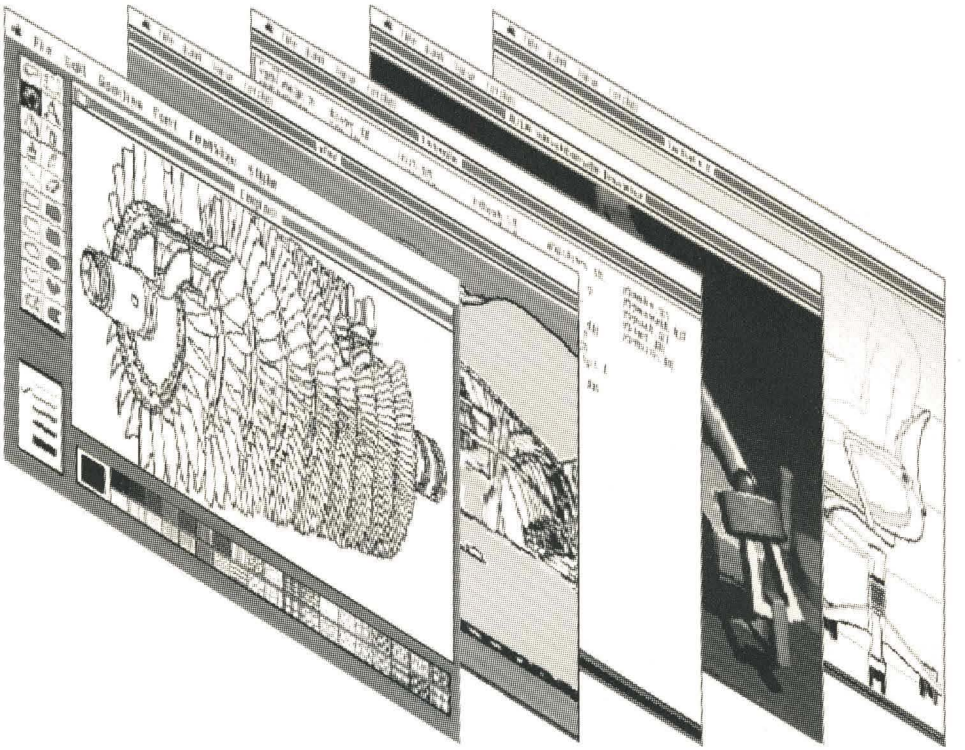
A/UX™ Installation Guide



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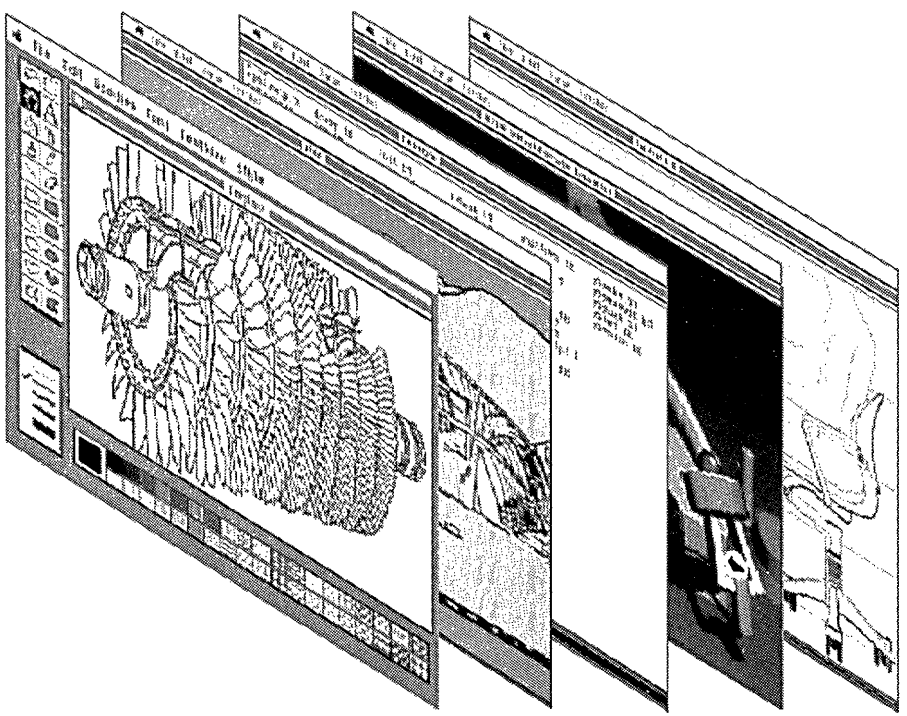
Operation with noncertified peripheral devices is likely to result in interference to radio and television reception.

Apple® A/UX™ Installation Guide



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Installation Overview

Developed to run on the Apple® Macintosh™ II computer, A/UX™ is a version of the industry-standard AT&T UNIX® System V Release 2 operating system. A/UX also incorporates extensions from the 4.2 Berkeley Software Distribution (BSD) version of the UNIX operating system, as well as Apple's own enhancements to the UNIX environment.

Installing A/UX is simple. A/UX is distributed on a factory-loaded Apple HD 80SC hard disk, and installing the system basically consists of setting up the Macintosh II hardware, turning on the computer, and setting a few site-specific details. The purpose of this guide is to simplify your task so that even if you are not a programmer or an experienced system administrator, you should have no difficulty setting up your computer and immediately running A/UX.

This guide explains in step-by-step detail how to set up your Macintosh II computer, how to start A/UX the first time, and how to set the initial software configurations that allow you to restart A/UX easily. In the course of the installation you will perform several standard Macintosh procedures and invoke several common UNIX commands.

Audience for this guide

This guide is for the person responsible for the hardware setup and initial software startup of A/UX on a Macintosh II computer.

In the past, a site running the UNIX operating system appointed an administrator to install and maintain the system for all other users. The advent of low-cost workstations like the Macintosh II, however, has brought the power of the UNIX operating system to the desktops of single users. If you're the sole user of your system, you're probably installing it and administering it yourself.

If you have little experience with UNIX operating systems, consider reading *A/UX System Overview* before beginning this installation. *A/UX System Overview* will familiarize you with the terms and concepts used in the installation instructions that follow. *A/UX System Overview* also contains a glossary of terms that you may find helpful.

To handle the complexity involved with administering the multitasking, multiuser environment of A/UX, you should already possess some experience and familiarity with computers. This guide assumes that you have enough computer experience to forgo the need to have basic computer terms and concepts explained. But this guide makes no assumptions about what kind of computer environment you might be familiar with. Some readers may be very familiar with the UNIX operating system, others with the Macintosh, and others with entirely different computer environments.

How to use this guide

To expedite the installation process while accommodating the needs of readers with different computer backgrounds, all critical installation steps are numbered and printed in **bold** type. These steps contain all the information many readers will need to carry out the installation. If you need more information about how to carry out a step—or if you'd like an explanation for why you're performing it—you'll find helpful, explanatory text with each step. These explanations are in plain type so that you can easily skip over them if you find them unnecessary.

Don't be intimidated by the size of this guide. Much of the information is relevant only to particular configurations, so you'll probably be skipping over many sections. Chapter 7, for instance, describes how to add several optional Apple peripherals: an Apple ImageWriter™ or ImageWriter II printer, an Apple LaserWriter™ printer, and a Macintosh Plus for use as a terminal. If you aren't adding any of these to your system at installation time, you can skip this chapter entirely. Other portions of this guide offer instructions that apply only to those who purchased A/UX on an external hard disk.

At many points in this guide, you'll be informed whether you can skip the next step, section, or chapter, and you will be directed where to go next for further instructions.

If you're new to UNIX and have A/UX on an internal hard disk, set aside about an hour and a half to start and complete this installation. Much of this time will be spent setting up the Macintosh II computer. By skipping over explanatory text about the software configurations, users familiar with UNIX should complete the installation in about half the time. If you're new to UNIX and you have A/UX on an external hard disk, figure on taking an additional half hour to attach the extra hardware and configure it to A/UX.

A summary of the installation

Follow these basic steps to install A/UX:

- ☐ Check the system requirements, described in Chapter 1.
- ☐ Set up and configure your Macintosh II as explained in Chapter 2.
- ☐ Start your system. Chapter 3 describes this simple procedure and explains what you should see as your system boots for the first time.
- ☐ Set the following site-specific details for your machine: your time zone, the local date and time, your host name, and a network domain name. Chapter 4 explains how to perform these functions.
- ☐ Bring A/UX up to multiuser mode and then set the `root` password. This is explained in Chapter 5.

- Shut down your system and bring it back up. Chapter 6 describes the procedures to follow when bringing your system down to single-user mode before turning the power off, and then how to restart your system and bring it back to multiuser mode. Restarting A/UX is much simpler than installing it, and should take 3 to 5 minutes once you're familiar with this operation.
- Optionally, you may choose to add an ImageWriter or LaserWriter printer by plugging it into the printer port (for the LaserWriter printer, this also involves entering several configuration commands); you can also add a Macintosh Plus to serve as a terminal by plugging it into the modem port of the Macintosh II and setting a few software configurations. These options are described in Chapter 7.

Chapter 8 concludes by suggesting what guides you should refer to next for maintaining A/UX.

Chapter 1

Installation Requirements

This chapter lists the minimum software and hardware requirements for starting and running A/UX. If your system has not been configured for A/UX as described below, contact your Apple representative at your place of purchase or contact your nearest authorized Level 1 Service Center for information about procuring the necessary upgrade.

Software requirements

You should have the following software:

- The A/UX operating system and utilities, factory installed on an 80-megabyte Hard Disk 80SC (either internal or external, at your option).

  If you purchased A/UX on a preloaded internal hard disk, your Apple representative should have installed the disk for you. If your A/UX-loaded internal hard disk has not been installed, call your Apple representative at your place of purchase or your nearest authorized Level 1 Service Center.

  If you purchased A/UX on an external hard disk, subsequent sections of this guide provide instructions for connecting the hard disk to your system.

- A 3.5-inch disk labelled *A/UX Stand-Alone Shell*. Distributed as a backup for starting and troubleshooting A/UX should there be problems with your hard disk, *A/UX Stand-Alone Shell* contains the utilities that are also installed on the Macintosh partition of your A/UX hard disk.

Hardware requirements

Because of the heavy processing demands of A/UX, your Macintosh II requires the special-performance hardware listed below. If you have any questions regarding these, refer to your hardware owner's guides or ask your Apple representative for more information.

- Macintosh II computer with at least one 3.5-inch disk drive.
- Video card. Chapter 2 offers installation instructions for Apple's video card. If you purchased a video card from another vendor, refer to the manufacturer's owner's guide for installation instructions.
- Monochrome or color monitor with power and data cables. Chapter 2 provides installation instructions for Apple's monitors. If you purchased one from another vendor, see the manual that came with the monitor for installation instructions.
- Keyboard, mouse, and Apple Desktop Bus™ (ADB) cables. Apple offers a mouse and a choice of keyboards; mouse devices, keyboards, and other input devices are also available from other vendors. Installation instructions for Apple's ADB mouse and keyboards are provided in Chapter 2. If you purchased input devices from other vendors, refer to the manufacturers' owner's guides for installation instructions.
- 68851 PMMU (paged memory management unit) in place of the address mapping unit (AMU) normally shipped with the Macintosh II. If your system does not have the PMMU installed, an error message reporting so appears soon after you try to start A/UX, in which case you should contact your Apple representative.

- At least 2 megabytes of main memory, instead of the 1-megabyte configuration standard for the Macintosh II. An additional 2 megabytes for every extra user on the system is recommended. (If your system does not meet the 2-megabyte requirement, a warning about insufficient memory appears soon after you try to start A/UX, in which case you should contact your Apple representative.) If you are installing extra memory yourself, see the manual that came with your memory upgrade product.
- If you purchased A/UX on an external hard disk, you also need the Apple SCSI Cable System. At the appropriate point in this installation, Chapter 2 directs you to instructions for connecting the external hard disk to the SCSI port of your Macintosh II.

Proceed now to Chapter 2 to set up your Macintosh II.

Chapter 2

Setting Up the Macintosh II

This chapter fully describes how to unpack and set up your Macintosh II in preparation for starting A/UX.

1. **Take all the materials out of the packing boxes and see if you have everything shown in Figure 2-1.**

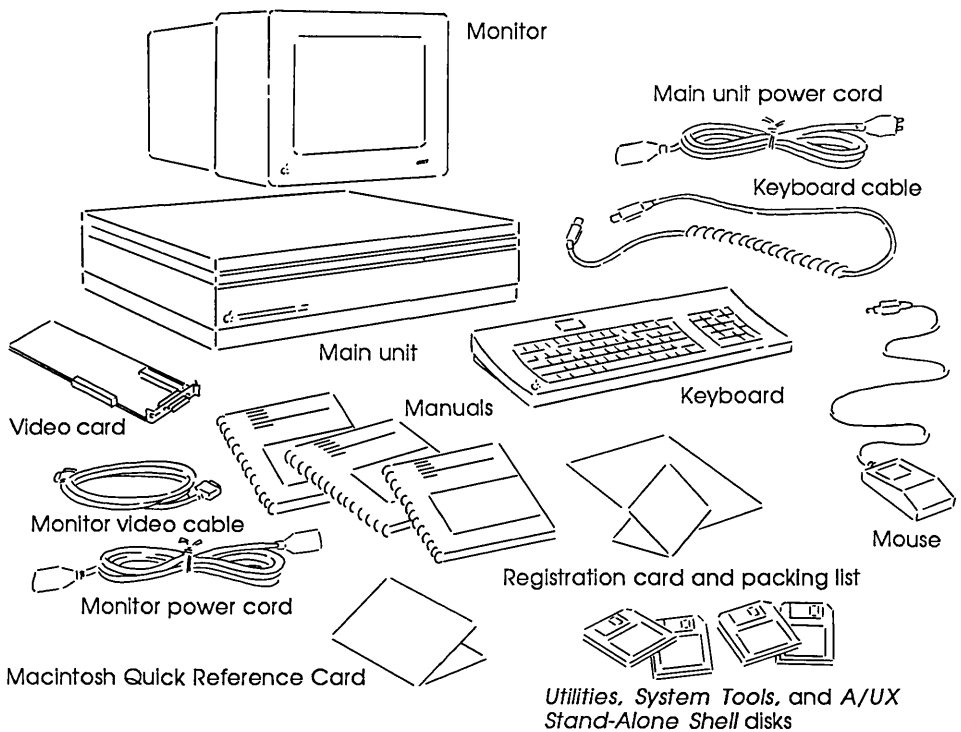

Figure 2-1
What you should have

Check your packing lists to make sure you have everything. Then fill out the registration card and mail it in. (The registration card asks for serial numbers; you'll find them either on the bottom or at the back of each part.) In the unlikely event that something is missing, call your authorized Apple dealer immediately.

- *Save the packing material:* Store away the boxes and all the packing material. You should use this material to repack your computer system if you have to move it over long distances (any distance that requires a car or airplane).

2. Choose a good place to set up your system.

Don't use card tables or other surfaces that could be tipped or knocked over. To avoid glare, pick a place where light won't be reflected into your eyes and you won't be facing bright light.

Your computer needs to be plugged into a three-hole grounded outlet. If you have more than two devices that need to be plugged into the wall, you should get a grounding power strip. Available at any electronics or hardware store, a power strip is like a wall socket with four to eight outlets; many of these power strips come with an on/off switch for convenience and a surge protector.

3. Familiarize yourself with the back of the system.

Turn the main unit so that you're looking at the back of it. Figure 2-2 identifies the ports, connectors, and switches that you will be using as you set up your Macintosh II.

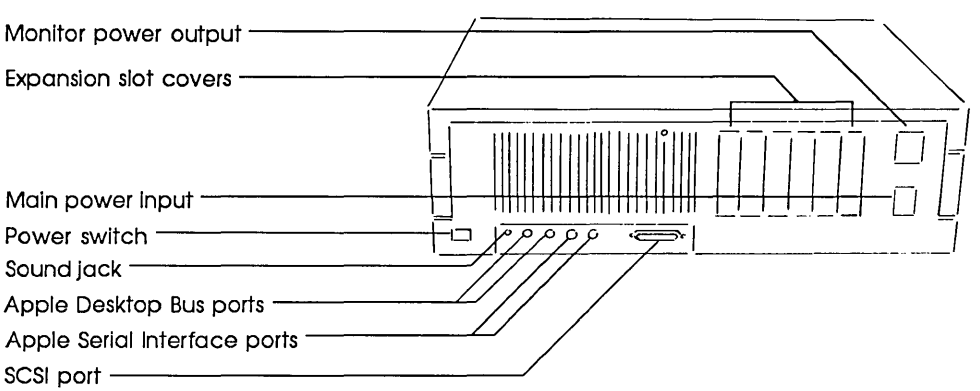

Figure 2-2
Back of the main unit

- You will find the serial ports identified by icons. The port identified by the modem (telephone) icon has the A/UX device name `/dev/tty0`. The port marked by the printer icon has the A/UX device name `/dev/tty1`. Chapter 7 describes how to use these ports for attaching Apple printers and a Macintosh Plus (for use as a terminal).
- Another item you'll find on the back of the main unit, the power switch, is there when you have to use it but is not intended for regular use. In the normal course of events, you turn on the computer with the Power On key as described in Chapter 3, and you should turn it off either by entering the `powerdown` command while in **single-user mode** under A/UX or by choosing Shut Down from the Special menu under the Macintosh Operating System. (Chapter 6 describes the proper steps to follow before entering the `powerdown` command.)

