9	If your computer is trying to boot from a tape device, this code indicates the system is searching for a label block on the tape.
xA	The system is loading the AMOS monitor from the boot device. This code might indicate a disk problem.

Table 8-1. Front Panel Status Codes

CODE	MEANING
xb	The system is beginning to execute the AMOS monitor program. If an error occurs at this point, try reloading the latest version of the system software.
xd	System bootup failed because of a time-out error. This code may indicate faulty memory or an addressing problem.
2E	System bootup failed because of a bootstrap loader program checksum error. This code may indicate a bad PROM or bad memory.
xF	System bootup failed because of an invalid boot device selection. Check the boot ID switches on the back panel of your computer. See Chapter 2 for the proper settings.
xC	The front panel boot enable lock is in the "LOCK" position. Turning the lock the the "OPEN" position will allow the system to boot.

NOTE: If an error occurs while the computer is trying to boot from a diskette, it tries to boot a maximum of eight times before giving up. If this happens, the display alternates between "x3" and some other code depending on where the error occurs.

For full information on the status codes above, and for information on how your own programs can send a number to the status display, please refer to the *System Operator's Guide*.

Other status codes can appear during the SBC self test; these codes are discussed in the section below.

SELF TEST FEATURE

One of your computer's most helpful features is its ability to test itself and check its major hardware components for proper operation. The major purpose of this diagnostic test is to check all hardware whose failure might prevent your system from operating properly, and to assure all your hardware components are working correctly.

If the diagnostic test reports a problem, you can contact your Alpha Micro dealer for help. Tell your dealer the information displayed by the diagnostic test; it will help the technicians give you quick service by narrowing the problem down to a specific piece of hardware within the system.

The diagnostic routines that make up your system self test are incorporated into the SBC's boot PROMS. You can bring up self test when you turn on power to the computer. In order to understand both the front panel display codes and the terminal output displayed by self test, you need to follow the instructions in the *System Self Test User's Guide*, shipped separately with your computer. This guide contains detailed information about diagnostic routines, error codes, and test looping. The self test document is included with the documentation shipped with your computer.

APPENDIX A

SPECIFICATIONS SUMMARY

GENERAL SPECIFICATIONS

Temperature/ Humidity	60 to 90 degrees F (15.6 to 32.2 degrees C); 10 degrees C per hour maximum fluctuation; 20% to 80% humidity noncondensing.
Power Requirements	United States: 115 VC (93.5 to 132 VAC), 47 to 63 Hz. International: 230 VAC (187 to 253 VAC), 47 to 63 Hz. (User selectable.)
Maximum Power Consumption	115 volts at 5 amps or 230 volts at 2.5 amps.
Electromagnetic Interference	Complies with U.S. FCC rules and regulations, Class A.
System Dimensions	Height: 28 in. / (71.1 cm) Width: 9 in. / (22.8 cm) Depth: 30.5 in. / (77.4 cm) Weight: Approximately 100 lbs. / 45 kg
Enclosure Composition	Sheet metal.
Memory	Minimum of 4MB of RAM, with byte parity error detect, expandable to either 32 or 64 megabytes, depending on the CPU board.
Additional Features	Clock/Calendar with Battery Backup Front Panel with Status and Diagnostic Display Programmable Interval Timer AC Powerfail Detect Remote Reset

CENTRAL PROCESSING UNIT

Microprocessor	MC68020 or MC68030, depending on the CPU board.
Clock Speed	33Mhz or 50Mhz, depending on the CPU board.
Number of Instructions	more than 70 mips
Architecture	32-bit data path, 8, 16 and 32-bit operands. Two stacks and one status word register.
Addressing Modes	11
Memory Addressing	32-bit (4 gigabyte range)
Flags	N (Negative); X(Extend); Z (Zero); V (Overflow); C (Carry); T (Trace); S (Supervisor).
Interrupt Capability	8 vectored interrupts.
Floating Point Arithmetic	Optional 25MHz MC68881 coprocessor.

INPUT/OUTPUT

Serial Ports

Number of Ports	Two ports standard; expandable to either 34 or 66 ports depending on the CPU board.
Characteristics	All asynchronous serial communication ports configurable for RS232 or RS422.
Control	68681 SIO.
Interface	DB-9 Connector. For DB-9 connector signals for RS-232 and RS-422, see Appendix B.
Supported Baud Rates	50, 75, 110, 134.5, 150, 200, 300, 600, 1050, 1200, 1800, 2000, 2400, 4800, 7200, 9600, 19200, 38400, 57600. See note at end of this appendix.
Stop Bit	2 stop bits if 110 baud; 1 stop bit all others.
Word Length	8 data bits
Parity	No parity

VCR Remote Port

See "Backup and Storage" below for more information.

Eight Bit Status and Command Port	TLL compatible remote control port.
Control	Host 68030 or 68020, depending on the CPU board.
Interface	20 pin-AMP connector (J101).
VCR Interface	NTSC video format (U.S. standard); PAL and SECAM video format compatibility is also provided.

ESDI (Enhanced Small Device Interface) On-board Controller

The AM-145 board uses a add-in board as an intelligent ESDI disk controller interface.

The AM-140 has an on-board ESDI intelligent controller containing its own 68000 CPU running at 8MHz, 1MB of dynamic RAM, and 4KB of ROM.

Physical Interface	60-pin connector for attachment to AM-528 ESDI interface card.
Maximum Number of drives supported	Two, both drives must be mounted internally.
Bus Control	Internal 24-bit address bus 16-bit bidirectional data bus.

SCSI (Small Computer Standard Interface) Port

Physical Interface	50-pin connector at rear panel.
Maximum External Bus Length	10 feet.
Maximum Number of Ports	Four, including internal drive controller(s).
Implementation	Single host only. Multiple host architecture not supported.

STORAGE AND BACKUP

Hard Disk Drive

Detailed specifications for SBC System drives depend on the model purchased. Consult the individual data sheet appropriate for your drive.

Maximum Number	The SBC enclosure supports four SCSI and two ESDI hard disk drives.
Physical Size	3°1/2" and 5°1/4"
Interface	SCSI (Small Computer Standard Interface) ESDI (Enhanced Small Drive Interface)

5 1/4" Diskette Drive

NOTE: Specifications subject to change without notice.

Physical Size	5°1/4"
Data Capacity	1.2 megabytes (formatted).
Diskettes	5°1/4", 10 sectors/track, 80 tracks/side, double-sided, double-density.
Transfer Rate	250K bits/second.
Latency (Average)	100 msec.
Access Time Track-to-track	5 msec.
Average Access Time	150 msec.
Track Density	96 TPI.
Recording Density	5922 bits/inch.
MTBF	9200 Power on hours or more, 25% duty cycle.
Soft Read Error Rate	1 x 10^-9
Hard Read Error Rate	1 x 10^-12
Seek Error Rate	1 x 10^-6

3 1/2" Diskette Drive

NOTE: Specifications subject to change without notice.

Physical Size	3°1/2"
Data Capacity	1.44 megabytes (formatted).
Diskettes	3 1/2", 18 sectors/track, 80 tracks/side, double-sided, double-density.
Transfer Rate	500K bits/second.
Latency (Average)	100 msec.
Access Time Track-to-track	3 msec.
Average Access Time	94 msec.
Track Density	135 TPI.
Recording Density	17434 bits/inch.
MTBF	10000 Power on hours or more, normal duty cycle.
Soft Read Error Rate	1 x 10^-9
Hard Read Error Rate	1 x 10^-12
Seek Error Rate	1 x 10^-6

Video Cassette Recorder

Data Capacity	80 megabytes on a two hour tape.
Video I/O Voltage Levels	1 Volt peak to peak typical into 75 Ohm termination.
Video Recorder Compatibility	Standard, commercially available VCRs, either VHS or Beta format.
Recording Format	NTSC video format (U.S. standard); PAL and SECAM format compatability is provided.

