MacWorks Plus II

Installation and Usage Manual

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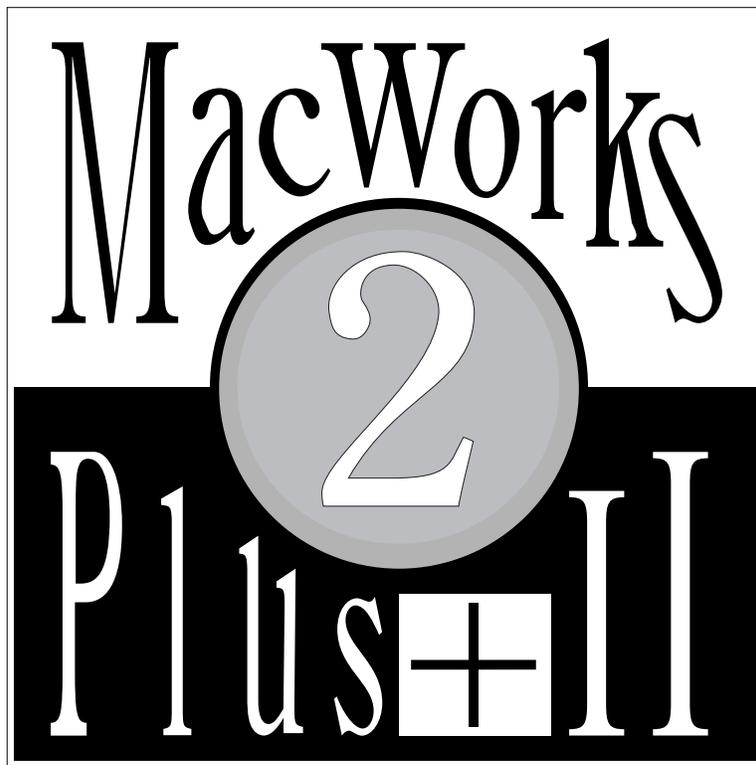
Installation and Usage Manual

July 1992

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For my friend, Lisa.

Foreword from the Engineer

MacWorks Plus II users range from the technically sophisticated to the technically disinterested. Writing a manual that is useful to this range of readers is a very challenging experience. I believe the communication of the informational content of the text is the most important aspect of this manual. As a result, you may find the English somewhat formal, and in places, difficult to read quickly. The intent is that it be taken literally, and in so doing, you will be minimizing the chance of misunderstanding. I hope that the drawings and diagrams have made the text more palatable, and that the information is sufficient for your needs.

Developing MacWorks Plus II has been a tremendous task requiring many trade-off decisions between time and cost, compatibility and performance. I hope the result will add years to the life of your Lisa, and that she will continue to serve you well.

Lisa deserves much respect and it has been a pleasure to work with her.

James MacPhail

Foreword from Dafax Processing Corp.

When it first became apparent to us that the Lisa would not be able to utilize Apple Systems beyond 6.0.3, and that as a consequence, the Lisa might die a slow death, we became committed to finding a course that eventually was fulfilled in what is now MacWorks Plus II. Along the way we decided that much more than System compatibility was required, and we trust that you the user, will benefit from the multitude of improvements made to the interface. We also urge you to read this manual, as familiarity with its contents will facilitate and enhance your use of the Lisa. This endeavor would not have been possible without the steadfast dedication of Query Engineering Inc., and the cooperation of Sun Remarketing, Inc. in licensing the original MacWorks Plus source code to us, for which we thank them.

Sam Neulinger

Acknowledgment

MacWorks Plus II and this manual have been made possible only by the efforts of many people. Engineers, beta-testers, proof readers, and many others have made significant contributions. But all of this effort would be worthless without the Lisa users who continue to find she provides pleasure and productivity; thanks is due to you, too!

Table of Contents

Introduction

MacWorks Plus II is a user installable software and hardware upgrade for the Lisa 2 and Macintosh XL (computers manufactured by Apple Computer, Inc.).

MacWorks Plus II includes many enhancements that have been engineered to allow your X/Lisa to perform better and with more current software than allowed by MacWorks XL and MacWorks Plus. (When referring to both the Lisa 2 and the Macintosh XL, the term "X/Lisa" is used in this manual.)

The MacWorks series of products are emulation packages that operate on the X/Lisa computer hardware to transform it into a Macintosh computer.

The Macintosh computers designed after the X/Lisa have built-in software (more precisely, "firmware") in ROM, which provides much of the basis for the operation of the computer. The Macintosh system software and application software depend on this built-in software for their operation.

The X/Lisa does have some software in ROM, but it is limited to performing the hardware self-test and loading an operating environment when the computer is turned on. This ROM is used to load MacWorks from a disk.

The MacWorks environment, as any X/Lisa environment, must be loaded from a special X/Lisa compatible boot-strap disk or device (one that the X/Lisa's **STARTUP FROM** menu can recognize). This is why the X/Lisa, unlike other Macintosh computers, requires the MacWorks Plus II Boot Disk.

Once MacWorks is loaded from disk, it provides software support on the X/Lisa that later Macintosh computers provide in their ROM. Thus a Macintosh System Disk may be used, just as on another Macintosh.

In the Macintosh environment, X/Lisa disks appear foreign and are not compatible with the Finder. Thus your MacWorks Plus II Boot Disk, and all Lisa environment disks, will not appear on the desktop. In fact, if you insert the MacWorks Plus II Boot Disk once you have loaded MacWorks, the disk will be reported as "not a Macintosh disk." You must *not* initialize this disk as a Macintosh disk, as that would destroy your copy of MacWorks Plus II!

Included in this MacWorks Plus II Package:

Hardware Upgrade Circuit Board

MacWorks Plus II includes a user-installable hardware upgrade called the X/Lisa Programmable Frequency Generator (PFG). The PFG circuit board has been designed to provide three major hardware improvements to the X/Lisa. These enable MacWorks Plus II to read virtually all valid 800k Macintosh disks, store Control Panel settings more effectively, and allow the serial ports to operate more closely to the Macintosh Plus hardware specifications.

A PFG circuit board is supplied in the black static shielding box. Be sure to keep this special black box for return in the event of a problem. The PFG must be installed on the X/Lisa's I/O board prior to the software installation of MacWorks Plus II, as the PFG is necessary to allow MacWorks Plus II to operate properly.

Each PFG board contains a "PAL" component which enables the additional features associated with each level of MacWorks Plus II (Basic, PRO, or PRO with Series 1 Updates). The PAL installed on your PFG is the PAL that supports the level of MacWorks Plus II that you have purchased, as labelled on the PFG's box.

MacWorks Plus II Floppy Disks

The MacWorks Plus II software is provided on two floppy disks (along with the PFG in the black static-shielding box). One disk is the "MacWorks Plus II Boot Disk," which is an X/Lisa `STARTUP FROM` disk. The second disk is the "MacWorks Plus II Install Disk," which is an 800k Macintosh disk containing MW+II Basic Install and new control panels.

The control panels include *free* updates to the XLerator and LSAC software for use with MacWorks Plus II, courtesy of Query Engineering Inc. These are enhancement products and are not required to use MacWorks Plus II.

> *The XLerator is the accelerator board for the X/Lisa incorporating a 16MHz 68000 processor, four SIMM sockets for 4Mb of memory, and optional SCSI interface and 68881/2 math coprocessor. The LSAC (X/Lisa SCSI Accessories Card) provides the ability to load MacWorks Plus and MacWorks Plus II from a SCSI hard disk, eliminating the need to use a floppy boot disk or a parallel port hard disk to load these environments. The LSAC includes an adapter to facilitate connecting an internal SCSI disk to the XLerator SCSI port. Contact Dafax Processing Corp. for their newsletters describing these products in detail.*

MacWorks Plus II Installation and Usage Manual

This document includes installation, operation, trouble-shooting, and technical information.

In this manual, general information (which everyone should read to use MacWorks Plus II) is denoted by this typeface. If you wish to use the most general features of MacWorks Plus II, you need to read only these sections.

In this manual, advanced information (which you do not need to read to use MacWorks Plus II) is denoted by this different typeface along with the grey vertical bar at the edge. If you wish, you may skip the advanced information sections; however, these sections contain information that will assist you in proficient use of MacWorks Plus II.

In this manual, technical information (which you do not need to read to use MacWorks Plus II effectively) is denoted by this typeface along with the black vertical bar at the edge. If you wish, you may skip the technical information sections; however, these sections contain information that may assist you in technical use and trouble-shooting with MacWorks Plus II.

Check list and impatient installation guide

This separate page provides a check list so that you may record your progress during installation and be sure you have not skipped any steps. It also outlines the process of installation for those who do not have the opportunity to read the manual before starting the installation. However, we *strongly* recommend that all users read the entire installation and usage manual at least once before installing MacWorks Plus II.

Other items you may need

In particular, MacWorks Plus II does not include the following items that may increase your productivity and enjoyment. Please contact your supplier or Dafax Processing Corp. for more information.

Apple Macintosh System Software—A System Software Upgrade Kit is available from Apple Dealers and User Groups. If you plan to purchase an upgrade kit, check that your level and version of MacWorks Plus II will support the system version that you wish to install. For example, using System 7 requires MacWorks Plus II PRO.

Application Software—according to your needs (for word processing etc.).

Macintosh Documentation—to assist in proficient use of Macintosh. Apple's "Macintosh Reference" and "MacWorks" manuals describe general use of the Macintosh environment. Many third party books are also available.

Memory Upgrade—to provide more memory (RAM) for performing more complex tasks. Upgrades are available to bring your X/Lisa up to 2Mb or 4Mb of RAM.

X/Lisa Documentation—to assist in trouble-shooting hardware problems. The "Lisa 2 Owner's Guide" may be useful if you are technically inclined.

XLerator—increases the performance of the X/Lisa giving approximately three times the speed of a stock machine and increased memory capacity. The XLerator is available from Dafax Processing Corp., and Sun Remarketing, Inc.

Compatibility

Hardware Requirements

MacWorks Plus II requires an Apple Lisa 2 or an Apple Macintosh XL computer. The computer must have at least 1Mb of RAM (more than 1Mb and a hard disk are strongly recommended). If your computer has a single sided floppy drive instead of a double sided drive, contact Dafax Processing Corp. or your supplier for a 400k (single sided) version of the MacWorks Plus II Install Disk or to order the 800k double sided floppy disk drive upgrade (recommended).