Single-user mode: The state of a UNIX system that accepts input from and directs error output to the system console only; in single-user mode, only the root file system is mounted.

If you encounter a problem with the computer and for some reason cannot use the `powerdown` or Shut Down commands to turn it off, you can push the power switch instead. (Be sure you push it only once.) Wait a few seconds, and the computer will turn itself off. Then you can start it again by pressing the Power On key. Note that this method of turning off the computer can be fairly drastic, and you will lose any work you had not previously saved on a disk.

4. Read the following safety instructions.

You're almost ready to plug in your Macintosh II, but first read these important safety instructions.

Warning This equipment is intended to be electrically grounded. Your computer is equipped with a three-wire grounding plug—a plug that has a third (grounding) pin. This plug will fit only a grounding-type AC outlet. This is a safety feature. If you are unable to insert the plug into the outlet, contact a licensed electrician to replace the outlet with a properly grounded plug. Do not defeat the purpose of the grounding plug!

For your own safety and the safety of your equipment, always take the following precautions:

Disconnect the power plug (by pulling on the plug, not the cord) under these circumstances:

- if the power cord or plug is frayed or otherwise damaged
- if anything is spilled into the case

- □ if your equipment is exposed to rain or any other excess moisture
- □ if the case has been dropped or if it has been otherwise damaged
- □ if you suspect that your computer needs servicing or repair
- □ whenever you clean the case

Be sure that you always do the following:

- □ Keep all air vents clear. Leave 4 to 6 inches of clearance between the vents on both sides of the main unit and any object that may restrict air flow. If you place your monitor on top of the main unit, it should not lie "flat"; make sure it sits at least 8 mm (0.314 inches) above the surface of the main unit. (Apple monitors come with little rubber "feet" to raise them the correct distance, allowing for air to circulate properly.)
- □ Keep your equipment away from any source of liquid (such as wash basins, bathtubs, and shower stalls). If you drink any beverages while at your computer, take care not to spill them.
- □ Keep your equipment protected from damp or wet weather.
- □ Read all the installation instructions carefully before you plug the product into a wall socket.
- □ Keep these instructions handy for reference.
- □ Follow all instructions and warnings dealing with your system.

Warning Electrical equipment may be hazardous if misused. Operation of this product or similar products must always be supervised by an adult. Do not allow children access to the interior of any electrical product, and do not permit them to handle cables.

When you wish to clean the case:

- □ Disconnect the power plug by pulling on the plug, not the cord.
- □ Wipe the case with a clean, soft cloth moistened with water.
- □ Wipe the surfaces lightly, but do not wipe the monitor screen. For cleaning the screen, use only the special cloth provided and do not moisten it.

5. **Now connect the socket end of the power cord into the main power input—the bottom receptacle on the right side, viewed from the rear. (See Figure 2-2.)**

   The first step in assembling your computer system is attaching and plugging in the power cord. The plugged-in power cord acts as a ground for the system, protecting its components from static electrical discharge.

❖ The connector above the main power input is for the monitor power output.

6. **Plug the other end of the power cord into a three-hole grounded outlet.**

Warning Do not turn on the computer system until you've completed the entire hardware installation process. Turning on the system at the wrong time could result in electrical shock to you or cause damage to your computer system's components.

If the power has been on, turn it off and wait at least 5 minutes before connecting anything to or disconnecting anything from your computer. There are several ways to turn off the computer. If you know how to choose Shut Down from the Special menu, do that. If you're still unfamiliar with how to use this command, push once on the external power switch (found on the back of the main unit) and wait for the computer to shut itself down. (See Figure 2-2 if you need help locating the power switch.) If this fails, pull the plug on the power cord (from the three-hole grounded outlet).

You are now ready to install your monitor. Apple offers color and monochrome monitors to go with your Macintosh II. Basic installation is the same for all the monitors. The monitor connects to your computer through the socket on the video card that you will install next.

7. **Remove the lid from the computer's main unit. (See Figure 2-3.)**

   □ Using a Phillips-head screwdriver, loosen and remove the security screw holding the lid to the main unit. (It's at the top center of the rear panel.)

   □ Wrap your hands around the rear corners of the case (as shown in Figure 2-3).

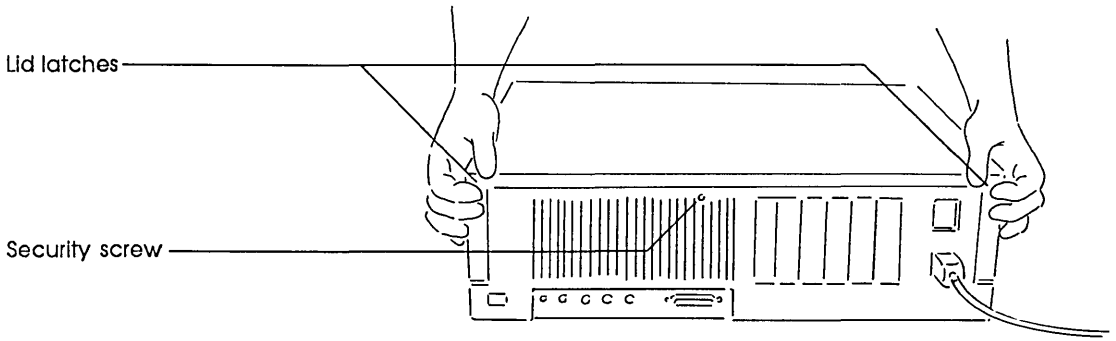

Figure 2-3
Removing the lid

- □ Press on the latches as you lift up on the back of the lid.
- □ When you feel it release, lift the lid all the way off the case and put it aside.

8. **Touch the power supply case inside the computer to discharge any static electricity that might be on your clothes or body. (See Figure 2-4.)**

Warning It's OK to touch the power supply if you've just unpacked the computer. However, the power supply can get hot in normal use. If the computer has been on, shut it off and wait at least 5 minutes before touching the power supply.

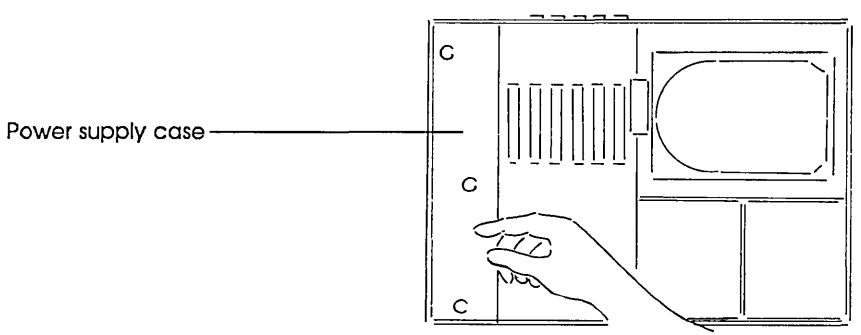

Figure 2-4
Touching the power supply case

9. **Choose an expansion slot for the video card. (See Figure 2-5.)**

   The expansion slots are the narrow, plastic strips running along the bottom of the main unit, near the back. It doesn't matter which one you use.

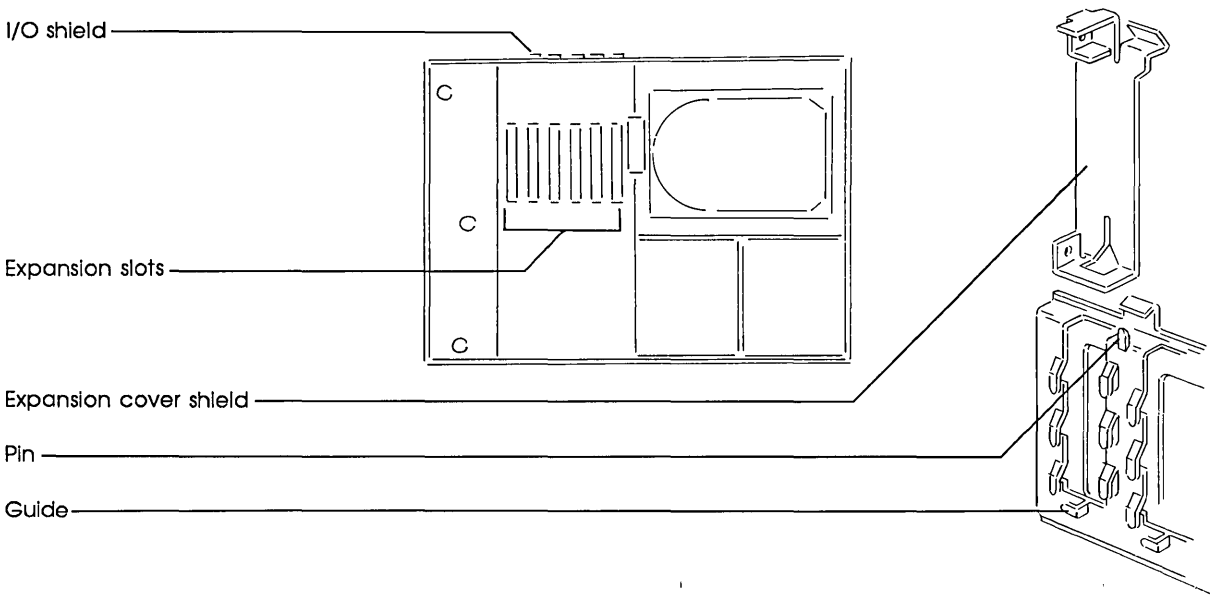

Figure 2-5
Expansion slots and expansion cover shield

10. **Remove the expansion slot's cover shield (see Figure 2-5) by lifting up until the shield is free of the guide and pin.**

    Save the shield; you will need it later if you take the card out of the slot. The card itself has a shield attached to it that will replace the shield you just removed.

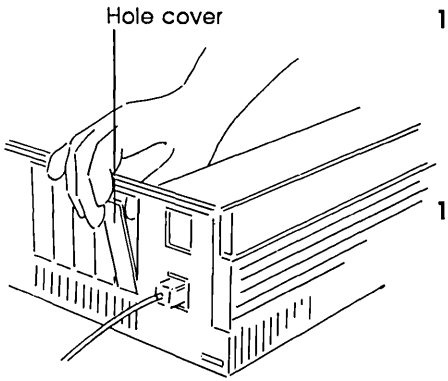

Figure 2-6
Removing the plastic hole cover

11. Push out the plastic hole cover that lines up with the slot you plan to use. (See Figure 2-6.)

- □ Grasp the cover with your thumb inside the computer and your fingers outside.
- □ Push the cover out with your thumb and set it aside.

12. Insert the video card into the expansion slot.

- □ The connector pins extend beyond the bottom edge of the video card. Be careful not to touch these pins. Instead, pick up the card by its top—at the metal bracket on one end and anywhere along the top edge at the other end.
- □ The expansion cover shield on the card attaches to the inside of the back panel in the same way as the shield you removed in step 11. Align the card so that the guide fits through the lower slot in the shield on the card and the pin sticks up slightly through the hole at the top of the shield. (See Figure 2-7.)

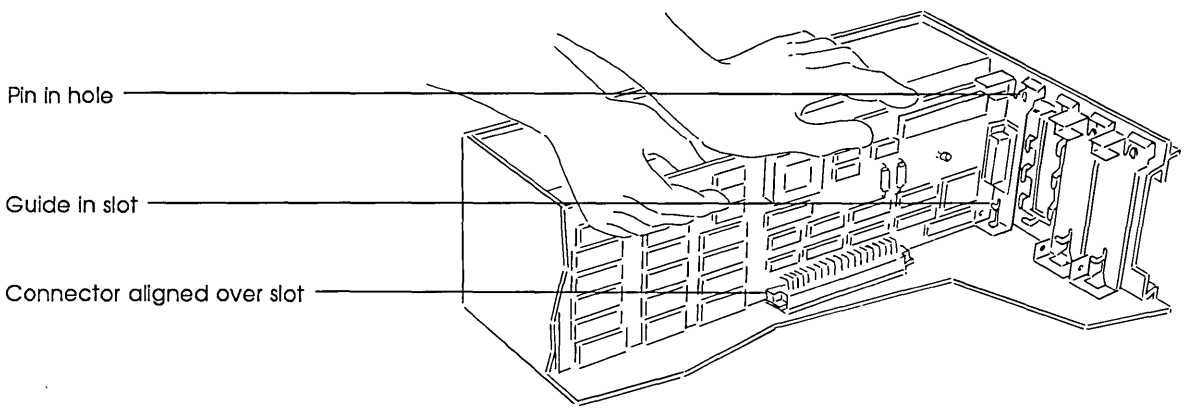

Figure 2-7
Aligning the card

- □ Align the connector on the bottom of the card, directly over the slot.

- ☐ Place one hand along the top edge of the card, directly over the connector area, and push down firmly until the connector is fully seated. (See Figure 2-8.)

Important Don't force the card. If you meet a lot of resistance, pull the card out and try again.

Don't wiggle the card from side to side when you insert it. Wiggling the card puts unnecessary stress on the card and slot.

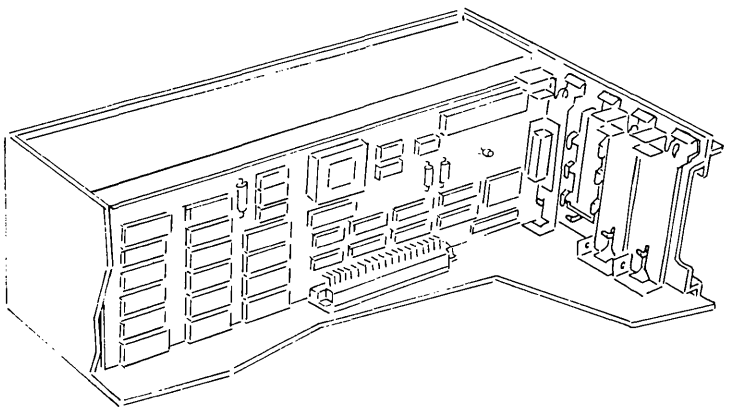

Figure 2-8
Inserted card

You can test if the card is properly connected by lifting the card gently. If it resists and stays in place, it's connected.

You can use this same method (that is, repeat steps 7 through 13) for installing all expansion cards in your Macintosh II at any time. Remember: If the computer has been running, let it cool down for 5 minutes before you open up the main unit. Of course, you should also read and follow any instructions that come with other expansion cards you may have.

Important If you plan to install more than one card, see Appendix C for details on the power available for the expansion slots.

13. **Replace the lid on the main unit. (See Figure 2-9.)**
    - □ Tip the front of the lid down so that it catches the three hooks under the lid in the front of the main unit's case.
    - □ Lower the back of the lid onto the case until the rear latches snap into place.
    - □ Replace and tighten the security screw.

Warning When reinstalling the lid, ensure that it is properly seated before turning on the power. To check, press firmly down at the two rear and three front latch positions.

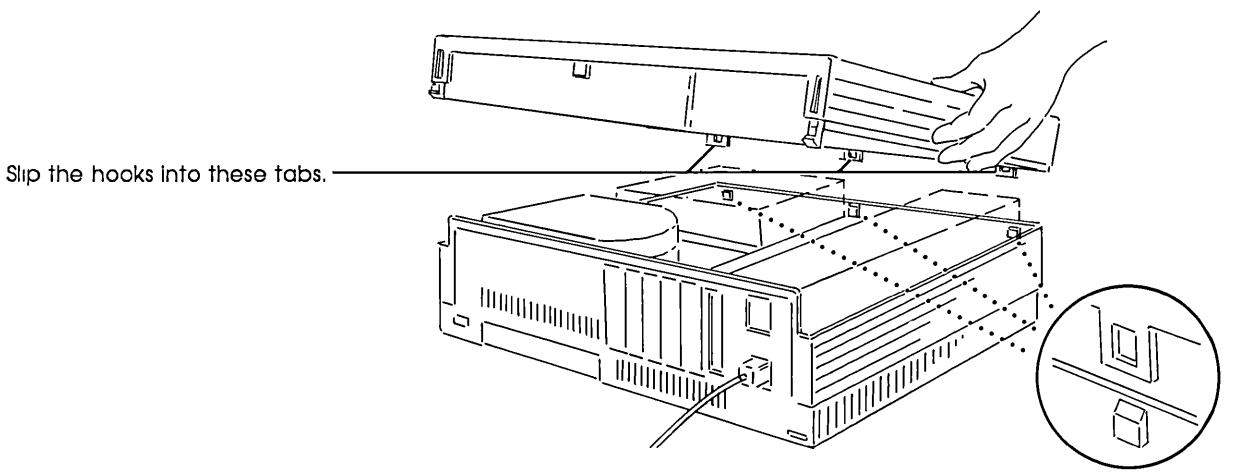

Figure 2-9
Replacing the lid

14. **Place your monitor near the main unit, and push one end of the video cable (both ends are the same) into the video socket on the back of the monitor.**

    With the back of the main unit still facing you, turn the monitor so its back is also facing you. (See Figure 2-10.) There are only two connectors on the back of the monitor: the 15-pin video socket and the 3-pronged power receptacle. The video cable fits only in the 15-pin video socket.