1/4" Streaming Tape Drive (AM-625 and AM-626)

Physical Size	5°1/4"
Data Capacity	AM-625 = 250Mb max.; AM-626 = 525Mb max.
Tape Cartridge	AM-625: DC6037, DC6150, DC600-XTD, DC6250 AM-626: DC6037, DC6150, DC6250, DC6325, DC6525
Interface	SCSI
Tape Format	AM-625: Write/read QIC-150; read only QIC-24 and QIC-120. AM-626: Write/read QIC-320 or QIC-150; read only QIC-24 and QIC-120.
Soft Error Rate	1 X 10^-8
Hard Error Rate	1 X 10^-10

8mm Streaming Tape Drive (AM-645)

Physical Size	5°1/4"
Data Capacity	Maximum 2 gigabytes
Interface	SCSI
Tape Format	Proprietary
Hard Error Rate	1 X 10^-12

SOFTWARE

Standard AMOS/32 Software Release contains:

- °°Operating System, AMOS/32: A multi-user, multi-tasking, timesharing monitor.
- °°Multiple Printer Spoolers.
- °°Parameterized Command File Processor.
- °°Multi-pass Macro Assembler, M68.
- °°Linkage Editor, LNKLIT.

- Symbolic Debugger, AlphaFIX.
- Object File Librarian, LIBLIT.
- Background Task Manager.
- Object File Patching Utility, PATCH.
- Indexed Sequential Access Method Data Access Package, ISAM.
- VCR File Backup Support Software.
- Over 150 other utility programs.
- AlphaBASIC programming language.
- Macro assembly programming language.
- Screen Oriented Text Editor, AlphaVUE.
- Text Formatter, TXTFMT.

Other software packages are available from your dealer.

BAUD RATE NOTE

The baud rate 57600 is exempt from the restrictions discussed in this section, and may be used for any port regardless of what other baud rates are chosen.

On the SBC, the baud rates for each pair of serial ports are controlled by a single chip. One chip controls ports 0 and 1 on the main CPU board, another controls ports 2 and 3 on the first AM-355 paddle board, another 4 and 5, and so on. Because of this, the baud rates for the ports in a pair must be compatible with each other. That is, they must come from the same table below:

Table #1	Table #2
50	75
110	110
134.5	134.5
200	150
300	300
600	600
1200	1200
1050	2000
2400	2400
4800	4800
7200	1800
9600	9600
38400	19200

When assigning baud rates to a pair of ports, follow these rules:

1. Choose the baud rate you want for the first port of the pair.

2. If this baud rate appears in both tables above—for example, if it's 9600—you can take the baud rate for the second port from either table.

3. If, however, the first baud rate appears only in one table—such as 1050—the rate for the second port must be from the same table.

4. If you assign a baud rate from the wrong table to the second port, the corresponding rate from the correct table is substituted and used instead of the rate you specified.

   For example, you choose 7200 baud for port 0. This selects table #1 for ports 0 and 1. If you then specify a baud rate of 2000, which is found only in table #2, for port 1, the computer substitutes the corresponding rate from table #1, and uses 1050 for port 1.

The baud rates for each pair of ports are independent of any other pair. You may use table #1 for ports 0 and 1, table #2 for ports 2 and 3, and so on.

APPENDIX B

PURCHASING OR CONSTRUCTING TERMINAL AND PRINTER CABLES

Alpha Micro SBC's can handle both RS-232 and RS-422 devices. The serial I/O ports are factory set to RS-232.

This appendix covers the following topics:

- RS-232 and RS-422 standards.
- Pin assignments to connect specific terminals and printers.
- Instructions for making and shielding cables.
- Purchasing pre-made cables from Alpha Micro.
- Connector signals for SBC ports.

WHAT IS RS-232?

RS-232 is the name of a standard developed by the Electronic Industry Association (EIA) to encourage standardized interfacing of devices to computer systems. The letters RS stand for Recommended Standard. The RS-232 interface standard specifies electrical signal characteristics and names, and defines the functions of the signal and control lines that make up the interface.

Basically, implementing this standard involves assigning standardized signal definitions for the various pins of the RS-232 connector at either end of your terminal or printer cables. For example, the wire attached to Pin #2 carries the signal interpreted on the computer end as "Input Data from Terminal" and on the terminal end as "Transmit Data To Computer."

You enable these specific signals by attaching cable wires to certain connector pins.

If a terminal or printer manufacturer says their device is RS-232 or RS-232C compatible, it will probably be easy for you to connect it to your Alpha Micro computer system.

Before constructing the cable to connect a printer or terminal to your Alpha Micro computer system, you need to consult the manufacturer's manual accompanying the device. It will tell you how to wire the connector on your device end. Few devices use all of the defined signals. In most cases, you need to connect only three or four pins. Although printer cables are sometimes a little more complicated on the printer end, terminal cables are often the same on both computer and terminal ends.

Alpha Micro uses both the DB-25 pin connector and the DB-9 pin connector in RS-232 interfaces. The SBC uses only DB-9 connectors at the computer end. The maximum length of RS-232 cables is 50 feet between devices.

WHAT IS RS-422?

Because of rapid technological advancements, it became necessary to extend the RS-232 standard. The EIA adopted three related standards that permit higher data signaling rates, greater distances between devices, balanced interface circuits, and loop-back testing. The standards are RS-422, RS-423 and RS-449. For Alpha Micro computers, we need be concerned with only RS-422 and RS-232.

The RS-422 interface uses balanced signal lines in a twisted-pair cable. It has greater immunity to electrical noise and can run over longer cables. The maximum length of Alpha Micro RS-422 cables is 1000 feet. Alpha Micro has set the maximum data rate of both RS-232 and RS-422 at 57600. All SBC serial I/O ports can be configured for RS-422 operation. In addition, your serial peripherals must be able to operate using RS-422 signal levels.

The Federal Communications Commission (FCC) has established rules regarding allowable emission levels of Class A computing devices (ref: Subpart J of Part 15 of FCC Rules). The Alpha Micro systems to which this manual applies have been determined to be in compliance with the FCC rules. However, you should be aware that if other devices, such as terminals and printers, are attached to these systems, even if the devices are attached in accordance with the instructions contained in this manual, the resulting configuration may not be in compliance with the referenced FCC rules. Corrective measures, if any are required, are the responsibility of the user. Information on emission levels of peripheral devices should be obtained from the manufacturer of the device.

CABLING CONSTRUCTION GUIDELINES

If you want to construct your own cables, perform the procedures in this section. Here are a few things you should keep in mind before soldering the cable connectors:

Cable Length

We strongly recommend that RS-232C cables not be more than fifty feet long if you don't use twisted-pair overall shielded cables; otherwise you can go beyond fifty feet. (The actual length depends on the capacitance rating of the cable.) As you increase the cable length beyond fifty feet, the reliability of the data signal decreases. The cable's susceptibility to noise and cross-talk is proportional to its length and bandwidth, so RS-232C restricts both. The following restrictions apply:

1. Slew rate—The slew rate is the speed with which the signal changes from high to low. The higher the slew rate, the more likely you are to create noise interference on other devices. To control interference on neighboring circuits, the slew rate of drivers is limited to 30V/us.