As the Macintosh system gains features and reliability, its size increases steadily. You may find that an X/Lisa with 1Mb is sufficiently restrictive that you may decide to use System 6.0.5 without MultiFinder. Upgrades are available that will bring your X/Lisa up to 2Mb or 4Mb and increase your productivity.

Updated software is provided with MacWorks Plus II that provides support for the XLerator and the LSAC; these are enhancement products for the X/Lisa and are not required to use MacWorks Plus II.

Software Requirements

MacWorks Plus II Basic has been engineered to operate best with version 6.0.5 and 6.0.8 of Apple Macintosh System Software (many earlier versions of the System Software will work well too).

The separate MacWorks Plus II non-compatibility sheet lists known compatibility problems.

Many software packages that are compatible with the Macintosh Plus and System Software 6.0.x will operate well with MacWorks Plus II. However, there are occasional exceptions. Please contact your supplier if you have compatibility questions regarding a specific software package. If you do find a particular software package does not perform properly with MacWorks Plus II, please inform us; improvements to MacWorks Plus II are a result of user feedback.

Important notes about upgrading to MacWorks Plus II

Protect your Boot Disk!

Make sure you put the MacWorks Plus II Boot Disk away after using it. As it is a special X/Lisa `STARTUP FROM` disk, it is not recognized as a Macintosh disk once MacWorks Plus II is running. If this disk is subsequently inserted, the X/Lisa will report that "This is not a Macintosh disk: Do you want to initialize it?" If this occurs, *you must eject the disk*, as initializing it will destroy your copy of MacWorks Plus II!

Backup your Data

Before installing MacWorks Plus II on your hard disk (and periodically thereafter), it is prudent to make a reliable backup of all of the important data on your disk. Don't forget to keep some old backups instead of re-using the disks. Remember that although backup programs are often used, the "restore" portion of the program is rarely used; just because you did a backup doesn't mean the backup disks are usable. Make sure your backup is sufficiently reliable for the importance of the data involved.

If your data is particularly important, take special care to note the problems with reliable use of the floppy disk with MacWorks Plus 1.1h and earlier as described in "Special notes regarding floppy disks" on page 52. A very reliable backup will require transferring your data over a network or onto a SCSI device.

If you must back-up important data onto floppies on an X/Lisa, we recommend that you perform a backup while using MacWorks Plus 1.1h or earlier, install MacWorks Plus II *without* changing the data (do not initialize the hard disk!), and back-up the data again (on *new* disks). The initial backup provides protection in the event that the installation is disastrous. The second backup protects against the various problems in MacWorks Plus 1.1h and earlier which make copying data to floppy disks unreliable.

Don't re-initialize disks on the Macintosh XL

Note that the PFG and MacWorks Plus II do not fix the Macintosh XL 800k re-initialization problem. See the Macintosh XL sub-section of "Special notes regarding floppy disks" on page 52 for more information.

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Incompatible software may crash your machine

Note that the software included with MacWorks Plus II is not compatible with software from MacWorks Plus 1.1h and earlier (SUNTrol, MW_Install), the LSAC (MW+Loader, MW+Patch), and the XLerator (@XLerator v2.1). Do not combine software from different versions unless instructed to do so.

400k HFS and 800k MFS disks

MacWorks Plus 1.1h and earlier did not handle these non-standard disk formats properly (it corrupted the organization of data on the disk). If you have disks like these that you have used with MacWorks Plus 1.1h or earlier, copy the data to a standard disk format before switching to MacWorks Plus II. This will allow you to access the data on these disks after upgrading to MacWorks Plus II (and on other Macintosh computers too). See the section entitled "Special notes regarding floppy disks" on page 52 for more information.

MacWorks Plus II Levels Overview

MacWorks Plus II is available in three levels providing varying amounts of sophistication (and economy). If you decide that you require the features in one of the more sophisticated MacWorks Plus II packages, contact Dafax Processing Corp. or your supplier for upgrade information.

All levels of MacWorks Plus II include the PFG hardware upgrade and support the XLerator and LSAC.

Note that the MacWorks Plus II PRO PFG hardware will run the Basic software if desired, but the MacWorks Plus II Basic PFG hardware will not run the PRO software. Contact your supplier or Dafax Processing Corp. for Basic to PRO upgrade information.

MacWorks Plus II Basic

Compatible with Apple System Software up to version 6.0.8.

Maximum computer memory supported:
Without XLerator: 2Mb
With XLerator: 4Mb + up to 2Mb disk cache using left over slot memory

MacWorks Plus II PRO

System 7 compatible with some restrictions. Apple System Software up to version 7.1. See next page for additional features.

Standard computer memory supported:
(more than 2Mb of slot memory requires a modified X/Lisa)
Without XLerator: 4Mb
With XLerator: 4Mb + up to 4Mb disk cache using left over slot memory

MacWorks Plus II PRO with Series 1 Updates

The Series 1 Updates can be provided to PRO users so that they may utilize the new features of MacWorks Plus II PRO as soon as testing is completed. Other users must wait for the final release of the complete MacWorks Plus II PRO. The new features of MacWorks Plus II PRO described below are sent automatically to Series 1 Update users.

Additional features of MacWorks Plus II PRO

These additional features are under development for MacWorks Plus II PRO:

Keypad layout configuration control

The Keypad control panel provides a variety of different keypad layouts which can be selected to suit the application in use. The +, -, = , / and cursor keys can be arranged to operate as labelled, re-arranged to operate as the physical layout on the Macintosh Plus keyboard, or as a hybrid layout.

PseudoRAM™ (Currently under development)

Using hard disk space for storage, PseudoRAM provides expanded memory space. This allows X/Lisa machines with only 2Mb of memory to operate (with some restrictions) as a machine with more memory. Limitations of the microprocessor in the X/Lisa prevent PseudoRAM from being compatible with some software packages, and the use of the hard disk periodically reduces performance.

MaxiRAM™ (Currently under development)

Along with memory expansion hardware, or used in conjuction with PseudoRAM software, MaxiRAM provides more accessible memory to application software. The expected limit is 12Mb of RAM to be shared among System Software, MacWorks Plus II and applications.

Installation

Preparing to Install

Make sure you have read the section "Important notes about upgrading to MacWorks Plus II" on page 8 *before* actually installing MacWorks Plus II.

To function properly, MacWorks Plus II requires that the Programmable Frequency Generator (PFG) hardware upgrade is installed. Install the PFG first according to the instructions that follow.

Programmable Frequency Generator (PFG) Installation

Please take appropriate static control precautions while installing the PFG according to the instructions below.

Prevent ESD from damaging your computer

The electronic circuits associated with this installation are easily damaged by electrostatic discharge (ESD).

You should attempt to eliminate the possibility of ESD by grounding yourself periodically to drain off any accumulated static charge. The simplest way to do this is to periodically (or continuously) touch a grounded metal portion of the chassis of the computer. If possible, perform the installation under humid conditions.

Additional precautions to consider are:
* *Do not* wear clothing made from static charge generating materials (cotton clothing is excellent, polyester and wool clothing are potential sources of static charge).
* *Do not* do the installation in a carpeted area.
* *Do not* transport (carry around) any circuit boards unless they are suitably protected by a static-shielding bag or enclosure.

All work should be done on a static-free surface, ideally this is a grounded electrically conductive workbench. A grounded static dissipative work mat or black conductive foam are preferable to pink anti-static foam. Avoid ordinary "styrofoam" as it is a strong static charge generator. Spreading metallic foil (eg. aluminum foil) on your work surface is a possible alternative when nothing else is available.

Disconnect all cables

Turn off your X/Lisa and disconnect all of the cables from the peripheral connectors at the rear of the computer.

Remove the back cover

As indicated in figure 1, remove the back cover by loosening the two thumbscrews at the top; turn the screws counterclockwise until they stop (about 4 turns). After tilting the top of the back cover away from the X/Lisa, the cover may be lifted away.
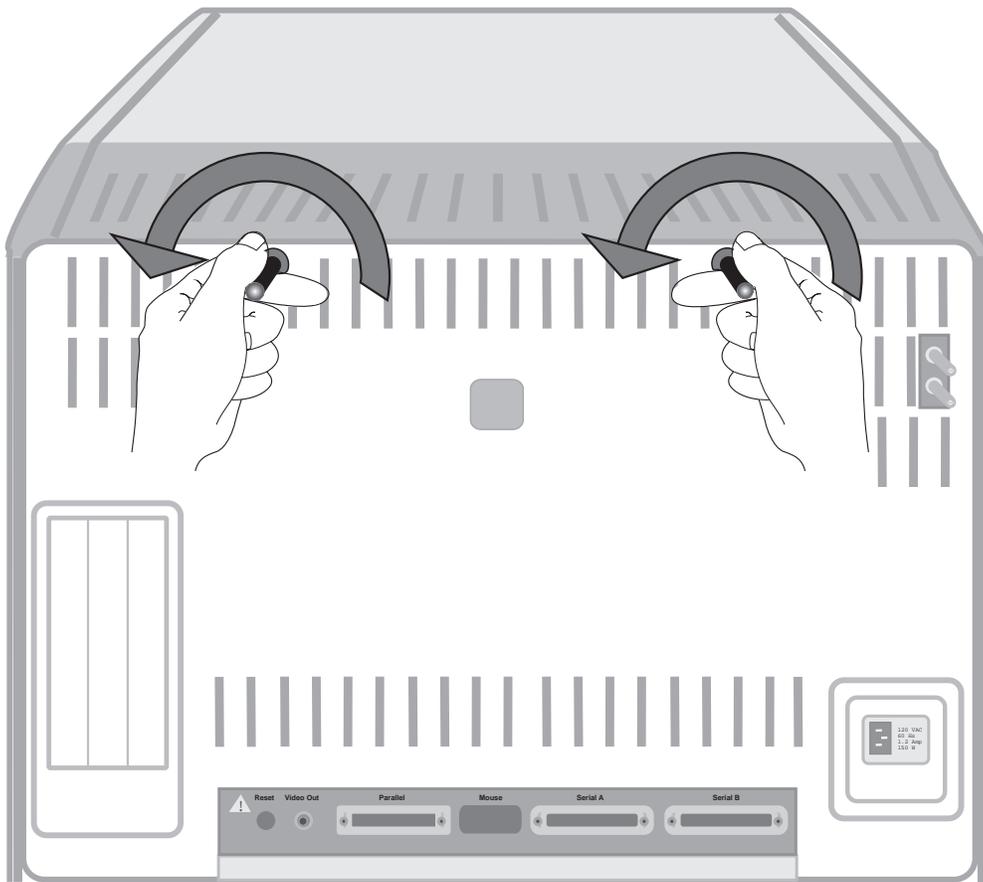
Figure 1. Removing the back cover requires loosening two screws by hand.