15. **Tighten the thumbscrews on the cable connector to prevent it from coming loose and to prevent radio and television interference.**

16. **Connect the other end of the video cable to the socket on the video card, and tighten the thumbscrews.**

Connect the cable to the card through the opening in the rear of the computer. (See Figure 2-10.)

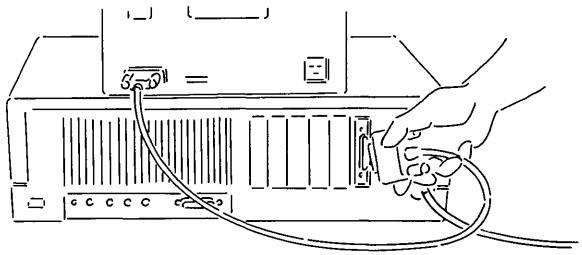

Figure 2-10
Connecting the video cable

You are now ready to connect the monitor's power cord. (See Figure 2-11.)

Warning The plug for your Apple monitor is identical to an Ethernet cable plug. If you later install an Apple EtherTalk™ card, be sure that you do not plug the video cable into the EtherTalk card's socket, and do not plug an Ethernet cable into the video card's socket. Either action can damage your card.

The EtherTalk card is identifiable from the back of the main unit by the round connector (used for thin Ethernet) just below the socket for the regular Ethernet cable.

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17. **Push the socket end of the monitor's power cord into the monitor's power input receptacle on the back of the monitor.**

The monitor's power input receptacle has three prongs.

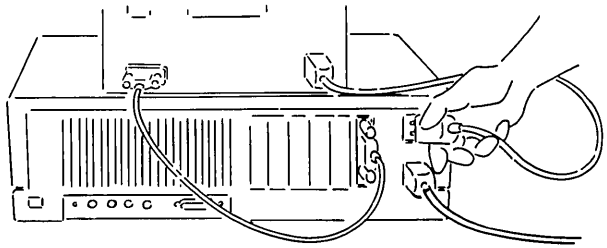


Figure 2-11
Connecting the monitor power cord

18. **Connect the other end of the power cord to the monitor power output receptacle on the back of the main unit.**

    The monitor power output is on the right side of the main unit, just above the main power input receptacle. (See Figure 2-11.)

    For information about adjusting brightness and contrast (and alignment, in the case of a color monitor), see the manual that came with your monitor. But don't adjust anything yet; to save yourself the trouble of turning around the monitor and main unit again, wait until you've attached the keyboard and the mouse.

    There are several ways to connect the mouse and the keyboard. The next several steps show how to connect the mouse to the keyboard and how to connect the keyboard to the main unit. When you've completed this procedure, you'll find information on alternative ways to connect these devices.

❖ *Avoid premature power on:* The steps are presented in this order so that the last thing you do is connect the keyboard to a power source. Once the keyboard has power, anyone could press the Power On key (described in Chapter 3) and accidentally turn on your computer before it's appropriate.

19. Plug the mouse cable into the connector on the right side of the keyboard. (See Figure 2-12.)

❖ *If you're left-handed:* Plug the mouse cable into the connector on the left side instead.

Place your keyboard near the back of the main unit with the keyboard facing you. To plug the mouse cable into the keyboard, turn the flat part of the cable's connector away so that it faces the rear of the keyboard, then insert it into the keyboard connector.

This kind of arrangement is known as a **daisy chain.** (In effect, the mouse will be connected to the computer through the keyboard.)

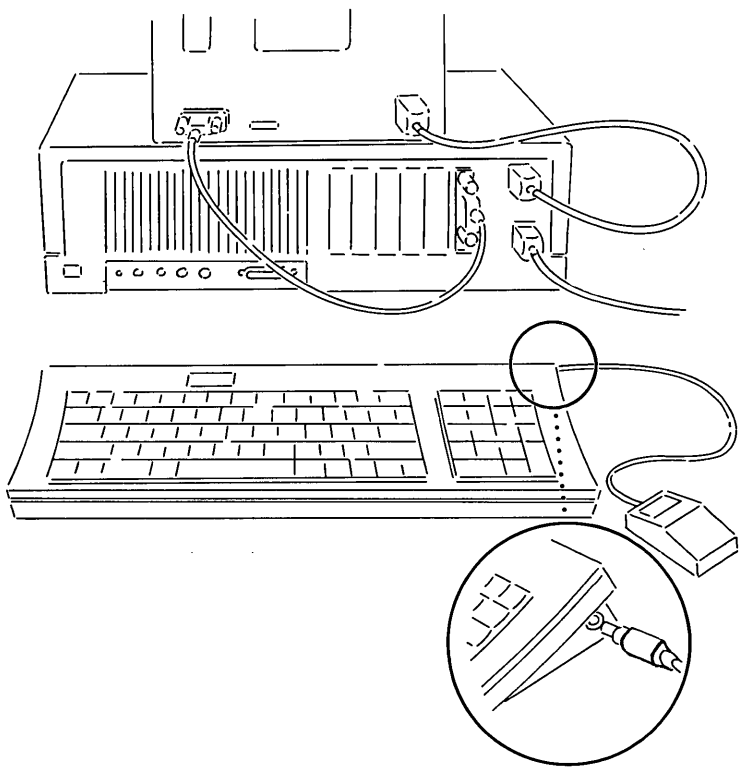


Figure 2-12
Connecting the mouse

20. **Plug one end of the keyboard cable into the remaining connector on the keyboard.**

21. **Plug the other end of the keyboard cable into either of the Apple Desktop Bus connectors to the right of the sound jack on the back of the main unit. (See Figure 2-13.)**

    Your Macintosh II works with a variety of keyboards. Keyboards may look different, but you attach them to the main unit in the same way.

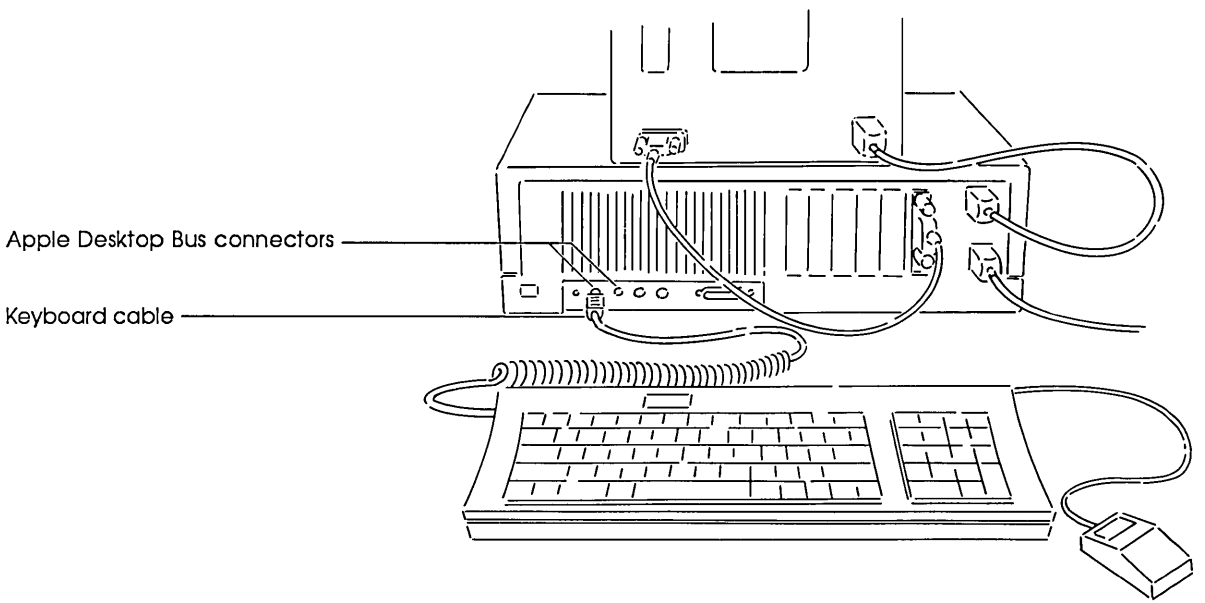


Figure 2-13
Connecting the keyboard to the main unit

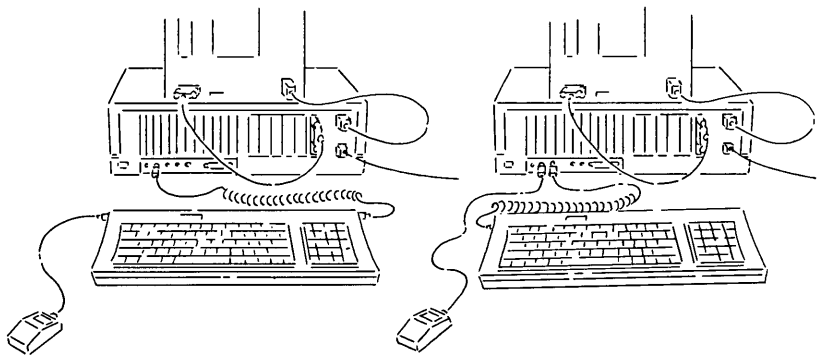


Figure 2-14
Alternative configurations

You might prefer to plug the mouse into the other connector on the back of the Macintosh II, leaving the second connector on the keyboard free for now. It's up to you. Figure 2-14 shows two possible arrangements.

If you have other Apple Desktop Bus devices to attach to your system, you can either daisy-chain them to the keyboard or use one of the back panel connectors.

Is A/UX on an external hard disk?

If you purchased A/UX on an internal hard disk, your Apple representative should have already installed it for you. You are almost ready to start up A/UX. Arrange your components as explained in step 22 below, then proceed to Chapter 3.

However, if you purchased A/UX on an external hard disk, you must connect this disk to your system before proceeding any farther. Skip to Appendix A, which contains instructions for setting up your external hard disk, and then proceed to Chapter 3.

22. **Arrange your components, make yourself comfortable, and get ready to start A/UX.**

Once you're satisfied that everything is connected properly, you'll want to arrange your Macintosh II components conveniently in your work area. Turn the main unit so that it's facing you. Place the monitor where you want it (on top of the main unit is fine), and position the keyboard and mouse where you can reach them comfortably.

Warning Protect your system from overheating by keeping at least 4 inches clear around all sides of your computer's main unit. (See Figure 2-15.) Always keep the computer's main unit flat, sitting on its rubber feet. Standing it on edge or not allowing room for air to circulate will defeat the cooling design and may eventually damage the main unit.

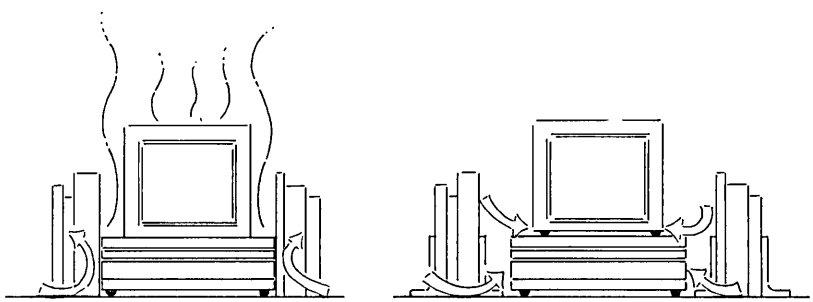


Figure 2-15
Allowing room for air to circulate

Now that your system's all set up (or set up as much as it needs to be for now), go on to Chapter 3 to learn how to start A/UX on your Macintosh II computer.

Chapter 3

Starting the System

In this chapter you will turn on the power to your Macintosh II. If your hardware is correctly configured and it contains an internal hard disk that has been factory loaded with A/UX, turning on the power for the first time automatically brings up A/UX.

Is A/UX on an external hard disk?

If A/UX has been factory loaded onto an external hard disk, before proceeding any further make sure that it is connected to the SCSI port of the Macintosh II, then make sure that you've turned on the power to the external hard disk as explained in Appendix A. After finishing step 1 of this chapter, you will be directed to Appendix B for instructions on modifying the startup procedure so that A/UX will boot off the external hard disk.

If your system has not been properly configured, error messages may appear, in which case you should look down the left margin of this chapter for the relevant error description printed in bold. The cause and likely solution for the error is explained within a ruled section beside the error description. Skip the ruled sections if the error descriptions don't apply.

1. **Turn your Macintosh II on by pressing the Power On key located on the keyboard.**

   You'll find the Power On key for the Apple Standard Keyboard (see Figure 3-1) at the top and in the middle of the keyboard, whereas the Power On key for the Apple Extended Keyboard (see Figure 3-2) is located in the top right corner.

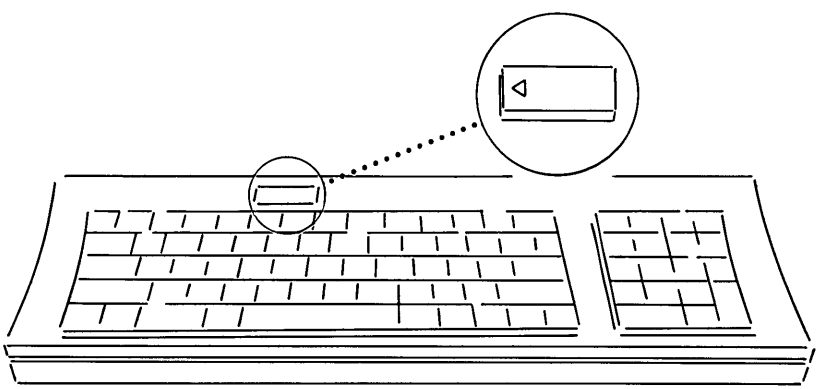


Figure 3-1
Power On key for Apple Standard Keyboard

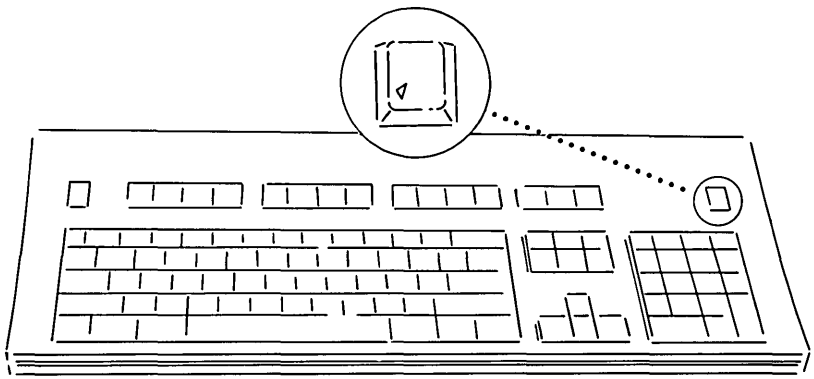


Figure 3-2
Power On key for Apple Extended Keyboard

A beep lets you know the Macintosh II is started. If this is the first time you've turned on the power, a small yellow sheet of plastic also pops out of the 3.5-inch disk drive (or drives, if your system includes a second, optional 3.5-inch drive). Remove the plastic piece from the disk drive, but don't discard it; if you ever need to transport your system, you'll want to reinsert it to protect your disk drive during shipping.

Your monitor should light up, and an icon of a smiling Macintosh will appear briefly, followed by the words

```
Welcome to Macintosh
```

This indicates that the Macintosh is booting correctly off your hard disk.

Icon with a blinking question mark?

If you see an icon of a Macintosh disk with a blinking question mark instead of the `Welcome to Macintosh` message, then your hard disk has not been properly connected. For an internal hard disk, call your Apple representative for service. For an external hard disk, refer again to Appendix A for instructions on properly connecting the disk.

Whenever you first turn the power on to a Macintosh II, it searches for a disk containing the Macintosh startup files. First it searches the 3.5-inch disk drives, then it searches any other attached serial disk drives, and finally it searches the SCSI devices, starting at the SCSI device with the highest ID number and working down.