2. Bandwidth—The bandwidth is limited on receivers to reduce cross-talk (the effect of one line on another).

These are some things you can do if the cables absolutely must be longer than fifty feet:

1. Alternatives to the RS-232 standard (RS-422 and RS-423) allow communication over cables longer than fifty feet. RS-422 is recommended when extra long cables must be used, high baud rates (38.4K or greater) are used, or equipment is used in electrically noisy environments.

2. Signal conditioning equipment (for example, a "short haul modem") can improve signal quality.

Cable Type

We recommend you use an overall-shielded, twisted-pair, low capacitance jacketed cable. The cable shield should terminate at the terminal end. Using such a cable helps minimize electromagnetic interference. Reducing this interference not only protects your system from signal noise, but protects other devices around your Alpha Micro computer system (such as a TV or radio) from interference radiated by an improperly shielded system.

Two ratings used by cable manufacturers to distinguish cables are "CMP" and "CMR". CMP cables are fire resistant, and are the best type for long-length use because of their low capacitance. Many building codes require the use of CMP cables if cables are routed above the ceiling. CMR cables are PVC-jacketed and non-fire resistant, and are best for short-length use, such as within the computer room.

Please see "Shielding the Cable" for instructions on creating an adequately shielded cable that will provide satisfactory protection from interference. Please see the "Important Note" above for information on your responsibilities concerning electro-magnetic interference.

Connector Type

All of the serial I/O connectors on the back panel of your computer are DB-9 receptacles. An interconnecting cable must have a DB-9 connector on the computer end and usually a DB-25 connector on the terminal or printer end.

Use a good quality DB 9-pin connector and a 25-pin connector and wire to implement RS-232 or RS-422. The connector should have a metal hood and cable clamp, both of which should be connected to the cable shield to minimize signal noise.

MAKING THE CABLE

If you look carefully at the RS-232C connector, you will see very small numbers printed on the side of the connector to which you will be soldering cable wires—these are the pin numbers.

If the instructions for the cable for a particular terminal or printer tell you to connect Pin #3 (for example), then:

1. Notice the cable consists of several (typically, three to six) colored wires in twisted pairs. Pick a color. It doesn't matter which color wire goes to what pin, as long as each end of the same colored wire goes to the proper pin on both ends of the cable. You will need to make sure that incompatible signals are not combined in the same twisted pair, however. See the pairing diagrams in "Terminal Cables," below.

2. Strip about 1/16" of the insulation off the end of the wire you have chosen, leaving bare wire. Tin the wire with a small amount of solder and trim it back to 1/16" if necessary.

3. Melt a small amount of solder into the solder cup of Pin #3.

4. Heat Pin #3 until the solder inside the pin melts, and insert the tinned wire into the pin while removing heat from the pin.

   Remember the color of the wire attached to Pin #3—you will solder the same color wire on the other end of the cable to Pin #3 on the other connector.

5. Now, solder the wires to the other pins per the instructions for your particular terminal or printer. Write down what colored wires go to what connector pins.

6. Remember to put the connector hood on—that protects wires soldered to the connector from being pulled loose. If there is a strain relief mechanism supplied with the connector hood, put that on as well to further protect the wires from being pulled loose.

   Connect the cable shield to the connector hood as directed in "Shielding the Cable," below.

7. Label the connector hood so you remember what terminal or printer it is for, and so you know which end goes to the device and which end goes to the computer.

8. Go to the other end of the cable and solder the cable's wires to the connector on that end, using the corresponding wires on the proper pins.

9. Connect the cable shield to the connector hood as directed in "Shielding the Cable," below. Attach the connector hood.

Always label the connector hoods on both ends of the cable so you know: what device the cable is for, what port number it should be connected to, which end goes to the device, and which end goes to the computer.

Please be sure Pin #1 is open unless you are using the remote reset feature of your Alpha Micro computer system serial port #0. When pins #1 and #7 are shorted by a remote switch, the system will be reset if the remote reset jumper on the CPU board is installed. **Unless a remote reset switch is installed on the cable, shorting those pins together on a cable connected to port #0 can prevent your system from booting.** See Appendix F for further details on the remote reset feature.

SHIELDING THE CABLE

There are different techniques for shielding a terminal or printer cable, but the method we recommend as best satisfying FCC shielding requirements is to use a metal connector hood that connects to the cable shield. Alpha Micro has pre-made cables available using this shielding technique.

The shielded cable consists of several layers. On the inside are the colored wires that carry the data signals. Surrounding these wires is a metal foil covering. On the outside of the foil covering are small, uncoated, "drain wires." Completely surrounding all of the above elements is the plastic coating that forms the outside of the cable.

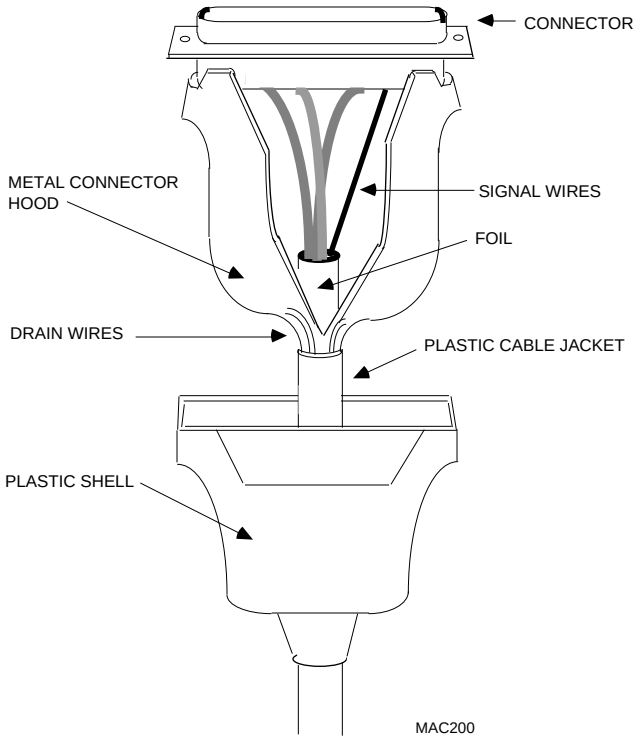


Figure B-1. Shielding a Cable

The technique for making an adequately shielded cable involves connecting the metal cable hood to the cable drain wires to ensure electrical continuity. Please refer to Figure B-1.

When you strip the end of the shielded cable to allow access to the signal wires, also strip a small amount of the plastic coating back from the interior foil layer of the cable. Trim the drain wires and bend them down over the plastic coating of the cable. Make the signal wire connections by soldering the proper signal wires to the appropriate connector pins as discussed in the preceding section.

Then place the metal connector hood in place, enclosing the cable. Bend the drain wires back up over the outside of the connector hood neck, and solder them into place. Crimp the supplied strain relief ring over the connector hood/cable connection as shown in Figure B-1. If a plastic outer shell is provided for the metal connector hood, put it in place now.

DB-9 CONNECTOR SIGNALS FOR RS-232 AND RS-422

The following table shows the signal-to-pin orientation for each of the DB-9 connectors used in external serial I/O interfaces to the SBC.