Remove the Card Cage

Refer to figure 2 and grasp the black bar just behind the panel of peripheral connectors. Pull on this bar while pushing with your thumbs on the metal chassis below the connector panel. As the card cage is withdrawn, it will suddenly move freely, so use limited force.

Figure 2. Withdraw the card cage by pulling on the bar behind the peripheral connectors while pushing on the chassis with your thumbs.

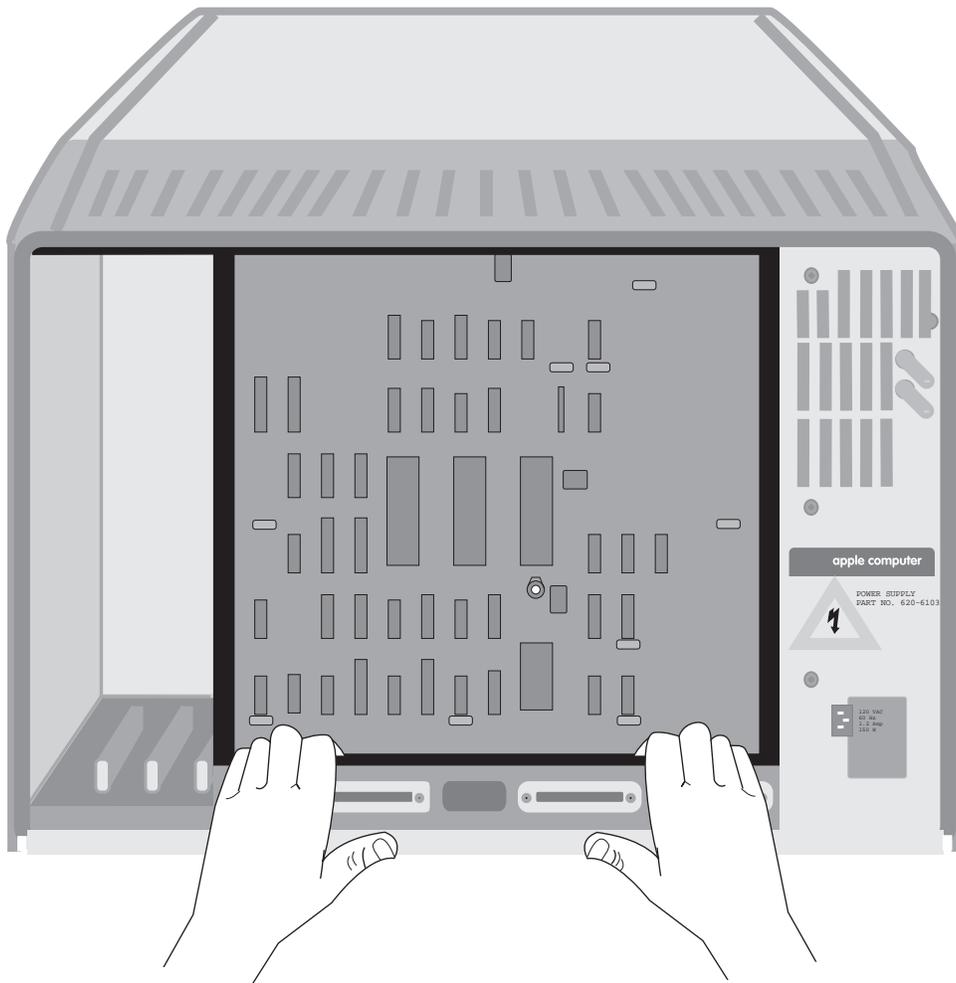At this point you may wish to move to a work area with better lighting as the following work requires examining small components. Carry the card cage by its metal chassis and ground yourself on arriving at the workbench to drain static charge accumulated during transport.

Identify the I/O board

Refer to Figure 3 to identify the I/O board. This is one of the two large boards in the card cage. The I/O board is the one closest to the peripheral connector panel (Mouse — Serial A — Serial B etc.) at the back of the card cage. On the top of the card cage is a red "I/O" label pointing to the red ejector-latch on the I/O board.
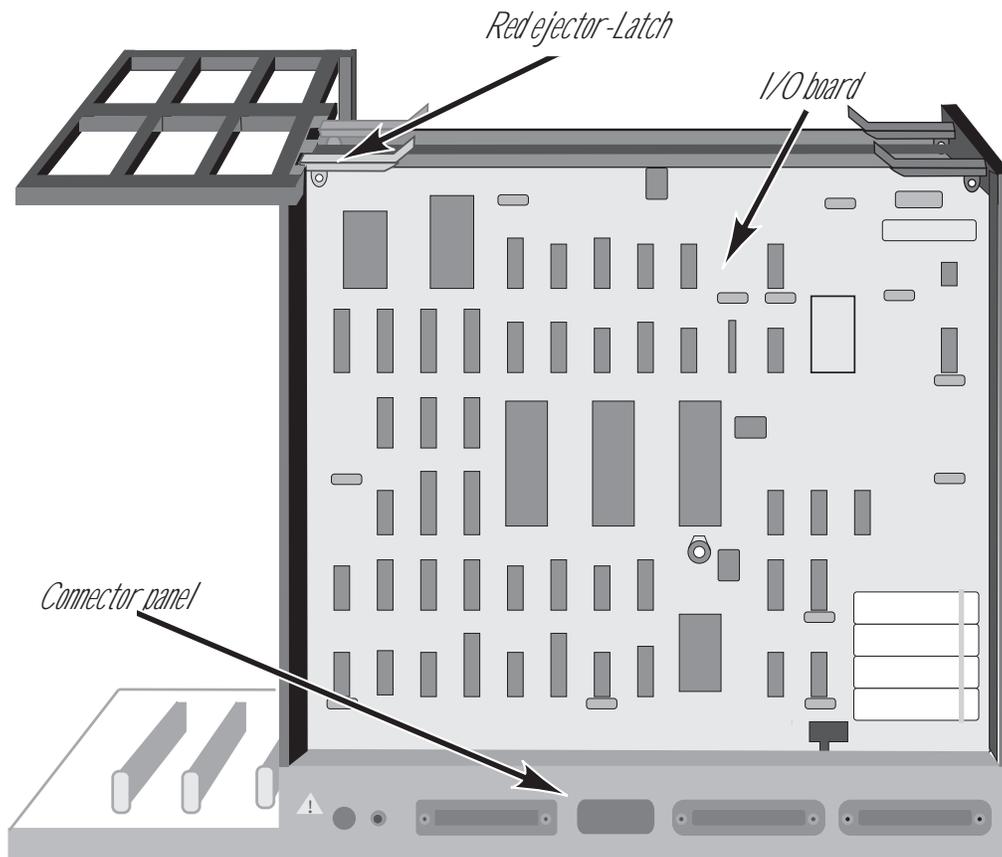
Figure 3. Identifying the I/O board as closest to the peripheral connectors.

Remove the I/O board

If you have an XLerator installed, disconnect the fan leads from the I/O board.

Remove the I/O board from the card cage by lifting the ends of the color-coded (red & brown) ejector-latches at the top of the I/O board. As the ejector-latches are lifted, they will pivot around the corners of the I/O board. Figure 4 shows how the ejector-latches rotate as they are lifted. Once the ejector-latches have rotated about one quarter turn, the I/O board will slide up easily out of the cage.
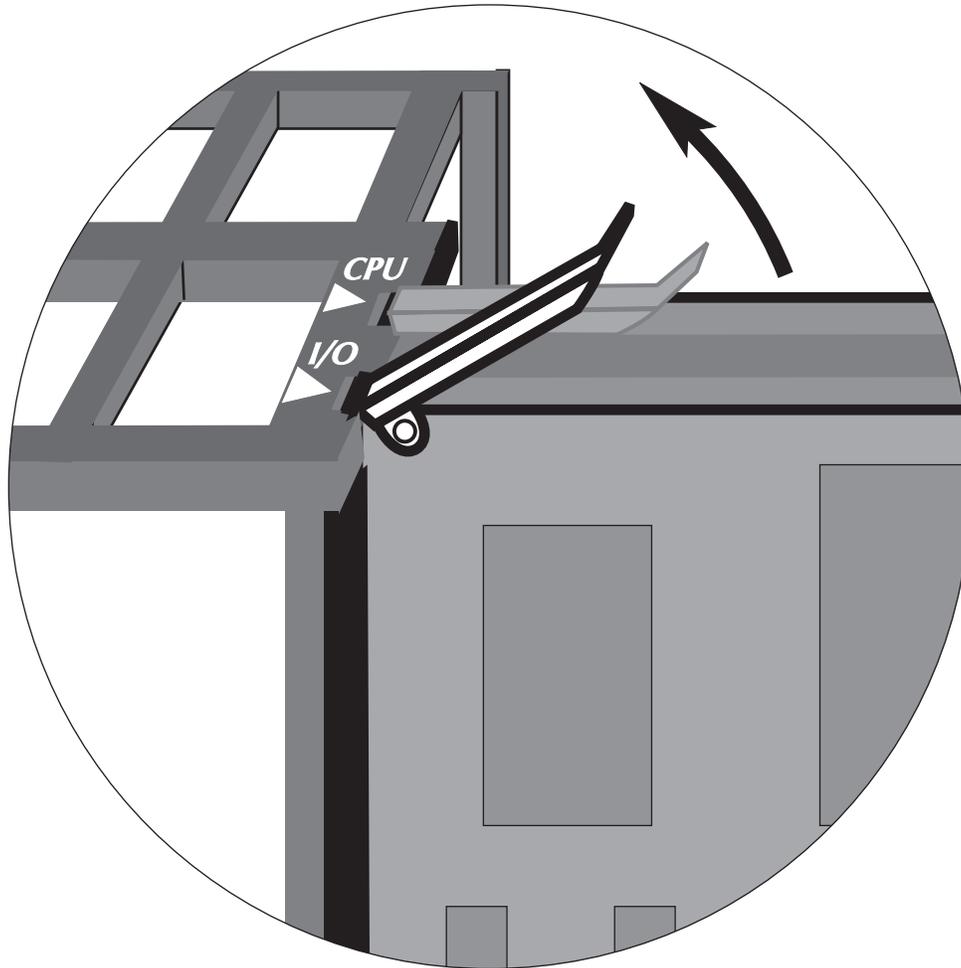
Figure 4. Removing the I/O Board by lifting the ejector-latches.