The A/UX hard disk is a SCSI device that has been divided into several partitions, one of which contains `sash` (the A/UX Stand-Alone Shell), startup files for the Macintosh Operating System, and several A/UX stand-alone utilities.

2. **Do not touch the mouse or the keyboard; instead, let `sash` boot A/UX automatically.**

   The `Welcome to Macintosh` message means that the Macintosh partition has been found on the A/UX hard disk. After the Macintosh Operating System comes up, the `sash` screen shown in Figure 3-3 appears if your system has been properly configured and if A/UX has been installed on an internal hard disk.

   If your system has not been properly configured or if A/UX is on an external hard disk, you'll receive one of the following messages instead of the screen shown in Figure 3-3.

`Disk c0d0s0 Error: Cannot select SCSI device` message?

If you purchased A/UX on an external hard disk, you'll receive a message like

```
Disk c0d0s0 Error: Cannot select SCSI device
generic disk c0d0s0 Fatal Error: Logical block 0
chroot failed
sash#
```

By default, `sash` expects to find A/UX on SCSI device 0, the number normally used for the internal hard disk. Skip the rest of this chapter and proceed instead to Appendix B for instructions on configuring `sash` to boot A/UX from your external hard disk.

`No PMMU` message?

If a dialog box with the message

```
No PMMU
Can NOT launch an A/UX kernel
```

appears on your screen, your system cannot boot A/UX until you replace your computer's address mapping unit (AMU) with a paged memory management unit (PMMU). Contact your Apple representative for assistance.

Not enough memory message?

If a dialog box appears on your screen with the message

```
Not enough memory
```

you do not have 2 megabytes of memory on the main logic board. Call your Apple representative to install the required memory.

Do you have the sash# prompt only?

If you accidentally stopped the automatic boot, you'll see the `sash` prompt, which looks like

```
sash#
```

If any other messages appear on your screen, look for them in the margins of this chapter, and follow the accompanying instructions for that particular error message.

If there are no accompanying error messages, restart the boot procedure, by typing

```
boot
```

then pressing RETURN. You can also restart the boot procedure by using the mouse to move the pointer to Execute in the menu bar at the top of the screen. Press the mouse button so that Execute is highlighted and a menu of commands appears. Hold the mouse button down and drag the mouse downward until the command Boot is highlighted. Then release the mouse button, and `boot` will be executed.

Stand Alone program space is too small message?

If a dialog box appears on your screen with the message

```
Stand Alone program space is too small
```

you set the RAM cache too high for running Macintosh applications before you began installing A/UX. Use the Macintosh Control Panel desk accessory to lower the RAM cache so that there is at least 1 megabyte of free memory, which is adequate for running `sash` and booting A/UX. Refer to your *Macintosh II Owner's Guide* for instructions on lowering the RAM cache.

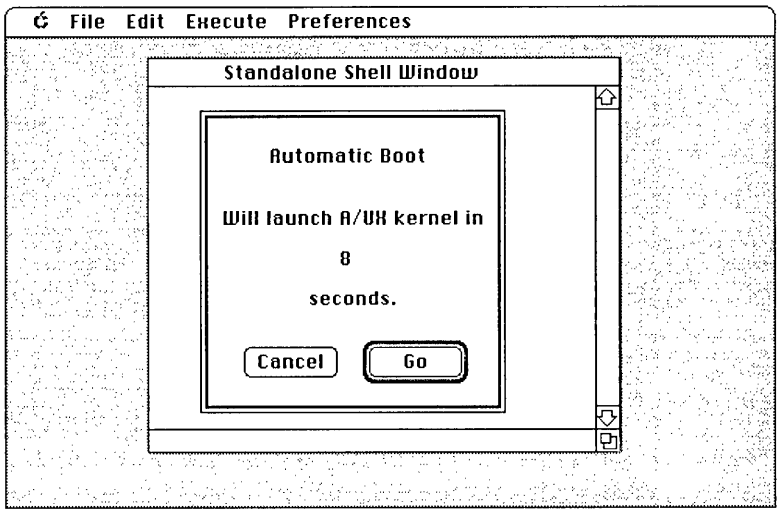


Figure 3-3
The A/UX Automatic Boot dialog box under `sash`

The most common task of `sash` is to boot A/UX, so that A/UX instead of the Macintosh Operating System takes control over the computer's functions. The `sash` program has been made the startup application, so it begins running automatically right after the Macintosh Operating System has booted. Unless you use the mouse to click the Cancel button or simultaneously press the Period key (.) and the Command key (marked with an Apple and an icon resembling a cloverleaf) within 10 seconds, `sash` automatically starts A/UX.

In the future, feel free to expedite the A/UX kernel launch by using the mouse to click the Go button, or simply press RETURN (which invokes the Go command because Go is the default action, as shown by the dark border surrounding the button).

3. **When the A/UX release notice and the message `This is the first time A/UX has been booted up` appears on your screen (Figure 3-4), proceed to Chapter 4 for instructions on setting the time zone and other site-specific details.**

```
This is the first time A/UX has been booted up
on this disk, so you will need to set the time.
Please answer the questions below to set the time.

The system needs to know how many minutes from GMT (Greenwich
mean time) your time zone is. For example, in the U.S.A., EST
is -300 minutes, and PST is -480 minutes, from GMT.

Enter the minutes your time zone is from GMT  [-1459 to 1459]
```

Figure 3-4
Setting the time (proceed to Chapter 4 for instructions)

If your Macintosh II has been properly configured, and if A/UX was loaded onto an internal hard disk, A/UX instead of the Macintosh Operating System should now be managing your computer. Your screen should display the message shown in Figure 3-4.

❖ *Note:* If your screen does not display the message shown in Figure 3-4, glance down the left margins of the preceding text in this chapter for a description of what is displayed on your screen. Follow the instructions accompanying that description, or contact your Apple representative for assistance.

Chapter 4

Setting Site-Specific Details

Your screen should now display an A/UX release ID and the following message:

```
This is the first time A/UX has been booted up
on this disk, so you will need to set the time.
Please answer the questions below to set the time.
```

At this point A/UX prompts you to provide information about your time zone. The information you enter in response to the next several prompts helps A/UX maintain time and date consistency with other UNIX systems around the world. A/UX then prompts for host and domain-name information, which uniquely identifies your computer for networking purposes.

Follow the instructions in this chapter to set these site-specific details. (Don't fret if you make a mistake; using various A/UX utilities referred to in this chapter, you can change any of these site-specific details later should you need to.) When you finish these functions, A/UX will be running in single-user mode.

❖ *Use of the mouse:* Your mouse is not functional for the Initial Console Emulator window that appears on your screen; however, other A/UX applications may make use of the mouse.

1. As prompted, enter the difference in minutes between your time zone and Greenwich mean time (GMT).

The first prompt you receive is

```
The system needs to know how many minutes from GMT (Greenwich
mean time) your time zone is. For example, in the U.S.A., EST
is -300 minutes, and PST is -480 minutes, from GMT.

Enter the minutes your time zone is from GMT  [-1459 to 1459]
```

Type the number of minutes your time zone is offset from Greenwich mean time, and press RETURN. Instructions for determining this offset are offered in the following paragraphs. If you mistype while entering the number, press DELETE to back over and erase previous characters, then continue typing.

Used by most of the world as a basis from which to calculate time, Greenwich mean time is the time of day along the meridian that crosses Greenwich, England. The map shown in the Addendum (at the back of this manual) will help you determine how many minutes from GMT your site is.

The GMT offset has a positive value east of Greenwich, England, since the time of day is later in eastern zones. Relative to GMT, for example, Paris, Rome, and Berlin (along with other cities in the Standard European Time Zone) are offset by 60 minutes (1 hour).

Since zones to the west are still earlier in the day, this displacement has a negative value west of Greenwich, England. New York City and Washington D.C. (along with other cities in the Eastern Standard Time Zone) are offset by –300 minutes (–5 hours), while Seattle, WA and Los Angeles, CA (and other cities within the Pacific Standard Time Zone) are offset by –480 minutes (–8 hours).

- *Daylight vs. standard time:* Don't worry about whether your time zone is currently on daylight time instead of standard time. Instead, just use the offsets shown in the time zone map in the Addendum. The `date` command, which is run whenever you start A/UX, determines from the current date whether it's the season for standard time or daylight time, and converts the time zone's relative position to GMT accordingly.

For example, if your site shares the time zone with Los Angeles, CA, type

```
-480
```

and press RETURN.

A/UX uses this offset to determine your local time relative to GMT, and thereby maintains time and date consistency with other UNIX computers. The following example illustrates why this is useful.

A file newly created on a UNIX computer in New York can be transferred within moments to a UNIX computer in California using any one of several UNIX utilities. If the California computer listed the file with its New York creation time, say, 11:00 A.M., this could lead to confusion since it might still be as early as 8:00 A.M. in California. The file would appear to have been created in the future. Likewise, a modified version of the file sent back to New York would have California's time, further confusing the file's history.

UNIX operating systems resolve this by keeping time in terms of GMT. Standard UNIX routines then automatically convert GMT to local time for performing tasks like printing files' creation or modification times. In the example, the file's creation time would be interpreted as 11:00 A.M. on the New York computer, but as 8:00 A.M. on the computer in California.

Now that A/UX knows its position relative to GMT, it needs information about your site's local date and time.

2. **As prompted, enter the last two digits of the current year.**

   The next prompt you receive is

   ```
   Enter the last two digits of the year  [87 to 99]
   ```

   For example, if it's 1988, type

   ```
   88
   ```

   and press RETURN. (If you mistype, press DELETE to back over and erase previous characters, then continue typing.)

3. **As prompted, enter two digits for the current month.**

   The next prompt you receive is

   ```
   Enter the two digits for the month  [01 to 12]
   ```

   For example, if it's January, type

   ```
   01
   ```

   and press RETURN.

4. **As prompted, enter two digits for the current calendar day.**

   The next prompt you receive is

   ```
   Enter the two digits for the day  [01 to 31]
   ```

   For example, if today is the first of the month, type

   ```
   01
   ```

   and press RETURN.

5. **As prompted, enter the current hour (using a 24-hour clock).**

   The next prompt you receive is

   ```
   Enter the two digits for the hour  [00 to 23]
   ```

   Be sure to specify the time using a 24-hour clock, where midnight is 00, noon is 12, and 11 o'clock at night is 23.

For example, if the current time is 1:05 P.M. (that is, 13:05 on a 24-hour clock), type

```
13
```

for the hour and press RETURN.

6. **As prompted, enter two digits for the current minute of the hour.**

   The next prompt you receive is

   ```
   Enter the two digits for the minutes  [00 to 59]
   ```

   For example, if the current time is 1:05 P.M., type

   ```
   05
   ```

   for the minute and press RETURN.

   You won't be prompted for this information again, since A/UX has just used it to set its local time and date. The battery-powered clock in the Macintosh II maintains this information even when you turn your system off.

   A/UX then returns the information you provided with a verification message. For example, if today is January 1, 1988, if the current time is 1:05 P.M., and if your site is located within the Pacific standard time (PST) zone, the message will read

   ```
   Today is: Fri Jan 1 13:05:59 PST 1988
   ```

Is the date or time wrong?

If the time or date is wrong, you can change it with the `date` command after finishing step 12 below. Refer to `date(1)` in *A/UX Command Reference* for information about resetting the time or date.

Is the time zone wrong?

If the time zone is wrong, you can change it with the `mactime` command after finishing step 8 below. Refer to `mactime(1M)` in *A/UX System Administrator's Reference* for information about using the `-p` and `-m` flag options to reset the time zone.

7. **Respond to the next prompt by entering `y` to check the root file system.**

   The next prompt you receive is

   ```
   Do you want to check the root file system? (y or n)
   ```

Type

```
y
```

and press RETURN. This automatically invokes the `fsck` (file system check) utility, which checks and interactively repairs inconsistencies in the A/UX files.

Did your system reboot?

It is highly unlikely that `fsck` will find any problems at installation time. However, if your file system has somehow developed inconsistencies, the `fsck` program repairs these. You will then briefly see the message

```
*****Fixed root, rebooting Unix!*****
```

After 5 seconds, your system then automatically reboots itself: your monitor turns black, then the `Welcome to Macintosh` message appears, followed by the `sash` Automatic Boot dialog box. Let `sash` launch A/UX. When you receive the prompt

```
Do you want to check the root file system? (y or n)
```

continue at step 7 above.

---

8. As prompted, enter a host name for your system.

When `fsck` is finished, the next prompt you receive is

```
Please enter a hostname (it must be unique):
```

A/UX Local System Administration explains how to fully configure your system for a UUCP network. *A/UX Network System Administration*, available through APDA, describes how to install and configure the TCP/IP and NFS networks (see Chapter 8 for information about ordering *A/UX Network System Administration*).

A **host name** is used to identify your computer on a network. If your computer is going to join a network, it is ultimately the responsibility of your network administrator to assign your computer its host name. Even if your computer won't be joining a network, or your network administrator hasn't assigned it a name yet, you must provide your computer with a host name at this time.

The host name you give your computer now can easily be changed in the future by editing the first field of the file `/etc/HOSTNAME`, so assigning your computer a temporary host name will not cause a problem. If you can't think of a host name, you might just call it `notnamed` for now.

The host name must be unique among all other computers in your network domain. (Step 9 below explains domains.) It is common for administrators to give related names to hosts to help identify them by work group. One department, for instance, may name all its computers after cartoon characters; another department may name them after mythological heroes; and still another may name them after sports cars.

In any case, the host name you enter now should consist only of lowercase letters, digits, and dashes. It should begin with a letter and may end with a letter or a digit—but not with a dash. For network compatibility, make your host name no longer than 8 characters.

Type in a host name now, and press RETURN. For example, if you're going to call your host `notnamed` for now, type

```
notnamed
```

and press RETURN.

9. As prompted, enter a domain name for your site.

The next prompt you receive is

```
Please enter a domain name:
```

A **domain name** refers collectively to a group of locally connected computers. If your computer will be joining an Ethernet local area network that supports the Network File System Yellow Pages facility, the domain name you enter here identifies your computer to the nearby connected hosts that share the same Yellow Pages data base of network users and computers.

Unlike host names, which must be unique for each computer, a domain name is shared by a group of computers. For example, all the computers in a company's engineering department might be given a domain name like `aero&astro`.

See *A/UX Network System Administration* for more information about setting up Yellow Pages service; Chapter 8 describes how to order *A/UX Network System Administration*.

The Yellow Pages facility simplifies network and local system administration by allowing multiple computers to share a common data base of users. This shared data base ensures that users have the same user IDs (UIDs) and group IDs (GIDs) on computers throughout the network; this greatly simplifies setting and removing access permissions for individuals working on group projects across a network. If your computer is on a network that uses Yellow Pages, it is up to your network administrator to assign your computer's domain name.

In any case, you must enter a domain name now. The name should consist only of lowercase letters, digits, and dashes; it should begin with a letter and may end with a letter or a digit—but not with a dash. For network compatibility, limit the entire name to eight characters. The domain name can easily be changed in the future by editing the second field of the file `/etc/HOSTNAME`, so assigning your computer a temporary domain name will not cause a problem. If you can't think of a domain name, you might just use `notnamed` for now.

Type in a domain name now, and press RETURN. For example, if you're going to call your domain `notnamed` for now, type

```
notnamed
```

and press RETURN.

10. Let A/UX reboot automatically; disregard the warning messages that appear.

After you enter a domain name, A/UX runs its `autoconfig` utility to automatically reconfigure the kernel to your host and domain names.

As A/UX reconfigures itself, expect several warning and status messages to print to your console. These messages can be disregarded.

After generating an updated kernel, A/UX reboots automatically. Your screen becomes black for a few moments, and then the `Welcome to Macintosh` message appears, followed by the Stand-Alone Shell screen. The Stand-Alone Shell counts down 10 seconds and then boots A/UX.

11. In response to the prompt, enter `y` to check the root file system.

Whenever A/UX boots, you'll see the following prompt:

```
Do you want to check the root file system? (y or n)
```

At this point, again type

```
y
```

and press RETURN to invoke `fsck` to recheck the A/UX root file system.

Did your system reboot? Again, it is highly unlikely that `fsck` will find any problems at this time. However, if your file system has somehow developed inconsistencies, the `fsck` program repairs these. You will then briefly see the message

```
*****Fixed root, rebooting Unix!*****
```

After 5 seconds, your system automatically reboots itself: your monitor turns black, then the `Welcome to Macintosh` message appears, followed by the `sash` Automatic Boot dialog box. Continue again at step 11 of this chapter.

After performing this check, A/UX comes up in single-user mode, at which point the following message appears:

```
INIT: SINGLE USER MODE
```

In single-user mode, many processes—particularly those that allow multiple users to access the system—will not be started yet.