Table B-1. Rear Panel DB-9 Connector Signals

PIN	Direction	RS-232 Signal Name	RS-422 Signal Name
1		N/C—no connection	N/C—no connection
2	Input	RXDx—Received Data	RXDx+—Received Data +
3	Output	TXDx—Transmitted Data	TXDx+—Transmitted Data +
4	Input	CTSx—Clear to Send	CTSx—Clear to Send
5	Output	RTSx—Request to Send	RTSx—Request to Send
6	Output	N/C—no connection	TXDx- —Transmitted Data -
7		GND—Signal Ground	GND—Signal Ground
8	Input	DCDx—Data Carrier Detect	RXDx- —Received Data -
9	Input	DSRx—Data Set Ready	DSRx—Data Set Ready

NOTE: x = channel number. For example: RXDx=RXD3 or Received Data, channel 3

The RS-232 or RS-422 interface is configurable independently for each connector.

TERMINAL CABLES

This section tells you which pins to connect to construct cables for particular terminals supported by Alpha Micro. For information on cabling to an AM-358 I/O controller, refer to the *AM-358 Serial I/O Controller Installation Instructions*, PDI-00358-00.

When using twisted-pair cables, it is important to assign signals to conductor pairs properly to reduce crosstalk. For best results, pair high-frequency and low-frequency signals such as TXD/DTR and RXD/GND as shown in the tables in this appendix.

The AM-60, AM-62, and AM-70 terminals are all RS-232 devices and use the same cabling. The AM-62A, AM-65, AM-72, and AM-75 terminals when used as RS-232 devices, also use these pinouts.

Table B-2 gives the pinouts required in cables connecting a terminal to the computer.

If you make your own cables, use twisted-pair cable and pair the signals as shown below. ***Remember to connect the shell to the cable shield as shown in "Shielding the Cable."***

Table B-2. Pinouts for RS-232 Terminal-to-Computer Cables

Terminal End DB-25 Connector			Computer End DB-9 Connector	
SIGNAL	PIN#	DIRECTION	PIN#	SIGNAL
TXD	2	>---->	2	RXD
DTR	20	>---->	4	CTS
RXD	3	<----<	3	TXD
GND	7	<---->	7	GND

The DTR connection (pin 20) to the computer (pin 4) can serve as "READY/NOT BUSY" handshake line to prevent "overrunning" the terminal with data. This protocol is also effective for several printers used by Alpha Micro.

While this cable configuration enhances the use of the Alpha Micro terminals, it may degrade system performance with other types of terminals and printers if they do not provide a compatible DTR on pin 20. In such cases, the connection to pin 4 at the computer end should be disconnected.

If it is necessary to operate the terminal with a cable over 50 feet in length (the specified maximum), or more than 20K baud, we recommend you use the RS-422 interface. The Alpha Micro RS-422 is a balanced voltage digital interface that eliminates noise problems and allows maximum performance for distances up to 1000 feet.

For a diagram of a typical cable configuration for RS-422, see the discussion of the AM-65 and AM-75 terminals below.

RS-422 peripheral device (terminal, printer, etc.) used with an Alpha Micro SBC must also have an RS-422 interface capability, or an RS-232/RS-422 converter must be used with the terminal.

AM-65 and AM-75 Terminals and RS-422 Cabling

To use the AM-65 or AM-75 terminal as an RS-422 device, you must use an RS-422 interconnecting cable and set the jumper block of the serial port to RS-422. Then, the terminal must be set to RS-422 in setup mode. See the documentation that comes with the terminal. See Table B-1 for the signal-to-pin orientation of the RS-422 interface. Tables B-3 and B-4 list the RS-422 pinouts for the AM-65 and AM-75 terminals.

If you make your own cables, use twisted-pair cable and pair the signals as shown below. ***Remember to connect the shell to the cable shield as shown in "Shielding the Cable."***

You must use twisted-pair cable for RS-422 to work correctly.

Table B-3. RS-422 Cabling for AM-65 Terminal

Terminal End DB-9 Connector			Computer End DB-9 Connector	
SIGNAL	PIN#	DIRECTION	PIN#	SIGNAL
TXD+	1	>---->	2	RXD+
TXD-	7	>---->	8	RXD-
RXD+	8	<----<	3	TXD+
RXD-	9	<----<	6	TXD-
GND	5	<---->	7	GND
DTR	4	>---->	4	CTS

Table B-4. RS-422 Cabling for AM-75 Terminal Port A

Terminal End DB-25 Connector			Computer End DB-9 Connector	
SIGNAL	PIN#	DIRECTION	PIN#	SIGNAL
TXD+	19	>---->	2	RXD+
TXD-	25	>---->	8	RXD-
RXD+	15	<----<	3	TXD+
RXD-	17	<----<	6	TXD-
DTR	20	>---->	4	CTS
GND	°7	<---->	7	GND

Workstation

RS-232 pin assignments for connecting an IBM PC-compatible Workstation to the Alpha Micro computer are listed below.

If you make your own cables, use twisted-pair cable and pair the signals as shown below. ***Remember to connect the shell to the cable shield as shown in "Shielding the Cable."***

Table B-5. Pinouts for Workstation-to-Computer Cable

IBM PC/AT and Compatibles

Workstation Serial I/O Port			Computer End DB-9 Connector	
SIGNAL	PIN#	DIRECTION	PIN#	SIGNAL
TXD	3	>---->	2	RXD
RTS	7	>---->	4	CTS
RXD	2	<----<	3	TXD
GND	5	<---->	7	GND
CTS	8	<----<	5	RTS
DSR	6	<--|		
DCD	1	<--|		

∞Pins 1, 6 and 8 on the workstation connector are jumpered.

Table B-5. Pinouts for Workstation-to-Computer Cable (Cont.)

IBM PC/XT and Compatibles

Workstation Serial I/O Port			Computer End DB-9 Connector	
SIGNAL	PIN#	DIRECTION	PIN#	SIGNAL
TXD	2	>---->	2	RXD
RTS	4	>---->	4	CTS
RXD	3	<----<	3	TXD
GND	7	<---->	7	GND
CTS	5	<----<	5	RTS
DSR	6	<--|		
DCD	8	<--|		

∞Pins 5, 6 and 8 on the workstation connector are jumpered.

PRINTER CABLES

This section provides the specific cable requirements for the printers most frequently connected to the Alpha Micro computer system. You can purchase the appropriate cables from Alpha Micro, or construct them according to the following specifications.

If you make your own cables, use twisted-pair cable and pair the signals as shown below. ***Remember to connect the shell to the cable shield as shown in "Shielding the Cable."***

AM-301, AM-304, and AM-306 Printers

The AM-301, AM-304 and AM-306 printers use the same RS-232 cabling. The pinouts are:

Table B-6. Pinouts for RS-232 Printer-to-Computer Cable

Printer End DB-25 Connector			Computer End DB-9 Connector	
SIGNAL	PIN#	DIRECTION	PIN#	SIGNAL
TXD	2	>---->	2	TXD
DTR	20	>---->	4	CTS
RXD	3	<----<	3	RXD
GND	7	<---->	7	GND

APPENDIX C

VIDEO CASSETTE RECORDER DATA BACKUP

This appendix contains instructions to help you begin using your video cassette recorder to perform system backup. As we mentioned in Chapter 3, it is very important that you make regular backups of your data.

NOTE: The information in this appendix applies to AMOS/32 versions 2.0 and later. If you have an earlier version of AMOS, refer to the document *AMOS Video Cassette Recorder Backup Software* for instructions on backing up your data.

Although we discuss the basics here, there is a lot more information you should be familiar with concerning the VCR backup software. For more detailed information on using the video cassette recorder for backup, refer to the *AMOS User's Guide* and the appropriate commands in the *AMOS System Commands Reference Manual*.