Place the I/O board on a static-free surface.

Identify the Z8530 SCC

Depending on whether your X/Lisa is a Lisa 2 or a Macintosh XL, use figure 5a or 5b to identify the Z8530 SCC. If you have difficulty determining which figure corresponds to your I/O board, do not be concerned. The differences are not important for this installation; you may use either figure if you are careful.

The Z8530 SCC is one of the three large black components near the center of

the I/O board. Along the top and left edge of the board are coordinates: 1–14, and A–F. The Z8530 SCC is at location 9C. "Z8530" is printed on the Z8530 SCC itself, and "8530" is printed on the circuit board just to the left of the Z8530 SCC.

Note the orientation of the Z8530 SCC

As shown in Figure 5a/5b, the end of the Z8530 SCC oriented towards the top of the I/O board has a notch or detent to identify it. Make sure that you will be able to recognize the notched end later; apply a sticker or a white mark if necessary. If you later insert the Z8530 SCC with the wrong end at the top, the Z8530 SCC may be damaged.
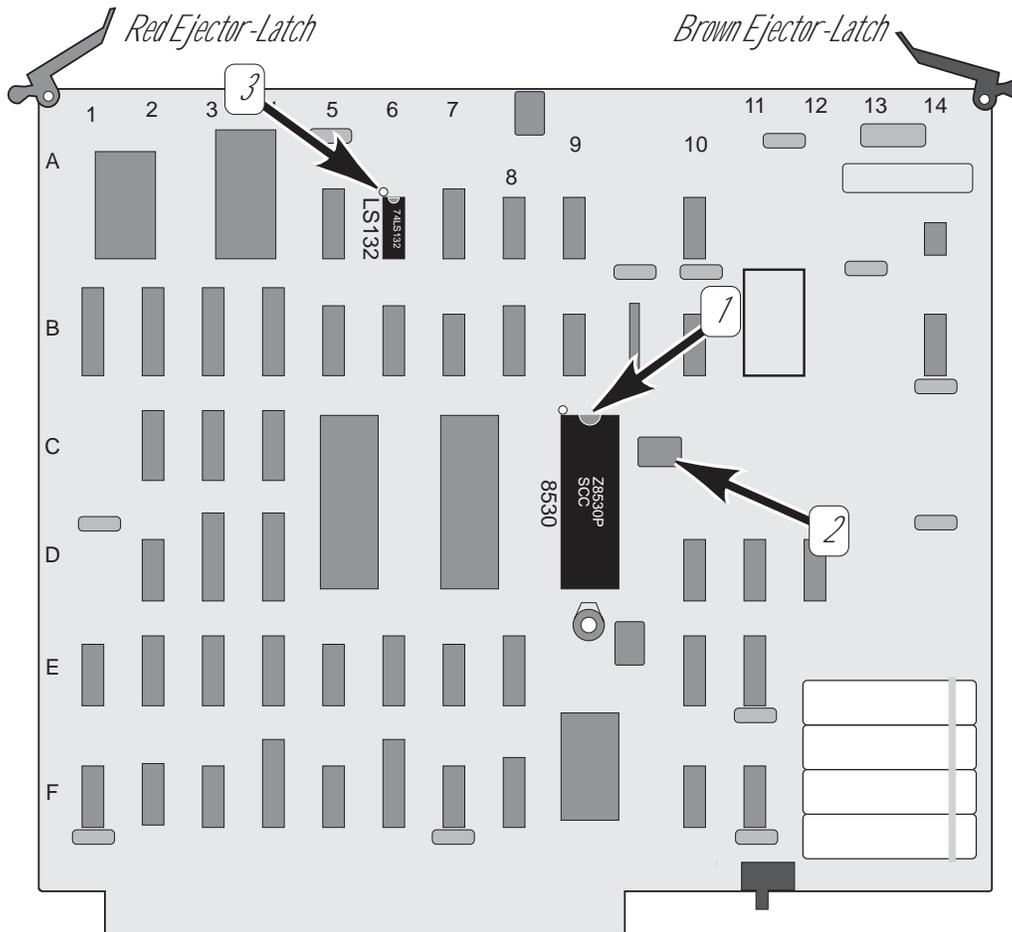
Figure 5a. The Lisa 2 I/O board layout.

This I/O board includes the switch and four batteries at the lower right and two medium sized chips at the top left.

The arrows denote:

> 1. **The notched end of the Z8530 SCC at location 9C.**
> 2. **The crystal at location 10C.**
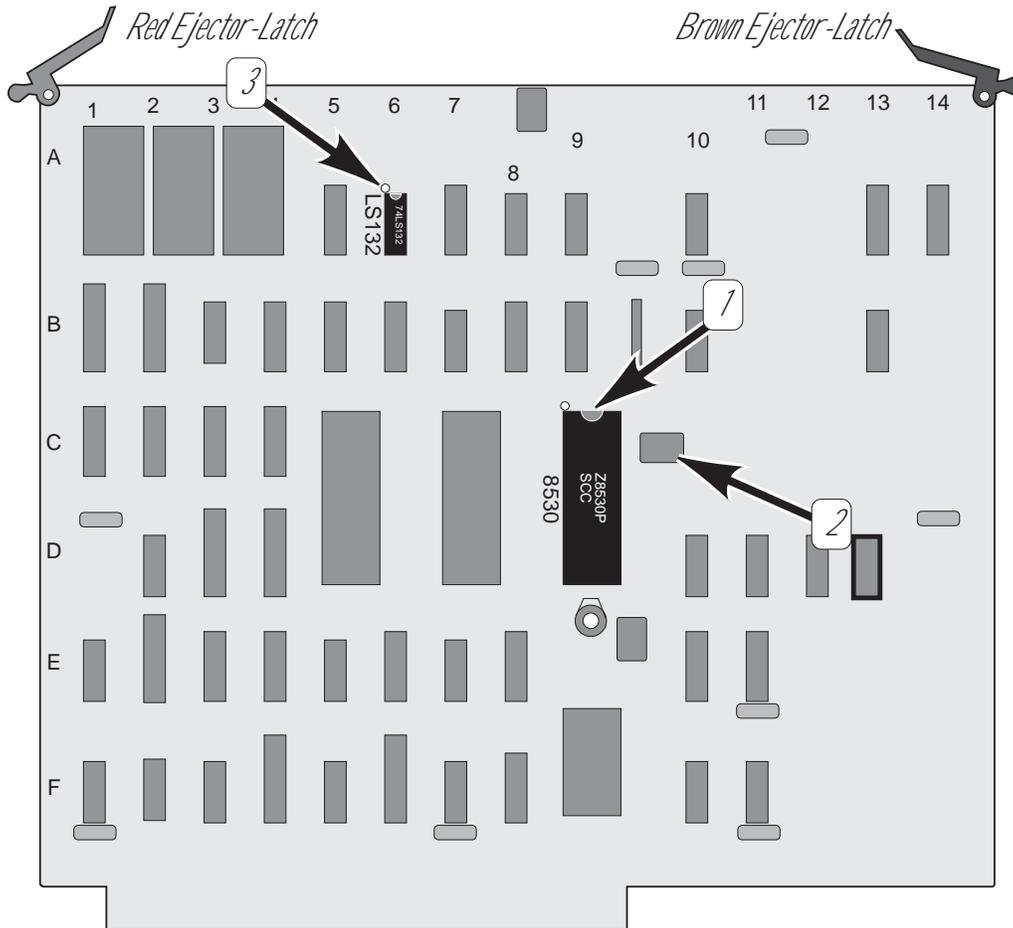> 3. **Pin 1 of the 74LS132 at location 6A.**

Figure 5b. The Macintosh XL I/O board layout.

This I/O board includes a large empty area at the lower right and three medium sized chips at the top left.

The arrows denote:

> 1. **The notched end of the Z8530 SCC at location 9C.**
> 2. **The crystal at location 10C.**
> 3. **Pin 1 of the 74LS132 at location 6A.**

Remove the Z8530 SCC

With a screwdriver or other thin instrument as shown in figure 6, alternately pry up each end of the Z8530 SCC against its socket, a little at a time (do not pry the socket from the I/O board!). After a few alternations, the Z8530 SCC should remove easily from the socket. Some Z8530 SCC sockets have a somewhat loose black plastic retainer that may come off with the Z8530 SCC, if this occurs, simply snap the cap back into place on the socket.
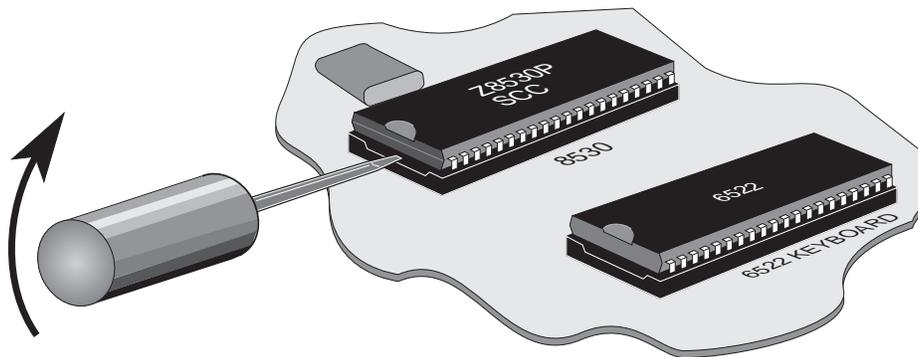
Figure 6. Removing the Z8530 SCC.

Place the Z8530 SCC aside for the moment on a static free surface.

Examine the crystal at 10C

There is a crystal beside the Z8530 SCC socket as shown in figure 5a/5b and figure 6 above. It is a silver or grey rounded box about 0.5˝ x 0.375˝ (13 mm x 10 mm) located at coordinates 10C and labelled Y2 on the I/O board. There are three crystals on the I/O board, the only one of interest is the one at location 10C. This particular crystal will be underneath the PFG after installation.