Below the `INIT: SINGLE USER MODE` message, A/UX also displays the "Message of the Day" login banner, welcoming you to A/UX. (At a later time you can change the message of the day by editing the file `/etc/motd`.)

12. Press RETURN to accept `mac2` as the terminal type.

Appearing below the message of the day is the following prompt:

```
TERM = (mac2)
```

Press RETURN to continue.

A/UX can read data from and write data to hundreds of different terminal types. By pressing RETURN to the prompt above, you instruct A/UX to treat the console as a `mac2` terminal type, which provides a partial emulation of the DEC VT100 terminal while taking advantage of the large display of the Macintosh II screen.

In the future, you can type and enter the name of another terminal type if you wish. This will prove helpful if you connect a terminal to your Macintosh II, or if you use a terminal from across a network to log into your system.

After pressing RETURN, you receive the command prompt for the root account, as shown below.

```
hostname.root #
```

The *hostname* that appears in your prompt will be the name you assigned in step 8 above. The name `root` is the user with unlimited access to all A/UX files.

Multiuser mode: a state that allows multiple users to use the computer simultaneously. Even if you don't have multiple users on your computer, this should be the usual state of your system because it provides more security than single-user mode.

Proceed now to Chapter 5 for instructions on setting the `root` password and bringing the system up to **multiuser mode.**

Chapter 5

Setting the `root` Password

The prompt

hostname.root #

should now appear on your screen. Since it is now running in single-user mode (also called run-level S), A/UX accepts input only from the system console (normally, the Macintosh II keyboard) and writes output only to the system console (normally, the Macintosh II screen). Whoever has access to the system console at this time has **superuser** privilege to every file and command in the system. Single-user mode is therefore a dangerous state in which to leave your computer unattended.

Superuser: The user with unlimited system privileges. Also called *root*.

This chapter explains how to bring your system up to multiuser mode (run-level 2), which is more secure because it requires users to authorize themselves before using the system. This chapter then explains how to set your `root` password. Since `root` has unlimited privileges to all files in the system, it is important that you prevent inexperienced or malicious users from accessing the system as `root` by setting the password right away.

1. Enter the command `init 2` to bring your system up to multiuser mode.

Type

```
init 2
```

(include a space between `init` and 2) and press RETURN to bring your system to run-level 2. (If you mistype, press DELETE to back over and erase previous characters, and then continue typing.) The `init 2` command starts additional processes so that multiple users can use the system simultaneously.

When A/UX enters multiuser mode, the following message appears on the console:

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

2. In response to the prompt, enter `n` to refrain from checking file systems.

After bringing A/UX up to multiuser mode, you receive the following prompt:

```
Do you want to check the file systems? (y or n)
```

At this point there are no file systems other than root to check (the root file system was checked when you entered single-user mode in Chapter 4), so type

```
n
```

and press RETURN (or just press RETURN to accept n, the default answer). The following message appears:

```
mv: cannot access /usr/lib/cron/log
```

Disregard this message, as it only appears the first time you bring the system up in multiuser mode.

The login prompt then appears. A/UX is now fully operational in multiuser mode.

```
process accounting started

Apple Computer, Inc. A/UX

login:
```

3. Log in as `root`.

Type

```
root
```

and press RETURN to log in under the `root` account. Because the `root` account's password is not set yet, you'll be logged in without being prompted for a password.

4. Press RETURN to accept `mac2` as the terminal type.

The "Message of the Day" login banner appears on your terminal screen, followed by the line

```
TERM = (mac2)
```

Press RETURN, and you will again see the command prompt for the `root` account.

```
hostname.root #
```

5. Set the `root` password with the `passwd` command.

Type the command

```
passwd
```

and press RETURN. The following prompt is displayed:

```
Changing password for root
New password:
```

You must decide on a password to use. Choose a password that you can remember easily, but don't make it so easy that others might guess it. For example, don't use your name, initials, or telephone number. One way to derive a fairly secure password is to combine into one word two or more short words that are meaningful to you, and then spell it with a mixture of upper- and lowercase letters and non-alphabetic characters. For example, `!noSmoking`, `$2toWin`, and `MacII4me` would make acceptable passwords (but since they're printed here, don't use them as passwords on your system).

Passwords for all users other than `root` must meet certain requirements. Although `root` doesn't have to adhere to them, you might follow them now anyway as they help create a more secure password, and they'll make you aware of the rules that non-`root` users must follow. These requirements are as follows:

- A password (set by a user other than `root`) must consist of at least six characters. Only the first eight are used for verification, but a user can include additional characters if they make the password more meaningful.
- A password (set by a user other than `root`) must contain at least two alphabetic characters. Remember that A/UX and other UNIX operating systems are case sensitive; for example, *s* and *S* are treated as two different characters.
- A password (set by a user other than `root`) must contain at least one numeric (0 through 9) or one special character (such as a punctuation mark).
- A password (set by a user other than `root`) must differ from the login name and from any reverse or circular shift of the login name. For comparison purposes here, an uppercase letter and its corresponding lowercase letter *are* equivalent.

Type the password you decide on and press RETURN. For security, the characters you type are not printed on your screen.

For verification, A/UX prompts you to reenter your password.

```
Re-enter new password:
```

Type your password again and press RETURN. Unless you mistyped the password, you will again see `root`'s command prompt.

```
hostname.root #
```

They don't match message? If you don't enter exactly the same characters at both password prompts, the system returns the message

```
They don't match; try again.
New password
```

You'll have to restart the procedure by entering your password over. When you're prompted

```
Re-enter new password:
```

type the characters carefully to ensure that they match those you just entered.

---

6. Set the password for user `rootksh`.

A/UX provides you with three accounts with unlimited superuser privilege. User `root` uses the standard System V Bourne shell; user `rootksh` uses the newer AT&T Korn shell; and user `rootcsh` uses the BSD C shell.

- ☐ Use the `passwd` command to begin setting the password for `rootksh` by typing

  ```
  passwd rootksh
  ```

  and pressing RETURN. One of `root`'s superuser privileges is the ability to change any other user's password at any time by invoking that user's login name as an argument to the `passwd` command.

  The following prompt is displayed:

  ```
  New password:
  ```

- ☐ Type the same password you used for the `root` account and press RETURN. You will again be prompted to reenter the password.

  ```
  Re-enter new password:
  ```

- ☐ Type the password once more and press RETURN. Unless you mistyped the password, you'll again see `root`'s command prompt.

  hostname`.root #`

7. Set the password for user `rootcsh`.

- ☐ To begin setting the password for the `rootcsh` account, type

  ```
  .passwd rootcsh
  ```

  and press RETURN. The following prompt is displayed:

  ```
  New password:
  ```

- ☐ Type the `root` password and press RETURN. You will again be prompted to reenter the password.

  ```
  Re-enter new password:
  ```

- ☐ Type the password once more and press RETURN. Unless you mistyped the password, you'll see `root`'s command prompt.

  hostname`.root #`

Proceed now to Chapter 6, which describes how to bring your system back to single-user mode and shut down your computer.

Chapter 6

Shutting Down and Restarting

In this chapter you'll learn how to bring A/UX back to single-user mode, safely turn off the power, and then restart A/UX. The entire procedure should take between 10 and 20 minutes. In the future it will be necessary for you to repeat these tasks when performing administration functions like various hardware or kernel-level software installations.

At this point the `root` user's command prompt should appear on your screen.

```
hostname.root #
```

(If you have logged out since finishing Chapter 5, log in again by entering the user name `root` in response to the `login:` prompt, then enter your password in response to the `password:` prompt.)

1. Use `shutdown` to return to single-user mode.

The `shutdown` program broadcasts a warning to any other users on the system to save their files and log off; after an interval (by default, 1 minute) `shutdown` stops all processes, unmounts all file systems except `root` (which always remains mounted), updates the system's superblocks, and returns all control of the system to the console.

- To start the `shutdown` program, type

  ```
  shutdown
  ```

  and press RETURN. The following messages and prompt are displayed:

  ```
  SHUTDOWN PROGRAM
  today's date

  Do you wish to enter your own delay to shutdown:
  Default is 1 minute, (y or n):
  ```

- In response to the `shutdown` delay prompt, type

  ```
  n
  ```

  and press RETURN. Responding to this prompt with `y` in order to specify 0 minutes for the delay would hasten the shutdown procedure, but letting the default work will show you how `shutdown` can be used in a multiuser environment to alert other users.

(If, in the future, remote users log in to your machine across modem connections or other communications media, you might wish to answer this prompt with a `y` and enter a longer delay to shutdown, thereby giving users a greater chance of seeing the warning and saving their work before the system shuts down.)

After you accept the default shutdown delay, the following prompt appears:

```
Do you wish to enter your own message (y or n):
```

- ☐ Accept the default shutdown message by typing

```
n
```

and press RETURN. The warning below is displayed on your screen; if other users were logged in, this message would appear on their terminals, too.

```
Broadcast Message from root (console) current date and time
SYSTEM BEING BROUGHT DOWN FOR SYSTEM MAINTENANCE

Minutes to SHUTDOWN :1
```

After 30 seconds, the following warning appears:

```
Broadcast Message from root (console) current date and time
SHUTDOWN IN 30 SECS...LAST CHANCE TO LOGOUT
```

After the 1-minute delay to shutdown is over, the following messages appear on your console (where *x* is the SCSI ID number for the disk containing the A/UX root file system; normally, 0 for an internal hard disk, 5 for an external hard disk).

```
Mounted devices are:
/dev/dsk/cxd0s0 on / type 5.2 (rw,noquota)
Unmounting file systems
/dev/dsk/cxd0s0 on / type 5.2 (rw,noquota)

****    SYSCON CHANGED TO /dev/console    ****
Killing all processes

INIT: New run level: S

INIT: SINGLE USER MODE
```

These messages inform you of the progress of the `shutdown` program. (Although the `shutdown` program goes through the procedure of unmounting the root file system, /, and even reports that it is being unmounted, `root` is integral to the operating system and can never be unmounted.) The system login banner appears when A/UX is in single-user mode, and the following prompt reappears.

```
TERM = (mac2)
```

- ☐ Press RETURN to accept the terminal type. The `root` user's command prompt then appears.

  hostname`.root #`

2. Enter the `sync` command.

Now that A/UX is in single-user mode, you are ready to bring the system completely down. Before doing this, however, type

```
sync
```

and press RETURN. The `sync` command writes all previously unwritten system buffers to disk, thus ensuring that all file modifications up to that point are saved.

3. Reenter the `sync` command.

As an extra precaution, once more type

```
sync
```

and press RETURN.

4. To shut off the Macintosh II, enter the `powerdown` command.

Although the Macintosh II has a power switch on the back of the computer, it is recommended that you do not use it to switch off the computer. Rather, you should use the A/UX `powerdown` command to turn the power off.

Type

```
powerdown
```

and press RETURN. Your system will shortly turn itself off. After the computer turns off, wait at least 30 seconds before continuing with the next instructions.

Warning To protect the files on your system, never use the `powerdown` command or shut A/UX down in any way until after you've brought the system to single-user mode and entered the `sync` command at least twice as described in steps 1 through 4 above.

Is A/UX on an external hard disk? If so, turn off your external hard disk. Wait at least 30 seconds, and then turn your external hard disk back on. Continue with step 5 below.

As a rule, when bringing your system down, the external hard disk containing A/UX should be turned off after the main unit of the Macintosh II computer is turned off. When bringing your system back up, the external hard disk containing A/UX should be turned on before the main unit of the Macintosh II computer is turned on.

5. Press the keyboard Power On key to reboot A/UX.

Now that you know how to safely bring down A/UX, restart it by pressing the Power On key again. As the Macintosh II begins booting itself, the `Welcome to Macintosh` message reappears, followed shortly by the Automatic Boot screen of the Stand-Alone Shell application (`sash`).

Let the Automatic Boot screen count down to zero; at the end of 10 seconds, `sash` causes A/UX to take control of the Macintosh II.

6. In response to the prompt, enter `n` to refrain from checking the root file system.

Whenever A/UX starts, it prompts you to command it to check the root file system.

```
Do you want to check the root file system? (y or n)
```

If in the course of this installation you received any error messages that were not covered in this book, enter `y` to this prompt to recheck the file system. Otherwise, just type

```
n
```

and press RETURN (or just press RETURN to accept `n`, the default answer).

The A/UX release ID and login banner appear again, followed by the prompt

```
TERM = (mac2)
```

7. **In response to the prompt, press RETURN to accept `mac2` as the terminal type.**

   After you press RETURN, you receive the `root` user's command prompt.

   ```
   hostname.root #
   ```

8. **Enter `init 2` to resume multiuser mode.**

   From the `root` user's command prompt, reenter multiuser mode by typing

   ```
   init 2
   ```

   and press RETURN. The following message appears:

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

9. **In response to the prompt, enter `n` to refrain from checking file systems.**

   After you enter the `init 2` command to bring A/UX up to multiuser mode, you receive the following prompt:

   ```
   Do you want to check the file systems (y or n):
   ```

   Since at this point there are no file systems other than root, type

   ```
   n
   ```

   and press RETURN (or just press RETURN to accept `n`, the default answer).

   The login prompt should now appear on your screen. A/UX is now fully operational in multiuser mode.

You have just finished the basic A/UX setup and installation!

Before doing any more work with A/UX, though, you should look at Chapters 7 and 8. Chapter 7 tells you how to quickly install additional Apple peripheral devices at your option. Chapter 8 tells you what other guides in the A/UX documentation set you should become familiar with for performing additional system administration tasks.

Chapter 7

Adding Optional Apple Peripheral Devices

This chapter explains how to quickly and easily add the following devices to your system:

- an Apple ImageWriter or ImageWriter II printer
- an Apple LaserWriter printer
- a Macintosh Plus (for use as a terminal)

Although attaching a printer to your system for hard-copy output or an extra terminal for secondary user access can be very useful, none of these options is necessary. If you are not adding any of these devices to your system now, you can skip this chapter and proceed to Chapter 8. If you do add any of these devices in the future, return to this chapter for installation instructions.

Identifying the serial ports

On the back of the Macintosh II are two serial ports from which you can attach printers, terminals, and other serial devices. The instructions in this chapter assume that for attaching a printer you will use the printer port (identified on the back of the Macintosh II by the icon shown in Figure 7-1), and that for attaching a terminal you will use the modem port (identified by the icon in Figure 7-2).

Figure 7-1
Icon for the printer port

Figure 7-2
Icon for the modem port

The printer port has the following A/UX device names, which can be used in commands for redirecting data to the attached printer:

```
/dev/tty1

/dev/printer
```

The modem port has the following A/UX device names for reading or writing data to the attached device:

```
/dev/tty0

/dev/modem
```

- *Attaching a modem:* This chapter describes how to use the modem port for connecting a terminal. Refer to *A/UX Local System Administration* for instructions on configuring the port for a modem instead.

Adding an ImageWriter II printer

A/UX is already set up to use an Apple ImageWriter or an ImageWriter II as a line printer. All you have to do is connect the printer to the Macintosh II printer port and use the `lp` utility to spool and print your files. This short section describes how.

If you have any questions about unpacking or setting up your printer, refer to the owner's guide that came with it.

- *Printer name:* The default printer name is `iw2`. See `lpadmin(1M)` in *A/UX System Administrator's Reference* for information about using or changing the printer name.

1. **Connect the Macintosh II to your printer with the appropriate cable.**

   For the ImageWriter II, this requires a Macintosh Plus-to-ImageWriter II cable (use part number 590-0552, 590-0340, or M0187). Plug one end of the printer cable to the serial interface socket at the back of the ImageWriter II, and plug the other end into the printer port on the back of the Macintosh II. The printer port is identified by the icon in Figure 7-1.

- *Adding an ImageWriter:* If you're attaching the older ImageWriter model printer, you won't be able to use a Macintosh Plus-to-ImageWriter II cable. Instead, make a printer cable by connecting a Macintosh Plus adapter cable (part number M0189 or 590-0341) to an ImageWriter cable (part number M0150 or 590-0169). That is, attach the ImageWriter cable's DB-9 connector to the DB-9 connector of the Macintosh Plus adapter cable. Then plug the DB-25 connector of the ImageWriter cable into the serial interface socket on the ImageWriter. Finally, plug the mini-8 connector of the Macintosh Plus adapter cable into the printer port on the Macintosh II. The printer port is identified by the icon in Figure 7-1. The rest of the instructions in this section apply to the earlier ImageWriter model as well as to the ImageWriter II.

2. **Turn the printer on and make sure its green Select light is on.**

   Paper must be loaded into the printer before the Select light turns on. Because A/UX prints a cover page with each job, you should use either the forms tractor with fanfold paper or a cut-sheet feeder for separate sheets of paper. Otherwise, you'll need to feed at least two pages through the printer by hand for each print job spooled by the `lp` utility.