MAKING A BACKUP

1. Place your backup cassette into the video cassette recorder.

2. Rewind the cassette. Look to make sure the cassette is rewound all the way to the clear plastic leader section of the cassette. (If you have a computer controlled Videotrax VCR, it will rewind automatically when you start the backup.)

3. Use the BACKUP command to back up all of the data on all disk devices on your system. If you have diskettes on your system, remember to place the diskettes containing the data you want to save in the drives and close the drive doors. If your system boots from a diskette drive, remember Drive #0 must contain a System Disk. If you are using a computer controlled Videotrax VCR, you do not need to operate the recorder controls—BACKUP does so for you. Type:

   BACKUP ALL:[] RETURN

4. BACKUP displays a list of the backup devices available. Choose the VCR.

5. Now, follow BACKUP's instructions, pushing the video cassette recorder's controls and pressing the RETURN key when instructed to do so.

   BACKUP asks you for some information (e.g., "Volume Name:" and "Installation:"). This is for your later reference only; if you do not wish to label the cassette with this information, press the RETURN key in answer to these questions.

6. When BACKUP is finished, it tells you:

```
The transfer is now complete
Press STOP on the VCR
```

   If you have a great deal of data to save (e.g., you want to back up a 40 megabyte hard drive), you may want to automate your backup procedures. By using the programmable capabilities of your recorder and an appropriate command file, you can instruct your SBC and recorder to work together to perform an automatic backup without operator help at a convenient time (for example, in the middle of the night). The *AMOS User's Guide* contains samples of backup command files. That book also tells you how to use the RESTOR command to restore data from a backup cassette back to a disk.

CERTIFYING A BACKUP CASSETTE

After you perform a backup it is very important to certify the cassette to make sure the backup is good. Use the CRT610/C command. Enter:

CRT610/C RETURN

Now follow CRT610's instructions, pushing the VCR's controls and pressing the RETURN key when requested to do so.

You now see a display on the terminal screen that looks something like this:

```
Total Blocks Read - 0
Total Copies Read - 0
Total CRC Errors  - 0
Total Hard Errors - 0
Reliability Ratio - 0:1
```

When the cassette has advanced to the beginning of the data, non-zero numbers replace the zeros in the display. CRT610 updates the displays every few seconds with new information. When the certification is finished, you see something like this:

```
Total Blocks Read - 55676
Total Copies Read - 551425
Total CRC Errors  - 1341
Total Hard Errors - 0
Reliability Ratio - 411:1

Certification is complete
```

The message "Certification is complete" tells you CRT610 has reached the end of the data on the cassette. Some number of CRC errors are expected and are perfectly acceptable. However, a hard error indicates some data was lost when the backup was performed. A Reliability Ratio of 100:1 or less may indicate possible problems with the cassette or recorder—see the *AMOS User's Guide* for advice.

Certifying a cassette takes as long as the original backup. If you do not want to tie up your terminal that long, you can tell the CRT610 command to send its display to a disk file you can examine later at your convenience. See the *AMOS User's Guide* for more information.

APPENDIX D

THE CONTROL CHARACTERS

Your terminal keyboard allows you to type control characters which perform special functions. A control character is the signal transmitted to the computer when you hold down the CTRL key and press another key at the same time. The following list contains the most important control characters. The *AMOS User's Guide* contains a complete list of control characters and their functions.

Control-C

Control-C is the system interrupt command. You use it to interrupt whatever program is in progress and return to AMOS command level. After typing a Control-C to interrupt a program, you cannot resume execution of that program; you must start it over from the beginning.

You may usually interrupt programs even when they are displaying data.

Some programs, such as AlphaVUE, do not recognize a Control-C as an exit command; instead you must use the exit command for that program if you want to return to AMOS command level.

Other programs do recognize a Control-C; however, if an exit command exists for a program, it is usually better to use that command than to enter a Control-C. Many programs perform various closing functions when you use their normal exit commands and would not have a chance to perform those procedures for an orderly exit if you bypass them by using a Control-C.

Control-U

At AMOS command level, if the line editor is enabled, typing a Control-U causes the cursor to return to the beginning of the line; if the line editor is not enabled, a Control-U erases the current line.

Control-I

Control-I is a tab character. It moves the cursor to the next tab stop on your terminal display. Many terminals have a TAB key you can use instead of typing Control-I.

Control-S

A program or command often displays more data on your terminal than fits on one screen. To stop the screen display, type a Control-S.

You can now read the data on the screen at your leisure. Not only does the display freeze, but AMOS actually stops sending data to your terminal until you type a Control-Q (see below); at that point, AMOS resumes sending information where it left off.

While a Control-S is in effect, AMOS stores, but does not act upon, anything you type except for a Control-Q. There is, however, a limit to how much can be stored. The exact number of characters depends upon your initial system set-up.

Control-Q

When you type a Control-S (described above) to freeze the screen display, you must type a Control-Q to resume the screen display. If you have typed anything while the Control-S was in effect, a Control-Q tells AMOS it can now go ahead and act upon that input.

Control-R

If the line editor is enabled, Control-R recalls commands you have already typed, bringing them back so you can use them again or modify them before resubmitting them. After you bring the command back, you can use the terminal keyboard arrow keys to move forward and back on the command line, and the alphanumeric keys to change command text. When you are ready to enter the recalled and modified command, press RETURN.

If the line editor is not enabled, Control-R shows commands that you have entered, but which have not yet been accepted by the computer because it is still busy processing another command.

APPENDIX E

SBC PERIPHERAL INSTALLATION

INSTALLING PERIPHERAL DEVICES

Mounting peripheral devices in the SBC is simply a matter of attaching the plastic rails to the side of the peripheral and sliding the device into its mounting position. The SBC chassis has mounting locations for 11 half-high (or five full-high) 5-1/4" peripherals. The front door on the computer has a cutout which allows access to peripheral devices using removable media. This cutout will accommodate up to four half-high 5-1/4" peripherals.

The following illustration shows the peripheral mounting area for the SBC with the slots numbered 1 through 12.

Slot number 7, shown in Figure E-1, is occupied by a metal support designed to reinforce the peripheral mounting bracket. No peripheral device can be mounted in slot number 7.