Check that the crystal has a grey plastic covering.

If it does *not* have the plastic covering (ie. it is a bare silvery metal package) you must insulate the crystal from contact with the PFG by taping a small piece of cardboard over it. Although the pins on the bottom of the PFG have been trimmed in this area, a piece of tape by itself is probably not thick enough. If you are not confident that you can insulate the crystal successfully, contact your supplier for technical support.

Locate the PFG

Remove the PFG circuit board from the black static shielding box in which it was stored. Use care as the connecting pins on the bottom of the PFG are thin and thus fragile.

Locate the PFG's serial number and the two wires with clips attached to the PFG. This is the top edge of the PFG. Figure 36 on page 93 may assist you.

Align the PFG

Position the PFG over the now empty Z8530 SCC socket at location 9C. While watching from the side, line up the two top-most pins (closest to the PFG serial number) with the receptacles at the top end of the socket as shown in figure 7.

Before pressing the PFG into the socket, check the alignment of the pins. Note that the last pin in each row has been cut off at the bottom end of the PFG; there should not be any PFG pins inserted into the two bottom-most receptacles of the Z8530 SCC socket. All of the other pins should line up with receptacles. If a pin appears to have been bent such that it will not align with its receptacle, attempt to straighten it with gentle pressure.
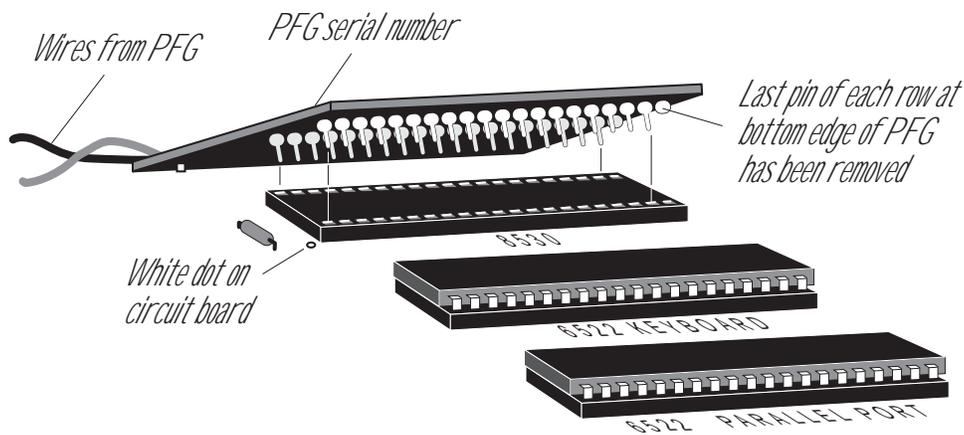

Figure 7. Align the PFG with the SCC socket while observing from the side.

Insert the PFG

After checking the alignment of the PFG pins from the top and side, insert the PFG into the socket by pushing it down in the area of the socket.

Prepare the Z8530 SCC

Before re-installing the Z8530 SCC in the PFG, we recommend that the pins of the Z8530 SCC be straightened and their spacing adjusted by putting the Z8530 SCC on its side (one row of pins flat on the table), and pressing down gently so as to make the pins more perpendicular to the body of the Z8530 SCC (see figure 8 below). Repeat for the other side and check that both rows of pins are straight and the pins evenly spaced.

Press down and rotate gently

Before

After
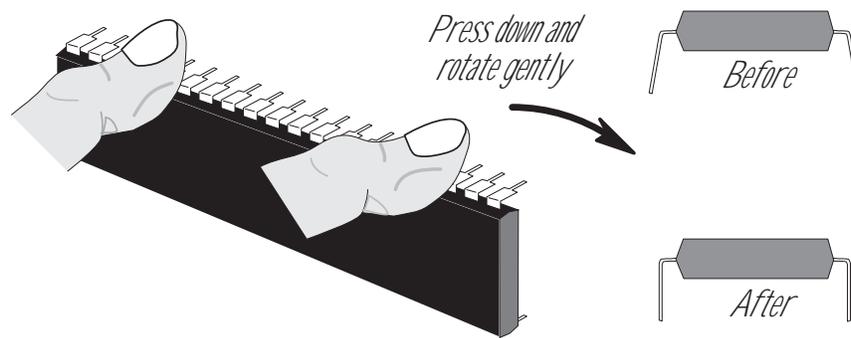
Figure 8. Adjust the pins on the Z8530 SCC for easy insertion.

Insert the Z8530 SCC

Locate the top end (the notched end) of the Z8530 SCC.

Position the Z8530 SCC over the empty socket in the PFG with the notched end toward the top of the I/O board (as it was when you removed it). Make sure all of the Z8530 SCC pins are lined up with receptacles in the socket, and with gentle pressure, insert the Z8530 SCC into the socket on the PFG.

Check to make sure that all pins of the Z8530 SCC are in receptacles, and that they appear straight. Look especially for pins inadvertently folded under the Z8530 SCC. When properly installed, the top edge of the Z8530 SCC should line up with the top edges of the other two large components to its left.

Examine the PFG clips

The red and black wires attached to the PFG have spring-loaded clips at their ends. Inside the plastic clip housing is a metal grabber hook which is used to make electrical contact. Operate each clip by sliding the plastic front portion of the clip back towards the wire as shown in figure 9; as the housing is retracted, the metal grabber hook is exposed.

Squeeze the two halves of the clip together to extend the grabber hook
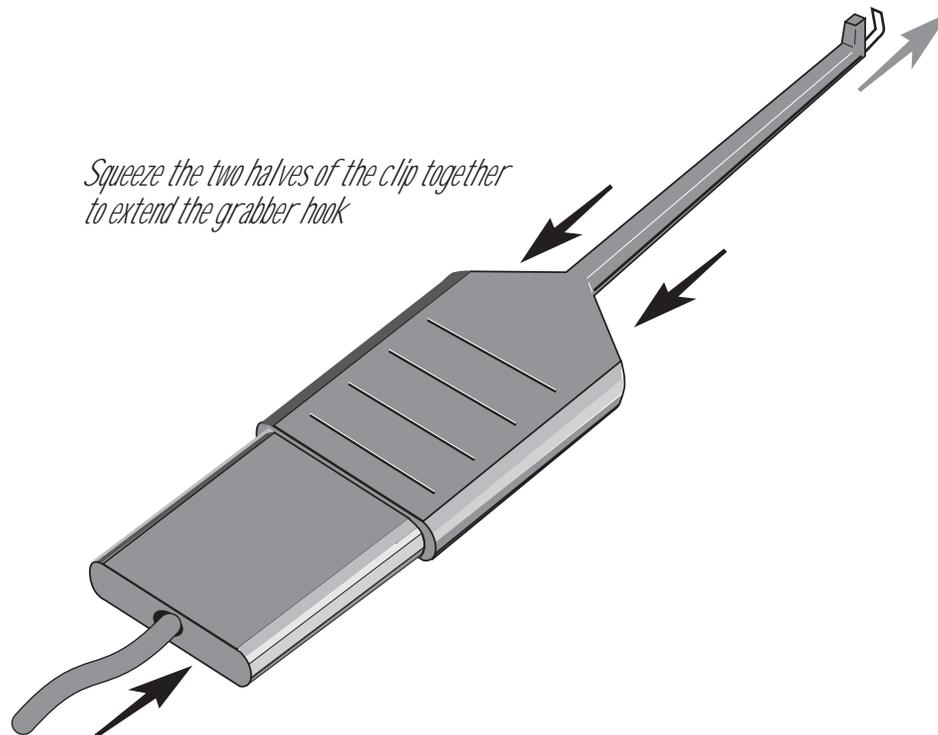
Figure 9. Operate the PFG clips by sliding the plastic housing.

Identify the 74LS132 at 6A

Using figure 5a/5b as a guide, locate the 74LS132 component in the top row of the I/O board at location 6A. This is one of the smaller black rectangular components. "74LS132" is printed on the component itself, and "LS132" is printed on the I/O circuit board to its left.

Note the white dot on the circuit board near the top left corner of the component (the corner closest to the red ejector-latch); this is pin #1.

Attach the red clip

Count down the pins on the left side (the same side as pin #1) of the 74LS132 to locate pin #5.

As shown in figures 10a through 10c, attach the red wire to pin #5. The red wire is labelled "F" where it is connected to the PFG. Squeeze the clip to expose the metal grabber hook, manoeuver the grabber hook between pins 4 & 5 by turning it flat, then rotate it into position and release the clip so that pin #5 is trapped between the metal grabber hook and the end of the plastic clip housing.

Notched end

Pin 1

White dot on circuit board

74ALS132

LS132

Pin 5

With clip open, slide grabber between pins 4 and 5
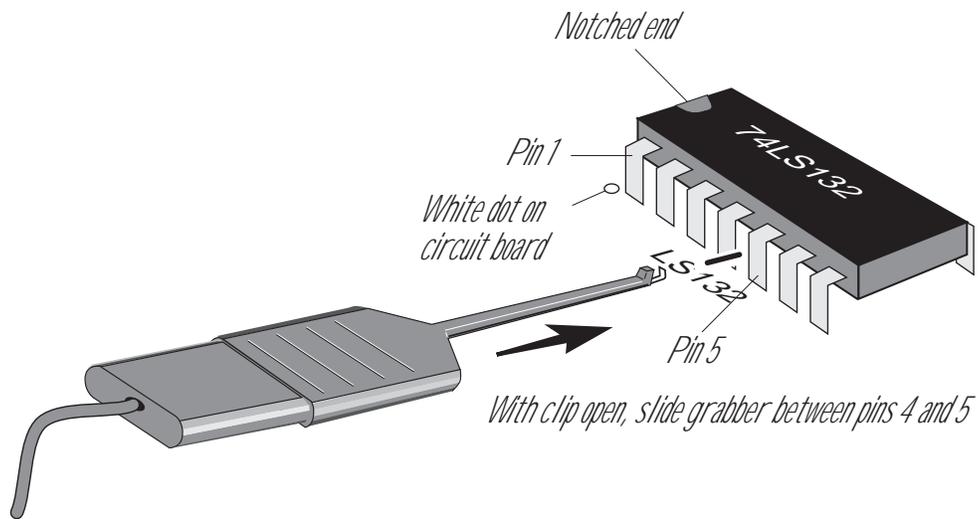
Figure 10a. Attach the red wire by inserting the grabber between pins 4 and 5…