3. **Bring A/UX up to multiuser mode if it isn't multiuser already.**

   If the `login:` prompt appears on your console, then your system's already in multiuser mode. If your system's in single-user mode, or if the root user's command prompt appears on your console and you're not sure if the system's in multiuser mode, type the command

   ```
   init 2
   ```

   and press Return. This ensures that A/UX is in multiuser mode. If you're prompted to check the file systems, enter `n`.

4. **Log in to A/UX.**

   If you aren't already logged in, log in as `root` or use any other valid acount. Provide your password when prompted and press RETURN to accept the `mac2` terminal type.

5. **Enter the command `lp /etc/motd` to test the printer.**

   Type

   ```
   lp /etc/motd
   ```

   and press RETURN. A/UX should return its command prompt to you, and within a minute the ImageWriter II should print a cover page and then the file `/etc/motd`, the "Message of the Day" login banner that normally appears to users when they log in to the system.

Adding a LaserWriter printer

Apple LaserWriter printers can be used as intelligent printers for producing near-typeset quality text and graphics. (See *A/UX Text Processing Tools* for details.)

If you have any questions about unpacking or setting up your particular LaserWriter, refer to the owner's guide that came with your printer.

1. **Put together a printer cable.**

   Currently, A/UX supports LaserWriters as serial devices only—not as AppleTalk devices. You will connect the printer to the Macintosh II using either the printer's 9-pin socket or its 25-pin socket.

Put together either of these cables:

- To connect to a LaserWriter's 25-pin socket, make a cable by connecting a Macintosh Plus adapter cable (part number 590-0341 or M0189) to an ImageWriter cable (part number 590-0169 or M0150); that is, attach the ImageWriter cable's DB-9 connector to the DB-9 connector on the Macintosh Plus adapter cable.
- Or, to connect to a LaserWriter's 9-pin socket, make a cable by connecting a Macintosh Plus adapter cable (part number 590-0341 or M0189) to a Modem cable (part number 590-0197 or M0170); that is, attach the Modem cable's DB-9 connector to the DB-9 connector of the Macintosh Plus adapter cable.

2. **Connect your cable's mini-8 connector to the printer port on the Macintosh II.**

   Plug the cable's circular connector into the Macintosh II printer port, identified by the icon in Figure 7-1.

3. **With your LaserWriter *switched off,* connect the free end of your cable to the printer's 25-pin or to its 9-pin socket.**

   Turn off the power to your LaserWriter. If you made your cable with a DB-25 connector, plug that connector into the printer's 25-pin socket. If you made a cable with a DB-9 connector, plug the connector into the printer's 9-pin socket.

4. **Change the printer's mode switch to 9600 baud.**

   Refer to your printer's owner's guide for instructions on changing the LaserWriter from its preset AppleTalk communication mode to its 9600-baud mode.

5. **Turn the printer on and make sure the green Ready light is on.**

   When you turn it on, the LaserWriter prints a test page if it's running correctly. Your printer's owner's guide contains more information about this self test.

6. **Bring A/UX up to multiuser mode if it isn't multiuser already.**

   If the `login:` prompt appears on your console, then your system's already in multiuser mode. If your system's in single-user mode, or if the `root` user's command prompt appears on your console and you're not sure if the system's in multiuser mode, type the command

   ```
   init 2
   ```

   and press Return. This ensures that A/UX is in multiuser mode. If you're prompted to check the file systems, enter `n`.

7. **Log in to A/UX as `root`.**

   If the `root` user's command prompt appears on the console, you're already logged in as `root`.

   However, if the `login:` prompt appears instead, type `root` and press RETURN. Provide your password when prompted and press RETURN to accept the `mac2` terminal type. The A/UX print spooler is initially configured to print to an ImageWriter II. You need `root` privileges to change A/UX to print to a LaserWriter.

8. **Enter the following commands to configure A/UX to your LaserWriter.**

   The commands below assume that you've kept the default printer name of `iw2` for your ImageWriter II. If you've used a different name, change `iw2` in the second command line below to your own printer name. (If you are unsure of your printer name, enter the command `lpstat -t` to determine it. See *A/UX Command Reference* for detailed information on `lpstat(1)`.)

   The third command line below gives your LaserWriter the printer name of `laser`. You may enter a different name if you wish. See `lpadmin(1M)` in *A/UX System Administrator's Reference* for further information about using or changing the printer name.

Type the first command shown below and press RETURN. When the `root` user's command prompt reappears, enter the second command below. A/UX returns several status messages regarding the progress of this command. When the `root` user's command prompt appears again, enter the third command. A/UX returns messages about the progress of this command, too.

```
cd /usr/spool/lp
RM_PR iw2
ADD_LW laser printer
```

9. **Enter the command `lp /etc/motd` to test the printer.**

   Type

   ```
   lp /etc/motd
   ```

   and press RETURN. A/UX should return its command prompt to you, and within a minute the LaserWriter should print a cover page then the file `/etc/motd`, the "Message of the Day" login banner that normally appears to users when they log in to the system.

Changing From a LaserWriter to an ImageWriter II

If you've already followed the steps in the previous section, "Adding a LaserWriter Printer," and you want to change back to using an ImageWriter or ImageWriter II, follow these instructions.

1. **Disconnect the printer cable from the LaserWriter and the Macintosh II.**
2. **Connect the Macintosh II to your ImageWriter II printer with the appropriate cable.**

   For an ImageWriter II this requires a Macintosh Plus-to-ImageWriter II cable (part 590-0552 or M0187). Plug one end of the printer cable to the serial interface socket at the back of the ImageWriter II and the other end to the printer port on the Macintosh II.

❖ *Adding an ImageWriter:* If you're attaching the older ImageWriter model printer, you won't be able to use a Macintosh Plus-to-ImageWriter II cable. Instead, make a printer cable by connecting a Macintosh Plus adapter cable (part number M0189 or 590-0341) to an ImageWriter cable (part number M0150 or 590-0169). That is, attach the ImageWriter cable's DB-9 connector to the DB-9 connector of the Macintosh Plus adapter cable. (You may already have made this cable for attaching your LaserWriter.) Plug the DB-25 connector of the ImageWriter cable into the serial interface socket on the ImageWriter. Finally, plug the mini-8 connector of the Macintosh Plus adapter cable to the printer port on the Macintosh II. The printer port is identified by the icon in Figure 7-1. The rest of the instructions in this section apply to the earlier ImageWriter model as well as to the ImageWriter II.

3. Turn the printer on and make sure its green Select light is on.

Paper must be loaded into the printer before the Select light turns on. Because A/UX prints a cover page with each job, you should use either the forms tractor with fanfold paper or a cut-sheet feeder for separate sheets of paper. Otherwise, you'll need to feed at least two pages through the printer by hand for each print job spooled by the `lp` utility.

4. Bring A/UX up to multiuser mode if it isn't multiuser already.

If the `login:` prompt appears on your console, then your system's already in multiuser mode. If your system's in single-user mode, or if the `root` user's command prompt appears on your console and you're not sure if the system's in multiuser mode, type the command

```
init 2
```

and press Return. This ensures that A/UX is in multiuser mode. If you're prompted to check the file systems, enter `n`.

5. Log in to A/UX as `root`.

If the `root` user's command prompt appears on the console, you're already logged in as `root`.

However, if the `login:` prompt appears instead, type `root` and press RETURN. Provide your password when prompted and press RETURN to accept the `mac2` terminal type. You'll need `root` privileges to use several of the commands below.

6. **Enter the following commands to reconfigure A/UX to your ImageWriter II.**

   The commands below assume that the printer name for your LaserWriter is `laser`. If you've used a different name, change `laser` in the second command line below to your own printer name. (If you are unsure of your printer name, enter the command `lpstat -t` to determine it. See *A/UX Command Reference* for detailed information on `lpstat(1)`.)

   The third command line below gives your ImageWriter II the printer name of `iw2`. You may enter a different name if you wish. See `lpadmin(1M)` in *A/UX System Administrator's Reference* for further information about using or changing the printer name.

   Type the first command shown below and press RETURN. When the `root` user's command prompt reappears, enter the second command below. A/UX returns several status messages regarding the progress of this command. When the `root` user's command prompt appears again, enter the third command. A/UX returns messages about the progress of this command, too.

```
cd /usr/spool/lp
RM_PR laser
ADD_IW iw2 printer
```

7. **Enter the command `lp /etc/motd` to test the printer.**

   When the root user's command prompt reappears, type

```
lp /etc/motd
```

   and press RETURN. A/UX should return its command prompt to you, and within a minute the ImageWriter II should print a cover page then the file `/etc/motd`, the "Message of the Day" login banner that normally appears to users when they log in to the system.

Attaching a Macintosh Plus as a terminal

Attaching a terminal to your Macintosh II allows a second user to access A/UX while you or someone else is logged in at the console. This section describes how to attach a Macintosh Plus, running a terminal-emulator application such as MacTerminal, to your Macintosh II. (These instructions apply to a Macintosh SE as well as a Macintosh Plus.) For information about adding a conventional terminal, refer to the owner's guide for the terminal and to *A/UX Local System Administration.*

To connect a Macintosh Plus as a terminal, you need an Apple system cable, such as a Macintosh Plus-to-ImageWriter II cable (part 590-0552 or M0187), with mini-8 connectors at both ends.

1. **Configure your terminal-emulator application on the Macintosh Plus.**

   Start your terminal-emulator application on the Macintosh Plus. Use your application's user guide to help you set the terminal characteristics shown below (if you are using MacTerminal, for example, these configurations are made by selecting Terminal and Compatibility from the Settings menu):

   - terminal type: VT100 (The VT100 is a popular terminal manufactured by Digital Equipment Corp. and is emulated by nearly all communications programs; the VT100 is the terminal A/UX expects by default to find at `/dev/tty0`. See `ttytype(4)` in *A/UX Programmer's Reference* for more information about how A/UX is configured for default terminals.)
   - line width: 80 columns
   - mode: ANSI
   - baud: 9600
   - bits per character: 8
   - parity: none
   - connection port: modem
   - connection: to another computer (that is, instead of to a modem)
   - handshake: XON/XOFF

2. **Connect the cable to the modem port on the Macintosh II.**

   Plug one end of the cable's circular connector into the modem port on the back of the Macintosh II. The modem port is identified by the icon shown in Figure 7-2.

3. **Connect the free end of the cable to the modem port on the Macintosh Plus.**

   The modem port is located on the back of the Macintosh Plus, and it is identified by the icon in Figure 7-2.

4. **Bring A/UX up to multiuser mode if it isn't multiuser already.**

   If the `login:` prompt appears on your console, then your system's already in multiuser mode. If your system's in single-user mode, or if the `root` user's command prompt appears on your console and you're not sure if the system's in multiuser mode, type the command

   ```
   init 2
   ```

   and press Return. This ensures that A/UX is in multiuser mode. If you're prompted to check the file systems, enter `n`.

5. **From the Macintosh II console, log in to A/UX as `root`.**

   If the `root` user's command prompt appears on the console, you're already logged in as `root`.

   However, if the `login:` prompt appears instead, type `root` and press RETURN. Provide your password when prompted and press RETURN to accept the `mac2` terminal type. You need `root` privileges to make the system configurations explained below.

6. **Make a copy of `/etc/inittab`.**

   When you receive the `root` user's command prompt after finishing step 4 above, type

   ```
   cp /etc/inittab /etc/inittab.old
   ```

   and press RETURN. When changing an important system file like this, it is always a good idea to save a copy in case you make a mistake. You can then copy the old file back over the changed version and return your system to its previous state.

❖ *Note:* After entering this command, you should immediately see the `root` user's command prompt again. If the system returned any additional messages, you've entered the command incorrectly—in this case, reenter the command more carefully.

7. **Use `sed` to create a new version of `/etc/inittab`.**

   Type the following command and check it carefully before pressing RETURN:

```
sed s/00:2:off/00:2:respawn/p /etc/inittab.old > /etc/inittab
```

   Make sure that you have typed the command exactly as shown above. Then press RETURN. This command uses the `sed` utility to create a new version of `/etc/inittab` that will respawn a process to serve your terminal.

8. **Enter the command `init q` to effect the changes in `/etc/inittab`.**

   Type

```
init q
```

   and press RETURN.

9. **Verify that the `getty` process is running.**

   Type

```
ps -e | grep getty
```

   and press RETURN.

   A line similar to the one below should appear on your console screen:

```
2930 0        0:01 getty
```

   The numbers in the first and third columns of your output will probably be different, but the 0 in the second column should appear, showing that a `getty` process has successfully spawned at `/dev/tty0` (the modem port). This is the process that will serve the terminal.

Do you see different output? If you receive no output from the command above, or if a number other than 0 appears in the second column, enter the following command:

```
cp /etc/inittab.old /etc/inittab
```

Your system returns to its previous state. To continue this configuration, begin these instructions over again at step 7.

---

10. Log in to A/UX from the Macintosh Plus.

You should now have a login prompt on the Macintosh Plus. Log in as `root` or any other valid user to test the connection. Enter your password when prompted, and press RETURN to accept the VT100 terminal type. Your Macintosh Plus is now serving as a functioning terminal for A/UX.

You don't get a login prompt?

If you don't get a login prompt on the Macintosh Plus, check the cable connection or your settings on the terminal-emulation application. If the command in step 9 was successful, then the problem is not likely to be related to A/UX.

Chapter 8

Where to Go From Here

You now have the versatile A/UX operating system running on a powerful Macintosh II workstation.

But having installed this system, your work is not finished. You (or some other user who should be appointed quickly) will also need to maintain and administer the system.

Administration tasks include bringing up the system, adding and removing users, adding and removing devices, and making and mounting file systems. Several guides in the A/UX documentation set have been written to help you carry out these functions. This chapter points you to the guides that'll help you administer A/UX.

1. **If you haven't already done so, read *A/UX System Overview* for a survey of the operating system and its documentation.**

   A/UX System Overview discusses the capabilities of A/UX and the interrelationship of its file system, utilities, and kernel and the Macintosh II hardware. Differences between A/UX and other versions of UNIX are discussed, a road map to the entire documentation set is presented, and a glossary of terms is included for general reference. This short guide is intended for an audience with a technical background, but it is not as detailed as the rest of the documentation suite.

2. **If you are an experienced UNIX user, read *A/UX Local System Administration* as soon as possible.**

   This guide is aimed at users who may not have any programming experience, but who are charged with administering A/UX. It explains the main duties and System V facilities for monitoring and maintaining a single system. Topics include system startup and shutdown, user administration, file backups, peripheral-device management, file system checking, system accounting, and setup and administration for uucp.

   A companion volume, *A/UX Network System Administration,* covers network-related topics and is available from the Apple Programmer's and Developer's Association (APDA) as described in step 4 below.

3. **If you are an inexperienced UNIX user, work through the *Getting Started With A/UX* tutorial first, then read *A/UX Local System Administration* as soon as possible.**

   Getting Started With A/UX is a tutorial for UNIX novices. If you are unfamiliar with the UNIX operating system, read this guide before undertaking *A/UX Local System Administration.*

4. **If you are planning to connect your computer to a TCP/IP or NFS network, order *A/UX Network System Administration* from APDA.**

   This guide is aimed at the programming-level user who is charged with administering a computer network that includes A/UX systems. While a system administrator is needed for each A/UX system, each system does not require its own network administrator. Instead, a single network administrator generally performs all of the networking duties for several or all of the machines connected on a network.

   A/UX Network System Administration describes the procedures and commands necessary to install and keep TCP/IP and NFS networking software running smoothly on the Macintosh II; it does *not* describe how to maintain network hardware. The guide assumes the reader has programming experience, because the complex duties of network administration require a programmer's level of expertise.

   This guide is not distributed with the standard A/UX books but is available instead through APDA. To order this guide, contact APDA at

   Apple Programmer's and Developer's Association
   290 SW 43rd Street
   Renton, WA 98055
   (206) 251-6548

5. **If you are adding any other cards to your system, consult the manufacturer's owner's guide for instructions.**

   Apple has greatly simplified the task of adding kernel-level devices to a UNIX system by giving A/UX the ability to automatically configure devices into its kernel at boot time. If the manufacturer followed the guidelines established by Apple Computer, the device should be very simple to install.

   To install such a device, you normally shut down A/UX and turn off the Macintosh II to install the device's controller board. You restart the system and insert a disk containing the device's installation software. You then run a short set of commands that automatically installs the software and reboots the system. A/UX routines—communicating with firmware on the new board—will determine that the hardware is not configured into the kernel. A/UX then uses the newly installed software to begin building a new kernel for itself. When it has finished configuring the new device, A/UX automatically reboots again, this time with a kernel configured for the new device.