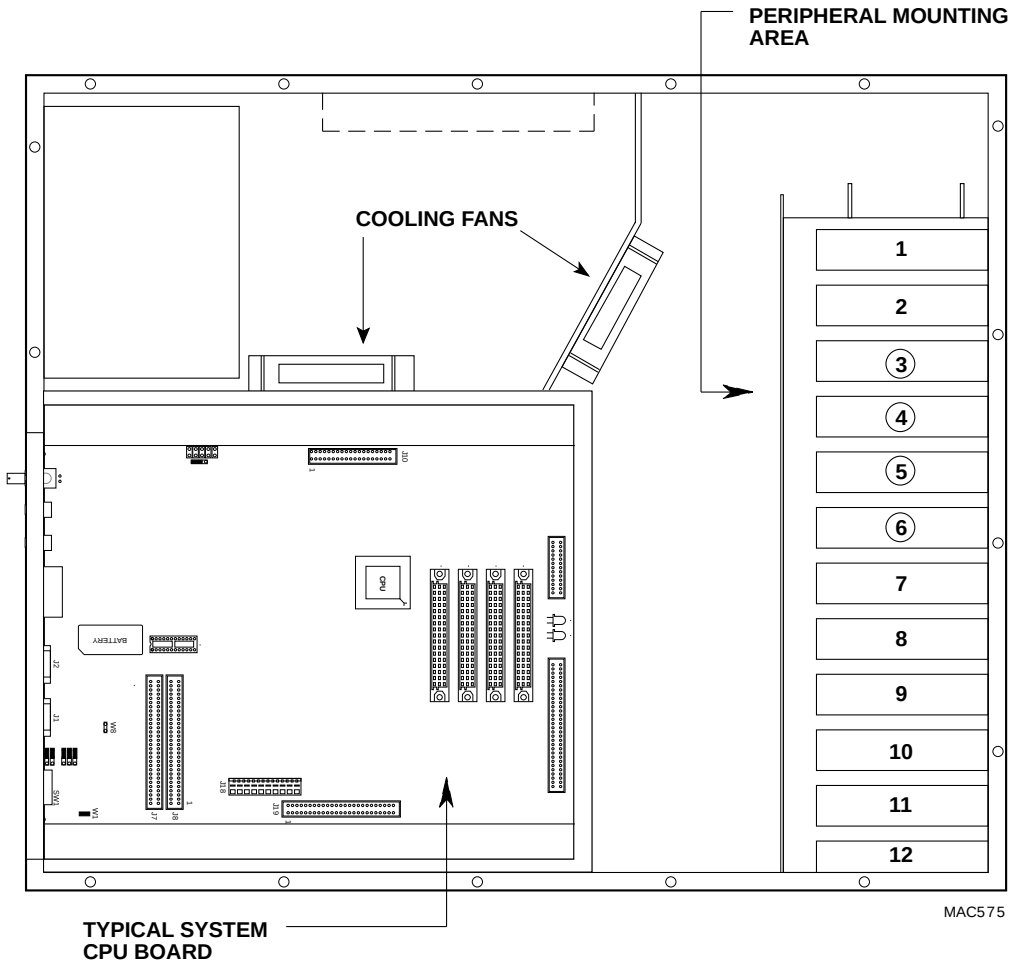


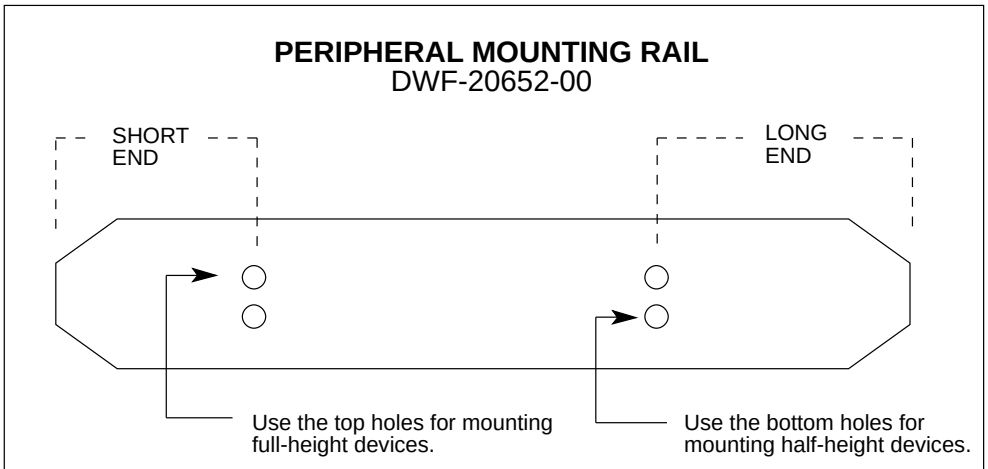
Figure E-1 — SBC Peripheral Mounting Area

Slots 3, 4, 5, and 6 are used for installing peripherals that will be accessed through the opening in the computer door. This includes devices like floppy disk drives and magnetic tape drives that use removable media. For example, Figure 1-1 in Chapter 1 shows an SBC with one 5°1/4" half-height floppy disk drive, one half-height 1/4" streaming tape drive, and one full-height 8mm magnetic tape drive. For this installation, the floppy disk drive occupies slot 3; the 1/4" streaming drive occupies slot 4; and because it is a full-height device, the 8mm magnetic tape drive occupies slots 5 and 6.

The first hard disk drive is mounted in slot 12, or slots 11 and 12 if it is a full-height device. A second hard disk drive would be mounted in the next available slot above the first disk drive. The hard disk drives are mounted in the lower part of the chassis for two reasons: to make sure the weight in the chassis is properly distributed and to provide easy access for both power and interface cables.

Plastic Mounting Rails

The plastic mounting rails are the key to installing peripheral devices in the SBC. Two rails are required to mount a peripheral device. The rails (DWF-20652-00) are universal; they can be mounted on either the right or left hand side of the peripheral. Figure E-2 shows an illustration of the rail and explains how it is installed on various types of peripherals:



SHORT END

For Tandberg 1/4" streaming tape drives and all hard disk drives, mount the rails with the short end pointing toward the rear of the computer cabinet.

LONG END

For Exabyte 8mm drives, floppy drives, and other drives (except Tandberg) with removable media, mount the rails with the long end pointing toward the rear of the computer cabinet.

MAC470

Figure E-2 — SBC Peripheral Mounting Rail

Figure E-3 shows the basic peripheral/rail assembly. Besides the rails, the peripheral mounting kit includes both standard and metric screws for compatibility with all of Alpha Micro's 5°1/4" peripherals.

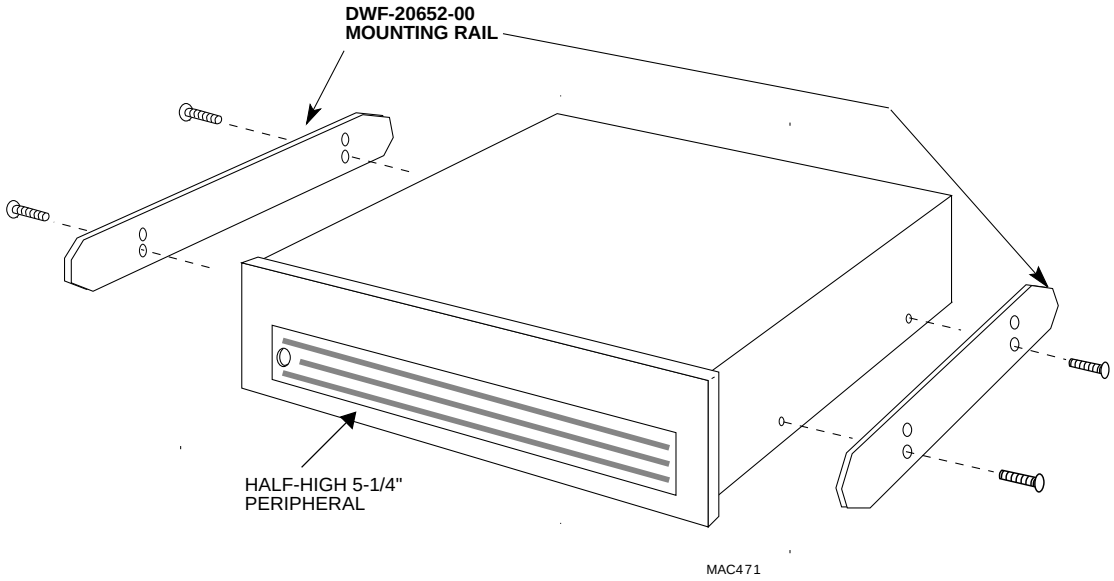


Figure E-3 — Attaching Mounting Rails to Peripheral

Additional Documentation

Each peripheral device sold by Alpha Micro is shipped with its own set of installation instructions. The installation instructions include information on jumper settings, termination, and cabling. Before installing a peripheral, make sure you read the documentation shipped with the device.