74LS132

Insert the clip until the grabber is behind the metal pin
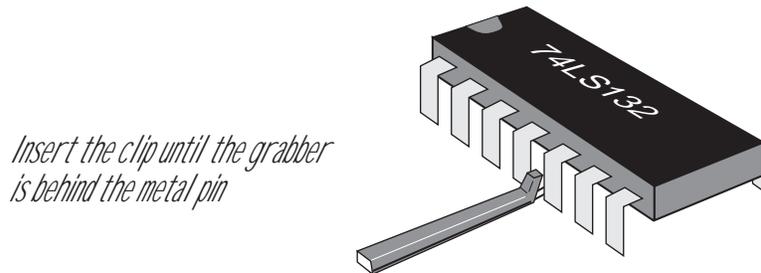
Figure 10b. … and once the grabber end is behind the metal pins…
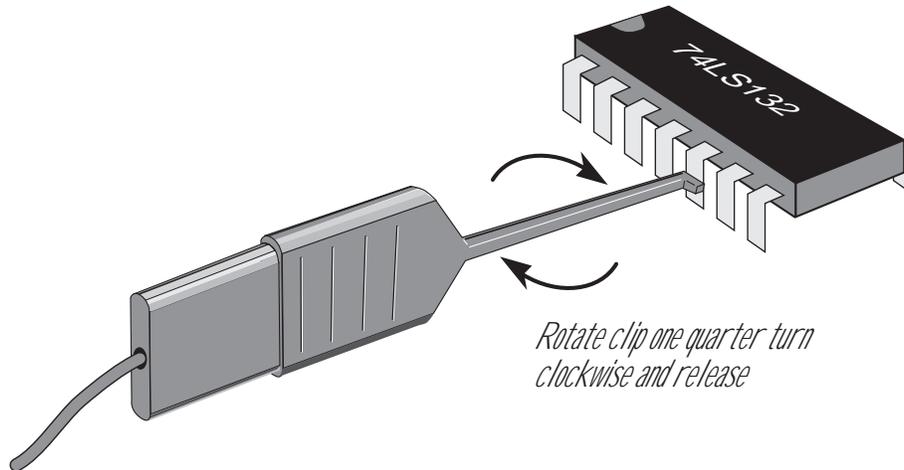
Figure 10c. … rotate the clip one quarter turn clockwise and release.

Attach the black clip

Attach the black wire to pin #1 of the 74LS132. The black wire is labelled "G" where it is connected to the PFG. Squeeze the clip to expose the metal grabber hook, and then release the clip so that pin #1 is trapped between the metal grabber hook and the end of the plastic clip housing.

Check the clips

Check that the metal grabber hook of each clip is connected to the prescribed pin alone, and is not making contact with any adjacent pin.

We recommend that a small piece of tape be used to hold the wires to the I/O board assembly near the clips. This is to prevent accidental disconnection of the clips during normal handling.

Mark the clip positions

Once both hooks are attached, we suggest attaching a self-adhesive label or masking tape to the 74LS132 with a black and red line or mark, indicating the locations of the two contacts for future reference.

Relax, the hard part is over

This completes the PFG installation. Please re-check to make sure that you have attached the two wires to the 74LS132 component (location 6A) and that the two clips are properly connected to pins #1 and #5.

Double check that the PFG board is installed at location 9C.

Check that the crystal at 10C (under the PFG) has an insulating cover.

Check again that the Z8530 SCC is installed with the notched end towards the top of the I/O board, and that it is in line with the two large components to its left.

Re-install the I/O board

Replace the I/O board in the card cage. Hold the ejector-latches in the open (upright) position while you slide the I/O board into the narrow groove in the card cage.

When the ejector-latches reach the card cage, rotate them back to their lowered position to lock the board into place. If the latches do not operate with moderate pressure, check that the connector on the bottom edge of the I/O board is suitably lined up with its socket.

If you have an XLerator installed, re-connect the fan leads to C21 (red fan lead to the end of C21 closer to C20, black fan lead to the other lead of C21). These leads come from the XLerator's fan assembly; do not connect the wires from the PFG to any component other than the 74LS132 at location 6A!

Re-install the card cage

Return the card cage to the X/Lisa, pressing it in firmly below the peripheral connectors on the back panel (do not apply pressure to the connectors themselves).

Re-install the back cover

Replace the back cover by inserting the tabs at the bottom of the cover into the slots in the chassis, and closing the top. While holding the top of the cover firmly closed, turn the two thumbscrews clockwise until they are snug. Do not tighten the screws firmly or they will be hard to open later.

Re-connect the cables to the back of the X/Lisa. Take extra care to connect parallel disks and SCSI devices to the correct connectors. Connecting a non-serial device to a serial port may damage the X/Lisa, the external device, or both.

After installing the PFG hardware, continue with the software installation described in the section that follows.

Important note

MacWorks Plus II will not operate properly without the PFG installed. In the event that the package is going to be returned under the 30 day money-back guarantee, be sure to re-install your original system and original MacWorks (Plus) prior to removing the PFG.

MacWorks Plus 1.1h and earlier will install and operate while the PFG is installed; however, the PFG must be removed for the Modem port to function properly with MacWorks Plus 1.1h and earlier. (The Printer port and LocalTalk will work properly with the PFG installed.)

Installing the MacWorks Plus II software

If your X/Lisa has an XLerator…

When installing MacWorks Plus II with the XLerator installed, no special instructions are required. Follow the instructions below according to your computer configuration (LSAC, Parallel Disk, or SCSI without LSAC / Parallel Disk).

When you load MacWorks Plus II for the first time (or after zapping the PRAM), the PRAM will be initialized to configure the XLerator in Off Mode. You may wish to use the space bar over-ride to select a faster mode until you change the setting with the XLerator control panel.

If you are installing MacWorks Plus II PRO, you may wish to inquire about an XLerator hardware modification under development which will allow the XLerator to use 2Mb and 4Mb SIMMs. Contact Dafax Processing Corp. or your supplier for details. (Expected availability: 1st Quarter of 1993.)

Note: Install the PFG first

The PFG must be installed (according to the directions on page 12) on the X/Lisa's I/O board prior to the software installation of MacWorks Plus II; the PFG is necessary to allow MacWorks Plus II to operate properly.

Note: Have your System Update Kit ready

A System Folder is included on the MacWorks Plus II Install Disk for startup purposes. It is a minimum System Folder and is incomplete (The Apple System Update Kit is four 800k disks). This System Folder may be used along with the items in the System Utility Folder until you obtain a full Update kit.

If you have a parallel port hard disk…

The common parallel port hard disks are the external Apple 5 and 10Mb ProFiles, the internal Apple 10Mb Widget, and the internal Sun 20, 30, and 40Mb hard disks.

If your X/Lisa has a parallel port hard disk, you may install MacWorks Plus II on the hard disk. The hard disk may subsequently be used to load MacWorks Plus II when you turn on the X/Lisa. Skip to the section "Installing on a parallel port hard disk," on page 32.

If you have a SCSI hard disk…

The procedure for installing MacWorks Plus II on a SCSI hard disk depends on whether your X/Lisa has an X/Lisa SCSI Accessories Card (LSAC). The LSAC is an expansion card that is an X/Lisa **STARTUP FROM** device. It provides the ability to load MacWorks Plus II (or MacWorks Plus 1.1h) directly from a SCSI disk without using a Boot Disk or a parallel port hard disk. Contact Dafax Processing Corp. for further information about the LSAC.

If your X/Lisa has a SCSI hard disk but no parallel port hard disk, skip to the section entitled "Installing on a SCSI hard disk, LSAC not installed," (on page 42) or to the section "Installing on a SCSI hard disk, LSAC installed" (on page 43) if you have an LSAC installed.

Installing without a hard disk

If you do not have a hard disk, you do not need to "install" MacWorks Plus II itself; however, you may wish to add the MacWorks Plus II control panels to your floppy System Disk(s).

Start-up with MacWorks Plus II

Use the MacWorks Plus II Boot Disk to start-up your X/Lisa with MacWorks Plus II according to the instructions in the section "Using the MacWorks Plus II Boot Disk," on page 45.

Load the System

When you observe the floppy disk and question mark icon, insert a System Disk and wait until you are in the Macintosh Finder.

Update your System Folder

Continue with "Updating your System Folder" on page 40 after noting the following:

Next time you start-up…

Whenever you turn on your X/Lisa or go back to the self-test, you will need to use the MacWorks Plus II Boot Disk to start-up your X/Lisa with MacWorks Plus II according to the instructions in the section "Using the MacWorks Plus II Boot Disk." You may avoid this inconvenience by installing a parallel port hard disk (available from your supplier) or a SCSI hard disk and the X/Lisa SCSI Accessories Card (the LSAC is available only from Dafax Processing Corp.).

Installing on a parallel port hard disk

Turn on the hard disk

If you have an external parallel port hard disk, turn it on and allow it to finish warming up before turning on your X/Lisa (wait until the light on the front of the disk stops flickering).

Start-up with MacWorks Plus II

Use the MacWorks Plus II Boot Disk to start-up your X/Lisa with MacWorks Plus II according to the instructions in the section "Using the MacWorks Plus II Boot Disk," (page 45) and type the left option key at the prompt to indicate that a floppy disk will be used as the System Disk (see "Starting up with a Macintosh Floppy System Disk," page 50).

Load the System

When you observe the floppy disk and question mark icon, insert the MacWorks Plus II Install Disk and wait until you are in the Macintosh Finder.

Open the Installer

Open the "MW+II Basic Install" application on the floppy disk (do not copy the installer to your hard disk). The installer will look for parallel port hard disks and will enable one button for each parallel port hard disk available as shown in figure 11.