6. **If you wish to mount A/UX file systems from an extra hard disk, refer to the following documentation.**

   Attaching an additional hard disk, partitioning it, associating the partition (or multiple partitions) to a device node (or nodes), making a file system on a particular partition, and mounting the file system—all these steps require a fairly high degree of system knowledge. These tasks are listed below with the documentation that will assist you should you decide to add another hard disk.

   - When attaching another SCSI hard disk, it is important that you give it a unique SCSI ID number, that you consider the startup order of it and the other devices on the SCSI chain, and that the first and last devices on the SCSI chain have terminators attached. Refer to the owner's manual that accompanies your hard disk and to the *Apple SCSI Cable System* guide for important information about attaching a SCSI hard disk.
   - After connecting the hard disk, you will use the `dp` utility to partition it. Refer to `dp(1M)` in *A/UX System Administrator's Reference* for information about the `dp` utility.
   - If you used `dp` to create multiple partitions on a single disk, use the `pname` utility to associate these partitions with A/UX device nodes. (If you used `dp` to create only one partition on the disk, it isn't necessary to use `pname`.) Refer to `pname(1M)` in *A/UX System Administrator's Reference* for information about the `pname` utility.
   - You will then need to make an A/UX file system on each desired partition created on the new disk. Refer to `mkfs(1M)` in *A/UX System Administrator's Reference* for information about making file systems.
   - To make use of a new file system , you will have to mount it with the `mount` command. Refer to `mount(1M)` in *A/UX System Administrator's Reference* for information about the `mount` command.
   - Finally, you should edit `/etc/fstab` so that the file system (or desired multiple file systems) on the new disk are automatically mounted upon system boot. Refer to `fstab(4)` in *A/UX Programmer's Reference* for information about the proper format of the `/etc/fstab` file.

7. **As soon as possible, become familiar with *A/UX System Administrator's Reference, A/UX Command Reference,* and *A/UX Programmer's Reference.***

   These three volumes are the system's main reference tools.

   A/UX System Administrator's Reference is intended specifically to help you maintain the system. It is divided into three sections:

   - Section 1M describes the administrative commands for the system, most of which require `root` privilege.
   - Section 7 contains descriptions of device drivers and their interfaces to the hardware.
   - Section 8 outlines system maintenance procedures, including general information about the system boot process and about recovering from system crashes. (Refer to *A/UX Local System Administration* for more specific information about these procedures.)

   A/UX Command Reference is intended for all users. You should become familiar with it as you, too, will be using the commands it describes; moreover, if you're administering the system for other users, you'll find that many of the problems they experience won't be system errors but will rather be operator errors caused by users' unfamiliarity with the commands. This guide is divided into two sections.

   - Section 1 describes commands generally available to all users.
   - Section 6 describes the games on the system.

   A/UX Programmer's Reference is intended for a technical audience. *A/UX Programmer's Reference* consists of four parts—Sections 2 through 5.

   - Section 2 covers system calls, necessary for software development.
   - Section 3 covers programming subroutines.
   - Section 4 describes the file formats, including those you will be maintaining as system administrator; of all the sections in *A/UX Programmer's Reference,* Section 4 is most important to you as an administrator.
   - Section 5 describes miscellaneous facilities, such as macro packages, character set tables, and network protocols and interfaces; this section can be useful for administrators as well as programmers.

At the back of both *A/UX Command Reference* and *A/UX System Administrator's Reference* you will find three additional resources.

The first is the "Command Summary by Function," which is a quick reference to commands organized by general task.

The second is the "Command Synopsis," which alphabetically lists every command with each command's purpose and syntax.

The third resource is an especially useful feature called the "Permuted Index." The same Permuted Index is printed at the back of *A/UX Command Reference* and *A/UX System Administrator's Reference.* This Permuted Index lists keywords that appear in the Name sections of these two guides.

The Permuted Index contains three columns. The center column is sorted alphabetically by keywords. When using the Permuted Index, scan the center column for the information you seek. When you find the topic, look to the third column, which identifies the command and section where you will find more information.

- If the command is followed by section numbers (1M), (7), or (8), then it's listed in *A/UX System Administrator's Reference,* where commands are alphabetical within each section.
- Commands followed by section numbers (1), (1C), (1G), (1N), and (6) are listed in *A/UX Command Reference.* These Section 1 commands are listed together alphabetically, while Section 6 commands are listed alphabetically in a separate section.

For example, if you need to find information about making a file archive, you might search the center column for *file archive.* In the third column beside the phrase *file archiver,* you'll find a reference to `tar(1)`, and next to *file archives in and out,* you'll find a reference to `cpio(1)`. Since `tar` and `cpio` are listed as being in Section 1, you'll find information about these commands in the first part of *A/UX Command Reference.*

Another Permuted Index is printed at the back of *A/UX Programmer's Reference.* This Permuted Index lists keywords that appear in the Name sections of this reference only, but like the Permuted Index that appears in the other two references, you scan the center column for the information you seek. When you find the topic, look to the third column, which identifies the *A/UX Programmer's Reference* listing under which you will find more information.

Appendix A

Connecting an External Hard Disk Preloaded With A/UX

A/UX is distributed on the Apple HD 80SC hard disk. It is your option to purchase A/UX on either an internal or external HD 80SC hard disk. If you purchased A/UX on an external HD 80SC disk, follow these instructions to connect it to your system.

When you unpacked your system components, the following items should have been included:

- a Hard Disk 80SC, factory loaded with A/UX
- a Hard Disk 80SC power cord
- an Apple SCSI System Cable
- an Apple SCSI Cable Terminator

Figure A-1 identifies these items for you. If any are missing, call your Apple representative immediately.

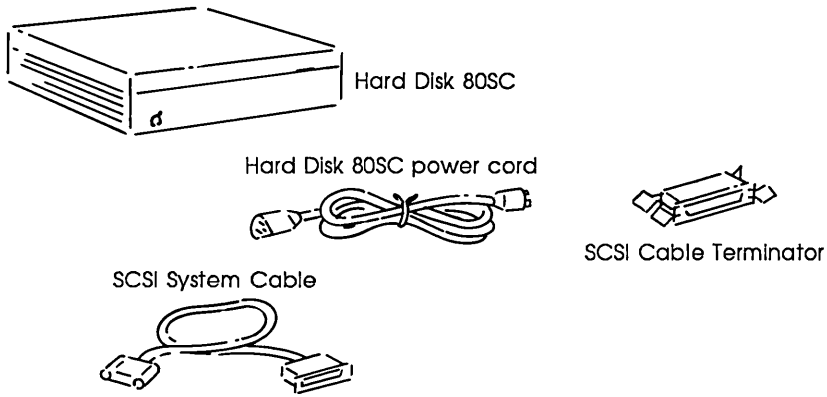


Figure A-1
What you should have

Follow these instructions to complete your Macintosh II setup.

1. **Make sure your computer is plugged in and turned off.**

   If the Power On key on the keyboard was pressed so that the Macintosh II is now turned on, turn the computer off by pushing once on the external power switch at the back of the computer's main unit. (See Figure 2-2 if you need help locating the power switch). The computer should shut itself off. If it doesn't, pull the computer's power cord by the plug from its power outlet. Wait at least 5 minutes before proceeding with the rest of these instructions.

2. **Touch any one of the metal connectors on the back of your computer.**

   Doing this discharges any static electricity that may be on your body or clothes.

3. Attach the DB-25 connector of the SCSI System Cable to the SCSI port on the back of your Macintosh II. (See Figures A-2 and A-3)

Warning

Attach only the SCSI System Cable DB-25 connector to the SCSI port on the computer. Putting another type of cable connector in the SCSI port can seriously damage the SCSI chip inside your computer or the computer itself.

Figure A-2
SCSI icon

Look for the SCSI icon (see Figure A-2) on the back panel of the computer to identify the port.

---

4. Tighten the thumbscrews on the DB-25 connector.

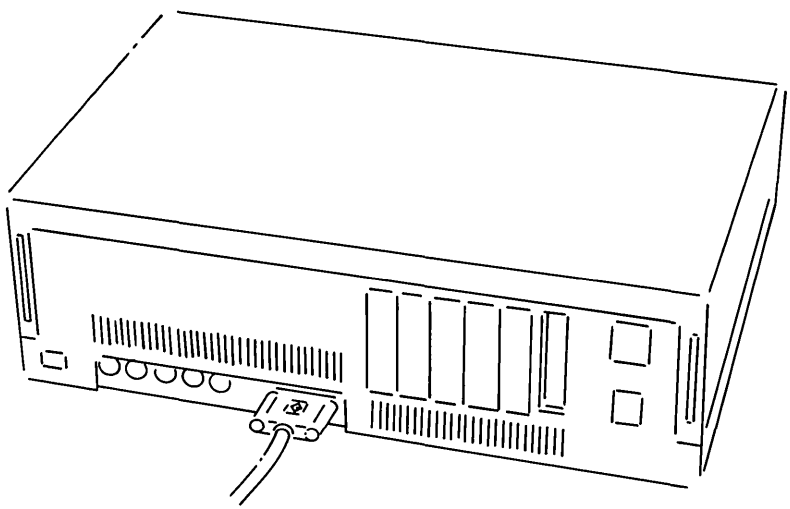


Figure A-3
Attaching the SCSI System Cable to the Macintosh II SCSI port

5. **Attach the 50-pin connector of the SCSI System Cable to either SCSI port on the back of the external HD 80SC. (See Figure A-4.)**

   Press the diamond-shaped wire clips toward the connector, then snap them into the clip brackets to secure the connection.

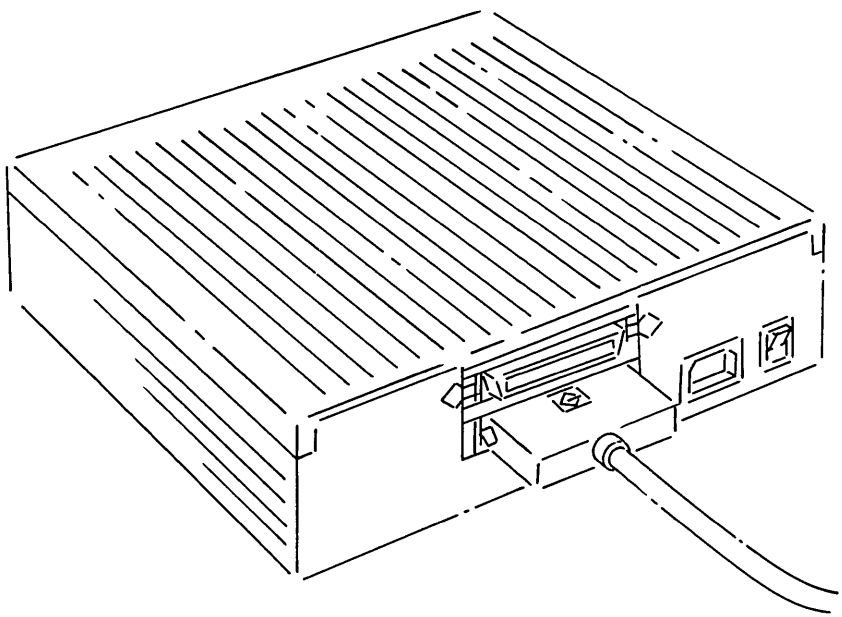


Figure A-4
Attaching the SCSI System Cable to the HD 80SC

6. **Attach the Cable Terminator to the available SCSI port on the back of the HD 80SC. (See Figure A-5.)**

   Snap the clips into the clip brackets to secure the connection.

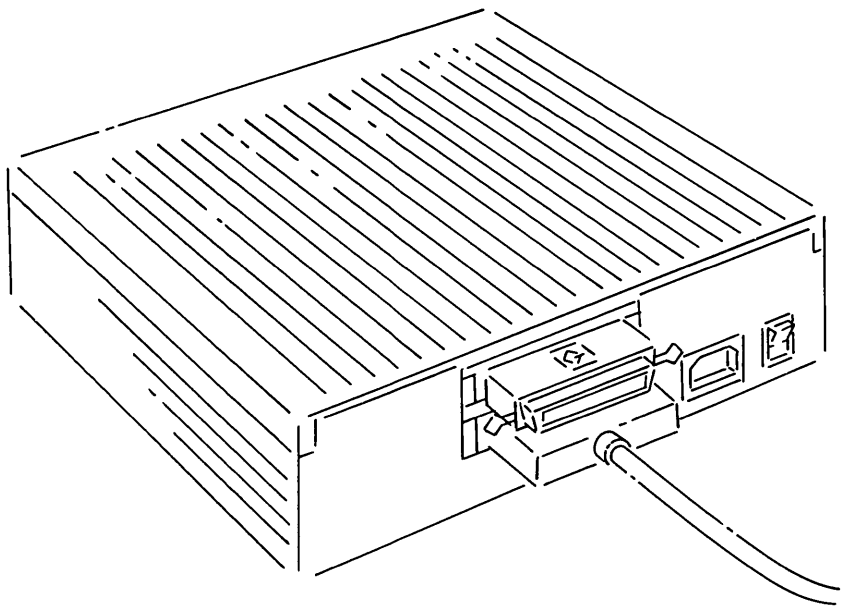


Figure A-5
Attaching the SCSI Cable Terminator to the HD 80SC

7. Verify that the SCSI ID number for the HD 80SC is 5.

The Apple HD 80SC is shipped with assigned SCSI ID number 5. The SCSI ID number indicator is found on the back panel of the HD 80SC. (See Figure A-6.) Examine the SCSI ID number indicator and verify that it's set to 5. While it is not absolutely necessary for the external HD 80SC to be set at 5, setting it at 5 will simplify later installation instructions.

Warning Because SCSI ID 0 is reserved for an internal hard disk and SCSI ID 7 is used by the computer itself, your external hard disk must not be set to 0 or 7.

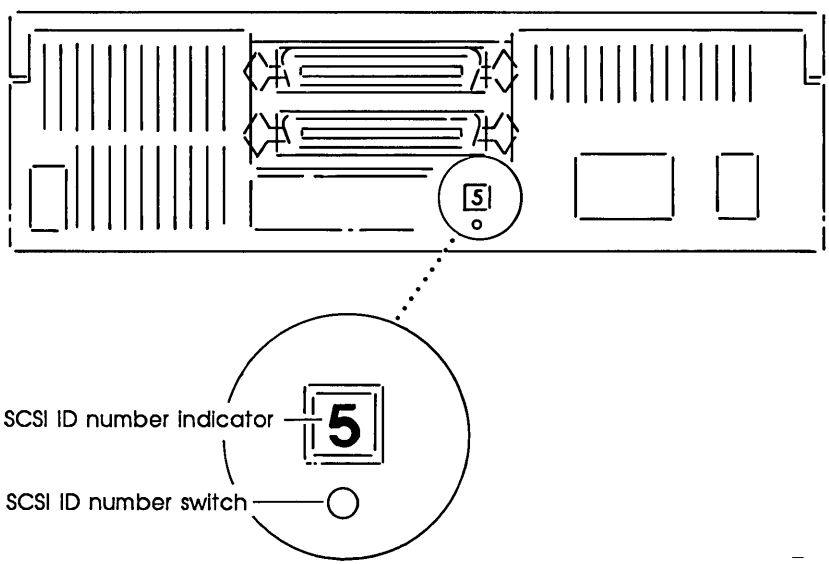


Figure A-6
SCSI ID number indicator and switch

If the SCSI ID number is not set to 5, follow these steps:

- Make sure the power cord is not connected to the external HD 80SC so that it cannot possibly be turned on.
- Insert the point of a push pin or straightened paper clip into the SCSI ID number switch (see Figure A-6).
- Push gently. The number increases.
- If you go past the number 5, keep pushing until the number cycles back to 5.

8. **With the HD 80SC attached to your computer system and with both the external hard disk and the computer *turned off*, attach one end of the HD 80SC power cord to the back of the HD 80SC and plug the other end into a grounded (three-prong) AC outlet.**

   The power switch for the HD 80SC is located to the right of the power receptacle on the back of the device. Press the bottom half of the switch to make sure the HD 80SC is turned off.

Warning **This equipment is intended to be electrically grounded.**

Apple computers and peripheral devices are equipped with three-wire grounding plugs—plugs that have a third (grounding) pin. These plugs will fit only grounding-type AC outlets. This is a safety feature.

If you are unable to insert the plug into the outlet, contact a licensed electrician to replace the outlet with a properly grounded outlet.

Do not defeat the purpose of the grounding plug!

---

9. **Arrange your components, keeping your main unit flat and your external HD 80SC away from the front left side of the main unit, and allow adequate ventilation around all components.**

   Once you're satisfied that everything is connected properly, you'll want to arrange your Macintosh II components conveniently in your work area. Turn the main unit so that it's facing you. Place the monitor where you want it (on top of the main unit is fine), and position the keyboard and mouse where you can reach them comfortably.