APPENDIX F

AM-140 USER CONFIGURABLE OPTIONS

SBC AM-140 CPU BOARD

The AM-140 is a 50Mhz main logic board available for the SBC. Most of the AM-140 specifications are covered in Appendix A, however, the following list highlights some of the key features on the AM-140 board:

- Memory expansion up to 64 megabytes.
- I/O expansion up to 66 serial ports.
- On-board intelligent ESDI controller.
- 68030 Processor chip.

The sections that follow include information on user configurable options for the AM-140 board.

Most of the jumpers on the AM-140 board are factory configured and should not be moved. Only the features discussed in the next sections have jumpers that are user configurable.

REMOTE RESET CAPABILITY

As discussed in Appendix B, it is possible to reset the SBC remotely through serial I/O Port "0." If properly configured, you can use a push button switch to short Pin 1 in that connector to Pin 7 (Signal Ground), resetting the computer. To enable remote reset, you must install a shorting block in the REMOTE RESET position on the SBC main logic board. See Figure F-1.

SERIAL I/O PORT CONFIGURATION

Ports 0 and 1 on the SBC are factory configured for RS-232 compatibility. You can configure either or both of these ports for RS-422 compatibility if desired. For each port, three jumpers on the main logic board control whether it is set for RS-232 or RS-422 compatibility. You must set all three to either 232 or 422. For Port 0, the jumpers are W2, W3 and W4; for Port 1, they are W5, W6 and W7. See Figure F-1.

VIDEO BACKUP DATA FORMAT CONTROL

The VCR Interface contained in your SBC system is factory configured to support NTSC video format (U.S. standard). If you want to convert your system to the "PAL" or "SECAM" video formats (European standards), set the PAL/NTSC jumper to the PAL shorting position. This jumper is located just above U45 on the main logic board, as Figure F-1 shows.

To return to NTSC configuration, return the jumper to the NTSC shorting position.

VIDEO NETWORK TERMINATOR

If you have purchased the AlphaNET product and want to add your SBC to your Video Network, you must make sure only the systems at the extreme ends of the network have network terminators installed. All SBC systems are factory configured with the network terminator removed. If you are connecting your SBC as the last computer in your network chain, install the LINK TERM shorting block on the main logic board. This jumper is located just above J6 link connector. See Figure F-1.

CONFIGURING SBC MEMORY

Installing memory boards in the SBC couldn't be easier. There are no jumpers to configure, no switches to set, and no concerns with beginning or ending memory addresses.

There are four connectors shown in Figure F-1 designed for SBC memory boards; J12, J13, J14, and J15. The first memory board is installed in J12; the second memory board is installed in J13; the third goes in J14; and the fourth goes in J15.

If you are going to mix 4MB and 16MB memory boards in your SBC, make sure you install the 16MB boards first followed by the 4MB memory boards.

SBC EXPANSION I/O

There are two 60-pin connectors on the SBC CPU board, each capable of supporting 32 serial ports. The first 32 ports are controlled by connector J7 and the second 32 ports are controlled by connector J8.

Connector J7 supports the standard interface drivers for all of Alpha Micro's paddle card devices designed for the AM-355 I/O bus. AM-355 I/O boards attached to connector J7 use the same interface driver used by the two serial ports on the CPU board, **AM140.IDV**. AM-358 I/O boards and any other AM-355 I/O bus paddle cards attached to the J7 connector will use the drivers designed for those specific devices.

The J8 connector only supports AM-355 and AM-358 I/O boards. AM-355 and AM-358 I/O boards attached to connector J8 use special interface drivers, **AM355B.IDV** and **AM358B.IDV**.

For information on jumper settings, port numbering, and I/O addresses, see the installation guide shipped with the AM-355 I/O bus device you are installing.

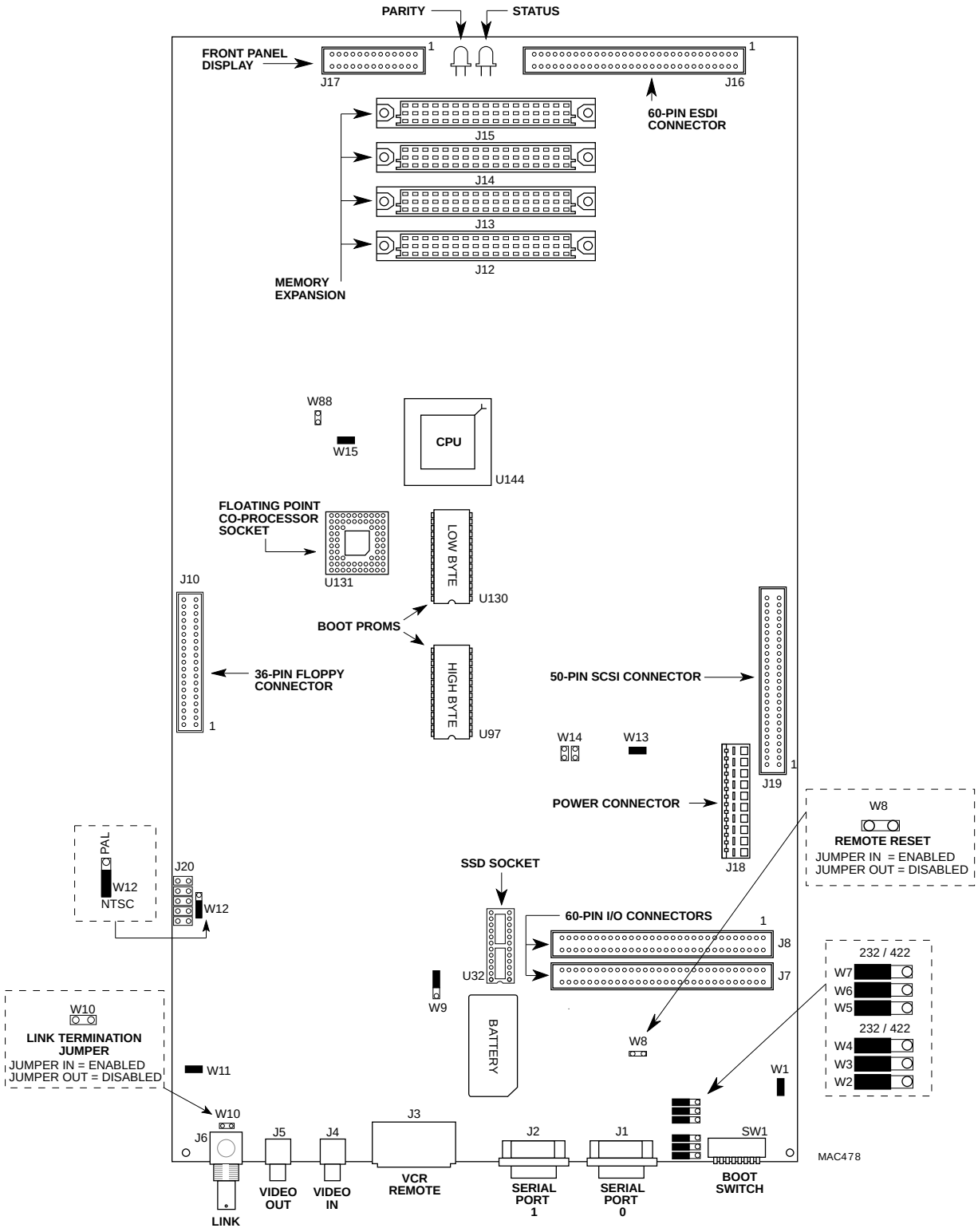


Figure F-1. Option Locations on the Main Logic Board

APPENDIX G

AM-145 USER CONFIGURABLE OPTIONS

SBC AM-145 CPU BOARD

The AM-145 is a 33Mhz main logic board available for the SBC. Most of the AM-145 specifications are covered in Appendix A, however, the following list highlights some of the key features on the AM-145 board:

- Memory expansion up to 16 megabytes.
- I/O expansion up to 34 serial ports.
- On-board floppy controller.
- 68020 Processor chip.