The buttons for the expansion slots will not be enabled unless you have an Apple Dual Parallel Port Card installed in the associated slot.
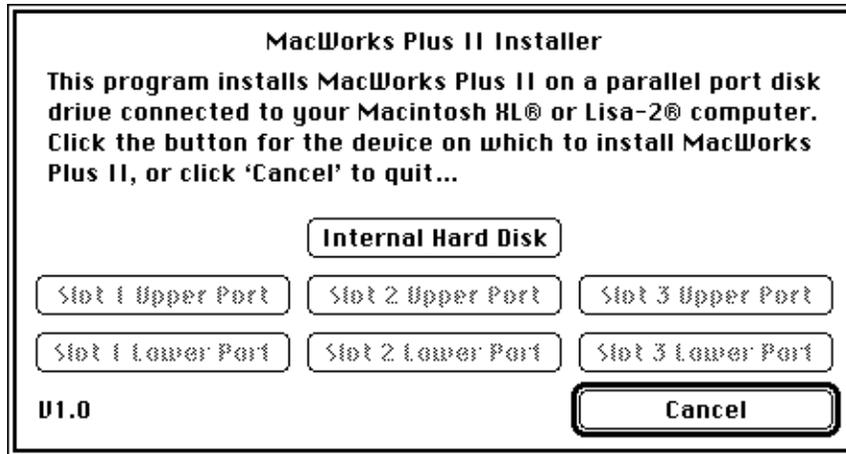
```
┌─────────────────────────────────────────────────┐
│              MacWorks Plus II Installer           │
│  This program installs MacWorks Plus II on a parallel port disk  │
│  drive connected to your Macintosh XL® or Lisa-2® computer.  │
│  Click the button for the device on which to install MacWorks  │
│  Plus II, or click 'Cancel' to quit...            │
│                                                   │
│              [ Internal Hard Disk ]               │
│                                                   │
│  [ Slot 1 Upper Port ] [ Slot 2 Upper Port ] [ Slot 3 Upper Port ]  │
│                                                   │
│  [ Slot 1 Lower Port ] [ Slot 2 Lower Port ] [ Slot 3 Lower Port ]  │
│                                                   │
│  V1.0                              [  Cancel  ]   │
└─────────────────────────────────────────────────┘
```

Figure 11. The MacWorks Plus II Installer requests that you select a disk.

Select the hard disk

Click the button associated with the port through which you wish to install MacWorks Plus II.

> *After installing MacWorks Plus II on a parallel port disk, you may later move the disk to a different port; MacWorks Plus II disks can be used as* **STARTUP FROM** *devices on any parallel port.*

If your X/Lisa has a SCSI disk and no parallel port hard disk, only the Cancel button will be enabled. If so, click Cancel to quit the installer and skip to the appropriate section as directed near the beginning of this section.

If you are sure your X/Lisa has a parallel port disk, yet only the Cancel button is enabled, proceed to the "Trouble-Shooting" section on page 74.

Consider initializing the hard disk

Caution! Initializing the hard disk will remove and erase all existing files on the hard disk. Make sure you have a *reliable* backup of all important files on the disk before initializing the disk. During initialization, every file on the disk will be destroyed!

To install MacWorks Plus II on a parallel port hard disk, you may need to have the MacWorks Plus II Installer initialize your disk; find your configuration below to determine whether you can Update or will have to Initialize.

Updating from an earlier version of MacWorks Plus II

If you have been running under MacWorks Plus II, your hard disk does not need to be initialized.

Upgrading from MacWorks Plus version 1.0.14 or higher

If you have been running under MacWorks Plus v1.0.14 or higher, your hard disk does not need to be initialized.

Upgrading from MacWorks Plus versions 1.0 through 1.0.13

If you have been running one of these earlier version of MacWorks Plus, and have experienced frequent crashes, you should initialize your hard disk.

Switching from MacWorks XL or a non Macintosh operating environment (Lisa 7/7, Lisa Programmer's Workshop)

If you have been using one of these pre-MacWorks Plus operating environments, you will be required to initialize your disk to install MacWorks Plus II. MacWorks Plus II cannot be used on a parallel port hard disk that is shared (partitioned) with a Lisa environment.

Installing MacWorks Plus II on a brand new X/Lisa

If you have a brand new X/Lisa, you need to initialize your disk to install MacWorks Plus II unless your supplier has already prepared your disk for MacWorks Plus II.

Select Update or Initialize

If the disk cannot be updated because of its current configuration, it must be initialized to be used for MacWorks Plus II. In this case, the installer will not ask you to choose Update or Initialize; the installer will continue by displaying the warning shown in figure 13 below.

If you are installing or updating MacWorks Plus II on a parallel port hard disk that has been used for MacWorks Plus or MacWorks Plus II before, you will be able to select Update or Initialize as shown in Figure 12.
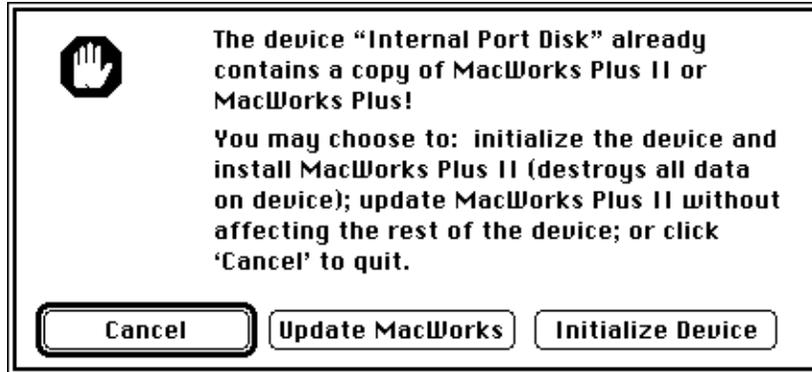
Figure 12. You may choose to Update or Initialize the parallel port hard disk.

If the disk has not been used for MacWorks Plus or MacWorks Plus II, or if you wish to start with a fresh disk, click Initialize to erase the entire disk and prepare it for MacWorks Plus II.

If you have selected Update MacWorks, skip to the section "After Updating MacWorks Plus II" on page 38.

Figure 13. If you click Initialize Device, the installer will erase the disk.

If you selected Initialize…

If you are about to Initialize the device, the installer will ask you to confirm that you wish to erase the entire disk as shown above.

"WARNING: Initializing a disk erases its contents. Once you click Initialize, you will not be able to change your mind, even by choosing Undo." (From *Lisa 2 Owner's Guide,* Apple Computer, Inc. 1983)

Wait while the hard disk is initialized

The installer will report its progress as it initializes the disk and installs MacWorks Plus II on the hard disk.

After MacWorks Plus II has been installed…

As installing MacWorks Plus II on the hard disk does not load MacWorks Plus II into memory, you are asked to note that the version of MacWorks Plus II used to `STARTUP FROM` is still in effect. In most cases, you will be able to continue with the version of MacWorks Plus II in use while you update your System Folder. In some cases, you may be required to Reset the X/Lisa to load the newly installed MacWorks Plus II so that you may finish updating your system. You will receive more specific instructions if this applies to your update.

After the installer has completed installing MacWorks Plus II on a newly initialized hard disk, figure 14 or 15 will appear as shown below. Proceed with the directions following the appropriate figure.

Figure 14. After initializing the parallel port hard disk under System 6.

After initializing with System 6.0 or later, update your System Folder

Unless you have been directed otherwise, click Continue to return to the Finder, and continue with "Updating your System Folder" on page 40.
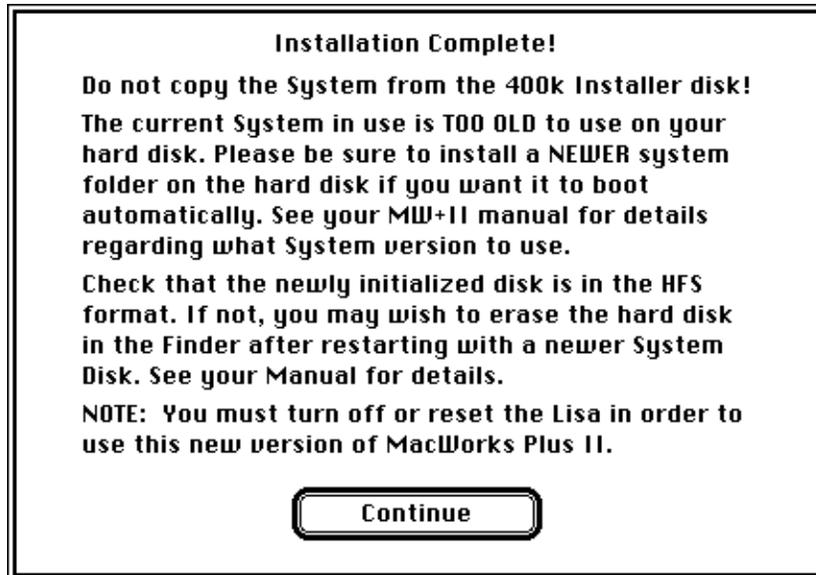
```
┌─────────────────────────────────────────────┐
│                                             │
│          Installation Complete!             │
│                                             │
│  Do not copy the System from the 400k Installer disk! │
│                                             │
│  The current System in use is TOO OLD to use on your │
│  hard disk. Please be sure to install a NEWER system │
│  folder on the hard disk if you want it to boot │
│  automatically. See your MW+II manual for details │
│  regarding what System version to use.      │
│                                             │
│  Check that the newly initialized disk is in the HFS │
│  format. If not, you may wish to erase the hard disk │
│  in the Finder after restarting with a newer System │
│  Disk. See your Manual for details.         │
│                                             │
│  NOTE:  You must turn off or reset the Lisa in order to │
│  use this new version of MacWorks Plus II.  │
│                                             │
│            ╭──────────────────╮             │
│            │     Continue     │             │
│            ╰──────────────────╯             │
│                                             │
└─────────────────────────────────────────────┘
```

Figure 15. After initializing the parallel port hard disk under an older System.

After initializing with a System older than 6.0…

In order to fit the necessary files onto a 400k floppy disk, the 400k version of the MacWorks Plus II Installer Disk has an older (and less complete) version of the System Folder. As a result, if an older system (prior to 6.0) is in use when you use the installer, you are advised, as shown above, to install a newer version of the System Folder than is on the installer disk. Do not drag the System Folder from the 400k installer disk onto your hard disk.

Make sure the hard disk is HFS

Note: If a very old system was in use when the hard disk was initialized, the disk may be in the MFS format. Before copying files to the hard disk, you should restart with a more current system (4.1 or later). After restarting, click on the newly initialized hard disk, and select Erase Disk from the Finder's Special menu. This will convert the hard disk to the HFS format.