   Keep the external HD 80SC away from the left side of the computer where it risks magnetic interference from the Macintosh II's power supply.

   To ensure proper ventilation while the hard disk is on, be sure not to block the air vents at the sides and back of the unit.

Warning Protect your system from overheating by keeping at least 4 inches clear around all sides of both your external hard disk and your computer's main unit. (See Figure A-7.) Always keep the hard disk and the main unit flat. Standing them on edge or not allowing room for air to circulate will defeat their cooling design and may eventually damage them.

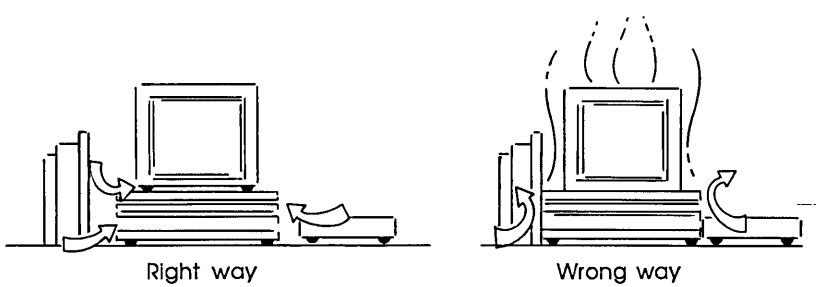


Figure A-7
Allowing room for air to circulate

10. Switch on the HD 80SC, and proceed to Chapter 3 for instructions on starting the Macintosh II.

The power switch is located beside the power receptacle on the back of the HD 80SC. Press the top half of the switch to turn the device on. You will hear the whir of the fan, indicating that the HD 80SC is on.

Now that your system's all set up (or set up as much as it needs to be for now), go back to Chapter 3 to learn how to start A/UX on your Macintosh II computer.

Appendix B

Setting sash to Boot A/UX From an External Hard Disk

If you purchased A/UX on an external hard disk, you received a message like

```
Disk c0d0s0 Error: Cannot select SCSI device
generic disk c0d0s0 Fatal Error: Logical block 0
chroot failed
sash#
```

when you turned on your computer in Chapter 3. The sash application is initially configured to boot A/UX from the disk with SCSI ID number 0, which is normally reserved for the internal hard disk. Follow the instructions in this appendix to make sash boot A/UX from your external hard disk. When you are finished with these instructions, A/UX will be running on your computer, and you will return to Chapter 4 for further instructions on configuring A/UX for your site.

1. Choose General from the Preferences menu.

Use the mouse to move the pointer to Preferences in the menu bar at the top of the screen. Press the mouse button so that Preferences is highlighted and a menu of commands appears. Hold the mouse button down and drag the mouse downward until the command General is highlighted (Figure B-1). Then release the mouse button. This brings up the dialog box shown in Figure B-2.

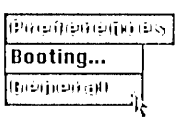


Figure B-1
Choosing General from the Preferences menu

The RootDirectory box shown in Figure B-2 is used to set the disk from which `sash` boots A/UX. Inside the parentheses are three parameters: by default they're 0,0,0. The first parameter sets the SCSI ID number, initially 0 for an internal hard disk.

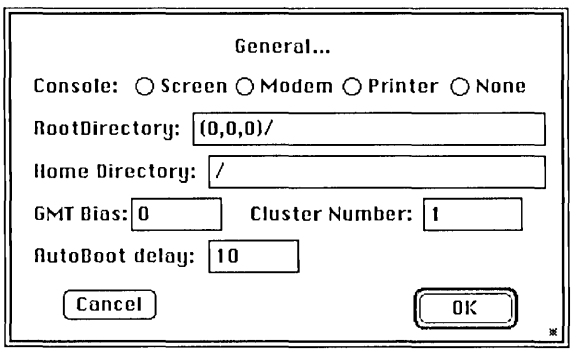


Figure B-2
The General dialog box

Figure B-3
Positioning the cursor to change the SCSI ID number

2. To begin changing the SCSI ID number, use the mouse to move the cursor to the right of the first 0 in the RootDirectory box, then click the mouse button once.

A blinking cursor line should appear between 0 and the first comma as shown in Figure B-3. (If the blinking cursor is in the wrong location, move the mouse and click again.)

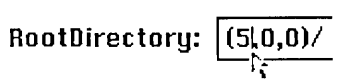


Figure B-4
Example: setting `sash` to boot A/UX from SCSI device 5

3. Press DELETE to backspace over the first 0, then type in the SCSI device number of the external disk (normally 5).

Normally the SCSI ID number assigned to your external hard disk is 5, unless you reassigned the number when following the instructions in Appendix A. You can verify the SCSI ID number now by checking the indicator on the back of the external hard disk. (See Figure A-6 if you have trouble locating the SCSI ID number indicator.)

The SCSI ID number is the only parameter in this box that you need to change now. The second parameter sets the logical unit assigned to that ID, and should normally remain set at 0. The third parameter specifies which partition slice to boot from; this should normally remain set at 0.

Figure B-5
Clicking OK

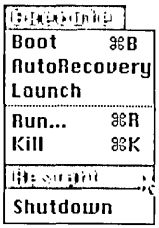


Figure B-6
Choosing Restart from the Execute menu

4. Click the OK button.

Use the mouse to move the pointer to the OK button on the screen. Press the mouse button once and then quickly release it (Figure B-5). The General dialog box disappears.

5. Choose Restart from the Execute menu.

To effect the changes you just made to the Stand-Alone Shell, you must restart your computer. Use the mouse to move the pointer to Execute in the menu bar at the top of the screen. Press the mouse button so that Execute is highlighted and a menu of commands appears. Hold the mouse button down and drag the mouse downward until the command Restart is highlighted (Figure B-6). Then release the mouse button.

Your screen will go blank for a few moments, then you will see the smiling Macintosh icon and the `Welcome to Macintosh` message. The Stand-Alone Shell application starts, counting down 10 seconds and launching the A/UX kernel. You should then see the message shown in Figure B-7.

6. When the A/UX release notice and the message `This is the first time A/UX has been booted up` appears on your screen (Figure B-7), return to Chapter 4 for instructions on setting the time zone and other site-specific details.

```
This is the first time A/UX has been booted up
on this disk, so you will need to set the time.
Please answer the questions below to set the time.

The system needs to know how many minutes from GMT (Greenwich
mean time) your time zone is. For example, in the U.S.A., EST
is -300 minutes, and PST is -480 minutes, from GMT.

Enter the minutes your time zone is from GMT  [-1459 to 1459]
```

Figure B-7
Setting the time (return to Chapter 4 for instructions)

- *Note:* If after 3 to 4 minutes you do not receive the prompt shown in Figure B-7, turn the power off to your computer by pushing once on the external power switch (found on the back of the main unit; see Figure 2-2 if you need help locating the power switch). If your computer fails to turn off, pull the plug on the power cord (from the three-hole grounded outlet). Then switch off your external hard disk. Review Chapter 2 and Appendix A to make sure that you installed all the hardware correctly. Wait at least 5 minutes after the power to your system was turned off, then switch your external hard disk on again and restart the installation, beginning at Chapter 3. If you still have any problems, call your Apple representative for assistance.

Appendix C

Expansion Cards and Power Requirements

There are limits to the amount of electrical power available for the six expansion slots in the main unit of your Macintosh II. Under most circumstances, this should not create a problem. However, if you plan to install several cards, it is a good idea for you to take time to assess the power requirements for the combined cards. Installing a group of cards that make excessive demands on available power may cause damage to one or more cards or to the computer itself.

There are three kinds of current from which a card can draw power. They are identified as

- +5V bus current
- +12V bus current
- –12V bus current

Each card will draw power from these sources in varying combinations and in varying amounts, but that in itself will not cause a problem. You need to determine the requirements of each of your cards, add those numbers together, and verify that the *totals* do not exceed the limits. Table C-1 defines those limits.

Table C-1
Power limits

Type of current	Recommended total for all six slots
+5V bus	12.8 amps
+12V bus	1.3 amps
–12V bus	1.0 amps

To calculate total power requirements, you'll have to identify the specifications for your cards. You should be able to find that information on the package or in the instructions that came with each card. Once you know how much power is required (and from which type of current), you can add up the figures and determine whether your cards as a group may exceed the limits.

For example, assume you have four cards with these requirements:

- □ +5V bus 8 amps total for four cards
- □ +12V bus 0.7 amps total for four cards
- □ –12V bus 0.632 amps total for four cards

These totals are all within the limits, and you can safely install all four cards. However, if you should purchase two more cards, you will have to add in their requirements to be sure that the totals are still acceptable.

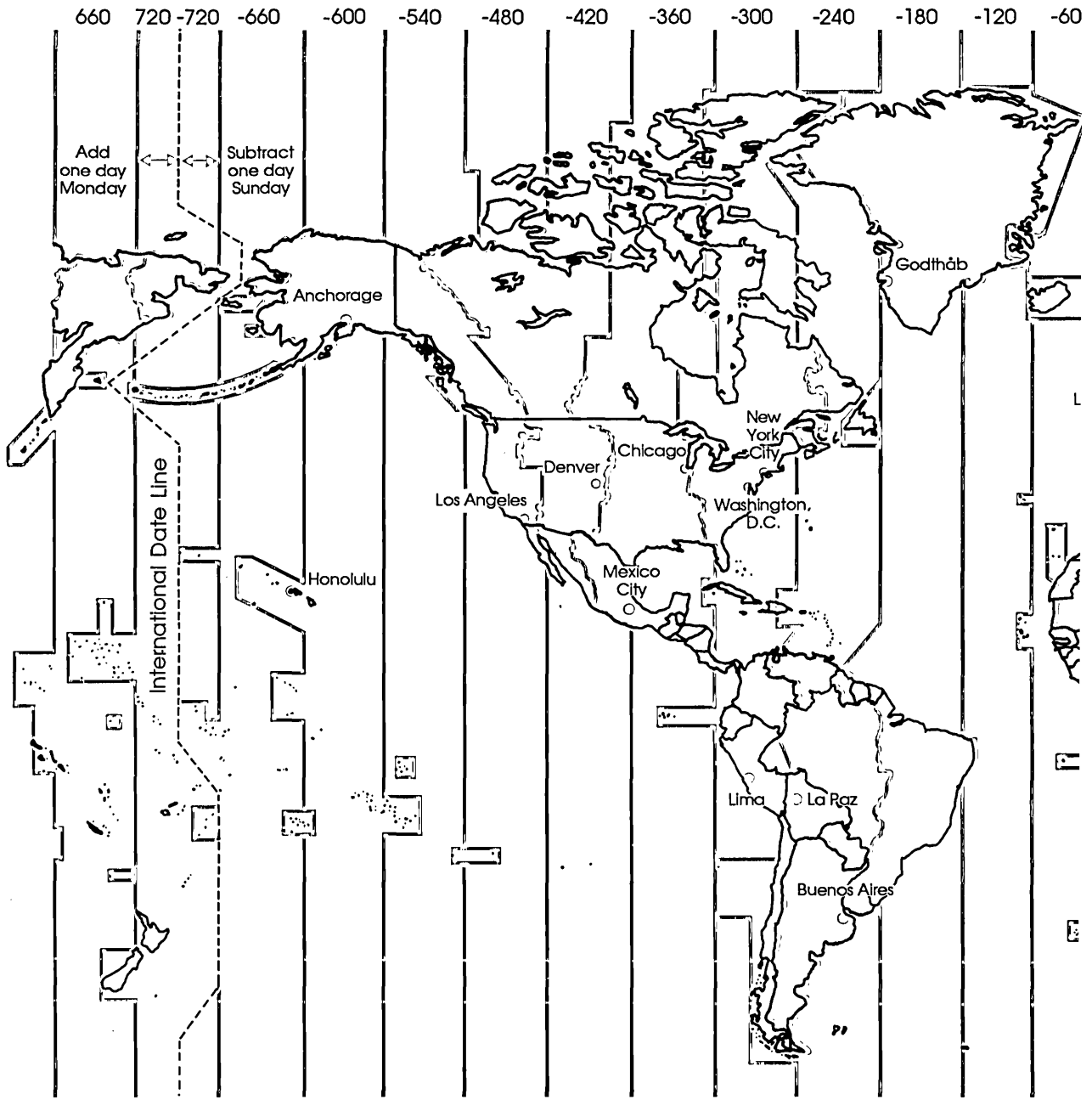
Index

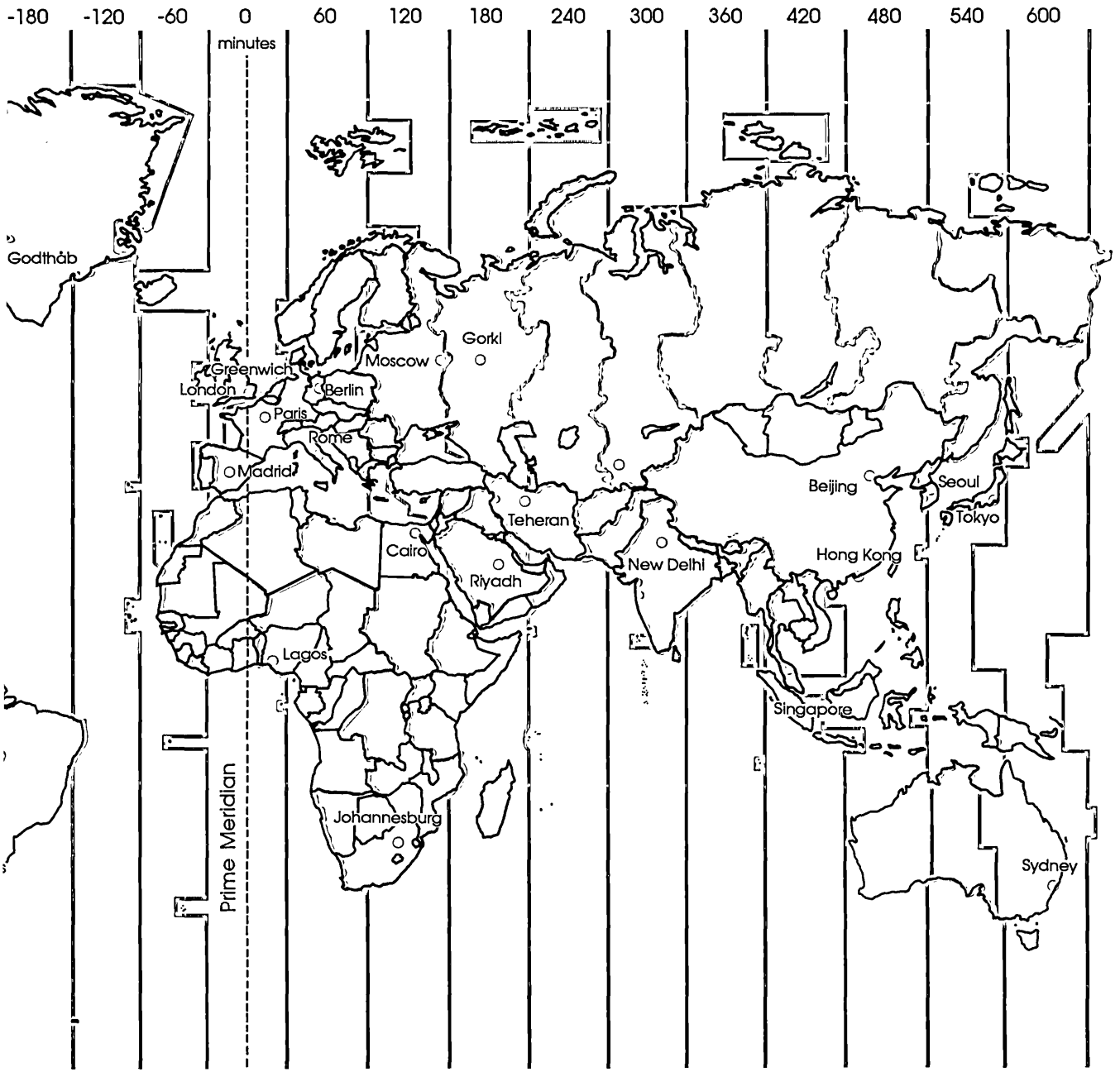
T, U

V, W, X, Y, Z

Addendum

Greenwich Mean Time Offsets


660
720
-720
-660
-600
-540
-480
-420
-360
-300
-240
-180
-120
-60
Add one day Monday
Subtract one day Sunday
International Date Line
Anchorage
Honolulu
Godthåb
Los Angeles
Denver
Chicago
New York City
Washington, D.C.
Mexico City
Lima
La Paz
Buenos Aires


-180
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Godthåb
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Paris
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