The sections that follow include information on user configurable options for the AM-145 board.

Most of the jumpers on the AM-145 board are factory configured and should not be moved. Only the features discussed in the next sections have jumpers that are user configurable.

REMOTE RESET CAPABILITY

As discussed in Appendix B, it is possible to reset the SBC remotely through serial I/O Port "0." If properly configured, you can use a push button switch to short Pin 1 in that connector to Pin 7 (Signal Ground), resetting the computer. To enable remote reset, you must install a shorting block in the REMOTE RESET position on the SBC main logic board. See Figure G-1.

SERIAL I/O PORT CONFIGURATION

Ports 0 and 1 on the SBC are factory configured for RS-232 compatibility. You can configure either or both of these ports for RS-422 compatibility if desired. For each port, three jumpers on the main logic board control whether it is set for RS-232 or RS-422 compatibility. You must set all three to either 232 or 422. For Port 0, the jumpers are W3, W4 and W5; for Port 1, they are W6, W7 and W8. See Figure G-1.

VIDEO BACKUP DATA FORMAT CONTROL

The VCR Interface contained in your SBC system is factory configured to support NTSC video format (U.S. standard). If you want to convert your system to the "PAL" or "SECAM" video formats (European standards), set the PAL/NTSC jumper to the PAL shorting position. The jumper that controls this option is W13, which is shown in Figure G-1.

To return to NTSC configuration, return the jumper to the NTSC shorting position.

VIDEO NETWORK TERMINATOR

If you have purchased the AlphaNET product and want to add your SBC to your Video Network, you must make sure only the systems at the extreme ends of the network have network terminators installed. All SBC systems are factory configured with the network terminator removed. If you are connecting your SBC as the last computer in your network chain, install the LINK TERM shorting block on the main logic board. This jumper is called W17. See Figure G-1.

CONFIGURING SBC MEMORY

There are four connectors shown in Figure G-1 designed for SBC memory expansion; J5, J6, J7, and J8. The memory expansion board is called the AM-715-10 and has four megabytes of memory. The maximum memory capacity of 16 megabytes is achieved by installing four memory boards.

See the *AM-715 Memory Board Installation Instructions*, for detailed information on installing memory boards.

If your computer includes an AM-522 ESDI controller board, the maximum memory capacity is reduced to 12 megabytes. The AM-522 board requires one of the memory expansion slots for installation.

SBC EXPANSION I/O

The AM-145 board has one 60-pin connector, located at J9, designed to support a maximum of 32 serial ports. These ports are in addition to the two standard AM-145 serial I/O ports (0 and 1) shown in Figure G-1.

AM-355 I/O boards attached to connector J9 use the same interface driver used by the two serial ports on the CPU board, **AM145.IDV**. AM-358 I/O boards use an interface driver called **AM358.IDV**. Other types of boards designed to be used on the AM-355 I/O bus have their own unique drivers.

For information on jumper settings, port numbering, and I/O addresses, see the installation guide shipped with the AM-355 I/O bus device you are installing.

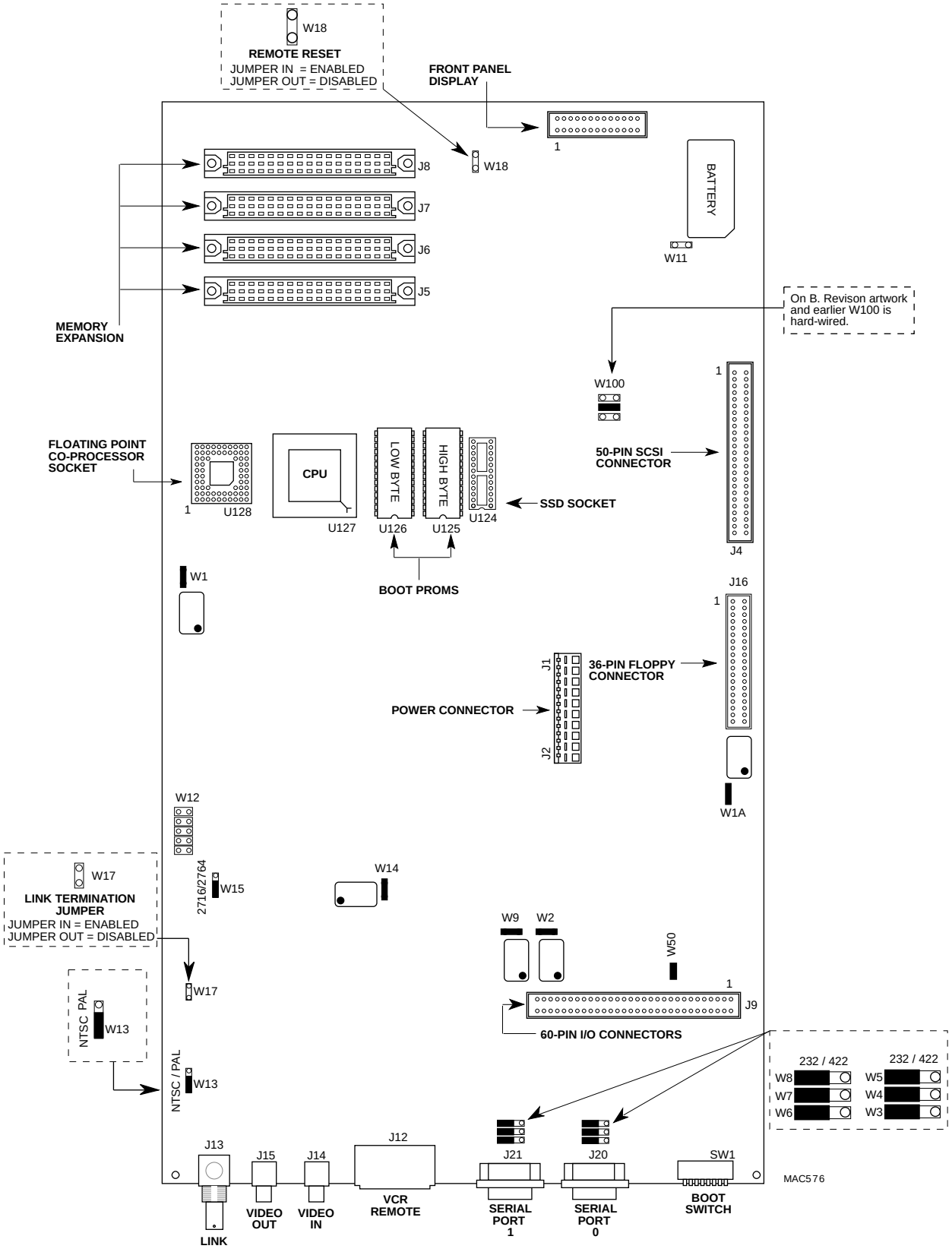


Figure G-1. Option Locations on the Main Logic Board

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