The HFS format is preferable as it implements a true hierarchical system of folders, whereas the MFS format does not. Current application software will operate much more effectively on an HFS disk. You may determine the HFS/MFS status of the hard disk as indicated by figure 25 on page 54.

Update your System Folder

Unless you have been directed otherwise, click Continue to return to the Finder, and continue with "Updating your System Folder" on page 40.

After Updating MacWorks Plus II

After MacWorks Plus II has been updated on the hard disk, you have four ways to proceed as shown in figure 16.
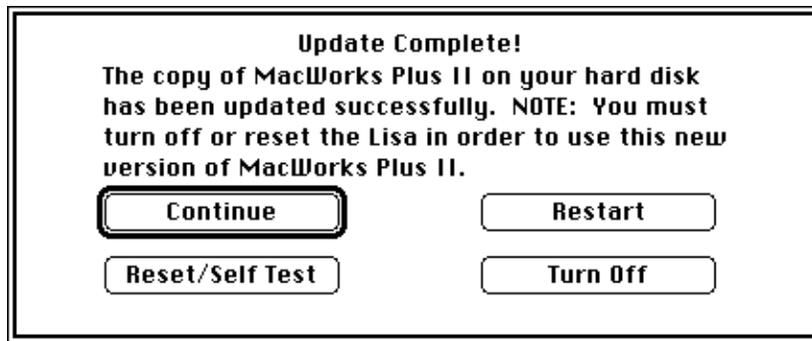

Update Complete!
The copy of MacWorks Plus II on your hard disk has been updated successfully. NOTE: You must turn off or reset the Lisa in order to use this new version of MacWorks Plus II.

Continue   Restart

Reset/Self Test   Turn Off

Figure 16. After Updating MacWorks Plus II.

As installing MacWorks Plus II on the hard disk does not load MacWorks Plus II into memory, you are asked to note that the version of MacWorks Plus II used to STARTUP FROM is still in effect. In most cases, you will be able to continue with the version of MacWorks Plus II in use while you update your System Folder. In some cases, you may be required to Reset/Self Test after updating the hard disk (in order to load the new version of MacWorks Plus II) before updating your system. You will receive more specific instructions if this applies to your update.

You may click Continue to return to the Finder, but you will still be running the version of MacWorks Plus II with which you started up. If the version you installed on the hard disk is not the version with which you started up, eventually you will need to Reset/Self Test or Turn Off to start using the new version from the hard disk.

You may click Reset/Self Test to go back to the self-test as though you had just turned on the X/Lisa. After the self test, the X/Lisa will load the newly installed version of MacWorks Plus II from the hard disk (unless a different disk is used as the `STARTUP FROM` *device).*

You may click Turn Off to turn off the X/Lisa if you wish to stop working on the X/Lisa.

You may click Restart to re-load the Macintosh System. This does not load in the newly installed version of MacWorks Plus II. You may wish to do this if you need to start-up with a different System Disk to complete the installation process.

Update your System Folder

Under most circumstances, you should click Continue to return to the Finder, and continue with "Updating your System Folder."

Updating your System Folder

Once in the Finder, you may install or update the System Folder on your System Disk(s).

Use Apple's Installer to update the System

We strongly recommend that you use Apple's "Installer" application on the Apple System Tools Disk, as it attempts to leave your fonts and desk accessories intact (a System Software Upgrade Kit is available from Apple dealers or User Groups for a nominal fee). MacWorks Plus II Basic works well with System versions 6.0.5 and 6.0.8.

If you are using an X/Lisa with 1Mb of memory, use Apple's "Installer" to install the "Minimum System for Macintosh Plus" to make most efficient use of your memory. System 6.0.5 without MultiFinder is recommended for use when memory is in short supply.

Install AppleShare if desired

If you wish to use the X/Lisa as a client on a LocalTalk network (so that you may use files from a file server or System 7 Macintosh computers), also use Apple's "Installer" application to install "AppleShare (workstation software)." Later you will use the Chooser to select your AppleShare server as documented in Apple's "Macintosh Reference" manual.

Remove SUNTrol

If you have been using MacWorks Plus 1.1h or earlier, be sure to remove the SUNTrol control panel as it is not compatible with MacWorks Plus II.

Install the MacWorks Plus II control panels

Insert the MacWorks Plus II Install Disk, and drag the "Monitor" and "Floppy" control panels from the install disk into the updated System Folder.

If you have more than one hard disk, drag the "Startup Device" control panel to your System Folder. If the Finder warns that a file of that name already exists, click Ok to replace it. (The "Startup Device" control panel installed by Apple's Installer will not show up in the Control Panel on the X/Lisa, you must use the one on the MacWorks Plus II Install Disk.)

If you have an XLerator, remove all previous XLerator software (@XLerator in particular), and drag the new "XLerator" control panel to your System Folder.

If you have more than one STARTUP FROM device, drag the "Disks" control panel too.

If you expect to use MacsBug or other debugging software, drag the "Debug" control panel too.

Configure the control panels

Refer to the sections below regarding the use of the new MacWorks Plus II control panels, and configure them as desired.

Re-load MacWorks Plus II

Unless you have already re-loaded MacWorks Plus II (or are in the process of configuring an LSAC), shutdown, wait 20 seconds, and power-up to run the newly installed MacWorks Plus II and the updated System.

Installing on a SCSI hard disk, LSAC not installed

Turn on the hard disk

If you have an external SCSI hard disk, turn it on and allow it to finish warming up before turning on your X/Lisa.

Start-up with MacWorks Plus II

Use the MacWorks Plus II Boot Disk to start-up your X/Lisa with MacWorks Plus II according to the instructions in the section "Using the MacWorks Plus II Boot Disk" on page 45.

Load the System

If your SCSI disk has already been used as a Macintosh System Disk, wait until you are in the Macintosh Finder before you insert the MacWorks Plus II Install Disk. If your SCSI disk is not a valid Macintosh System Disk, insert the MacWorks Plus II Install Disk when you see the disk and question mark icon.

If necessary, prepare your hard disk

If your SCSI hard disk is brand new (has not been initialized as a Macintosh disk and does not appear in the Finder) use the software that came with the disk to prepare it for use with the Macintosh environment (SCSI disk formatting software is not included with MacWorks Plus II).

Update your System Folder

Continue with "Updating your System Folder" on page 40 after noting the following:

Next time you start-up…

Whenever you turn on your X/Lisa or go back to the self-test, you will need to use the MacWorks Plus II Boot Disk to start-up your X/Lisa with MacWorks Plus II according to the instructions in the section "Using the MacWorks Plus II Boot Disk." You may avoid this inconvenience by installing a parallel port hard disk (available from your supplier) or the X/Lisa SCSI Accessories Card (the LSAC is available only from Dafax Processing Corp.).

Installing on a SCSI hard disk, LSAC installed

Turn on the hard disk

If you have an external SCSI hard disk, turn it on and allow it to finish warming up before turning on your X/Lisa.

Start-up with MacWorks Plus II

Use the MacWorks Plus II Boot Disk to start-up your X/Lisa with MacWorks Plus II according to the instructions in the section "Using the MacWorks Plus II Boot Disk" on page 45.

Load the System

If your SCSI disk has already been used as a Macintosh System Disk, wait until you are in the Macintosh Finder before you insert the MacWorks Plus II Install Disk. If your SCSI disk is not a valid Macintosh System Disk, insert the MacWorks Plus II Install Disk when you see the disk and question mark icon.

If necessary, prepare your hard disk

If your SCSI hard disk is brand new (has not been initialized as a Macintosh disk and does not appear in the Finder) use the software that came with the disk to prepare it for use with the Macintosh environment (SCSI disk formatting software is not included with MacWorks Plus II).

Update your System Folder

Update your system as directed by "Updating your System Folder" on page 40, but do not shutdown. Proceed with the following after updating your system:

Remove the old LSAC software

If you have been using the LSAC with MacWorks Plus 1.0.18/1.1h, remove all of the old LSAC files (MW+, MW+Loader and MW+Patches) from the System Folder of the SCSI disk that the LSAC uses to load MW+.

NOTE: All MW+Patch and MW+Loader files with version numbers less than 1.40 are not compatible with MacWorks Plus II. If you have MW+PatchF which would start-up the XLerator in fast only mode, you must remove it to run MacWorks Plus II.

Install the new LSAC software

Copy the new LSAC files supplied with MacWorks Plus II (MW+Loader, MW+II Basic Install), into the System Folder of the SCSI disk that you wish the LSAC to use to load MacWorks Plus II.

Rename the "MW+II Basic Install" application that has been copied into the System Folder to "MW+" (three letters exactly).

Re-load MacWorks Plus II

It is recommended that the LSAC be set to "debugging mode" (DIP-Switch 8 up) so that MacWorks Plus II loading messages will appear properly.

The LSAC may now be used as a `STARTUP FROM` device as described in your LSAC manual. Shutdown, power-up, and select the LSAC as the `STARTUP FROM` device to load the newly installed version of MacWorks Plus II.

Using the MacWorks Plus II Boot Disk

Turn on the X/Lisa

Turn on the computer by pressing the power switch (above the keyboard connector on the front of the computer); the computer will start its self-test sequence and display the testing window shown in figure 17.

Type the space bar

During the self-test, type the space bar to inform the X/Lisa that you wish to pause at the **STARTUP FROM** menu. Do not hold down the space bar.
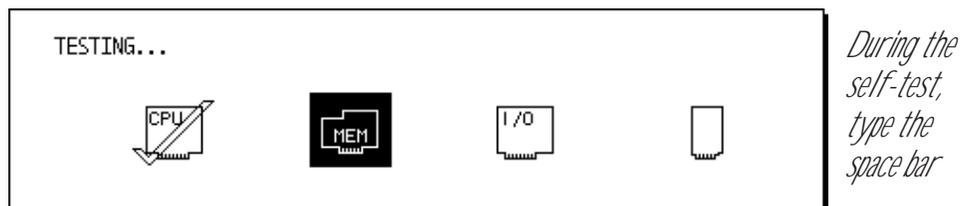

During the self-test, type the space bar

Figure 17. Sample screen during the X/Lisa's self-test.

During the self-test, consider what System Disk you will use

If you plan to use a floppy disk as the Macintosh System Disk after loading MacWorks Plus II from the floppy boot disk, you should read the section "Starting up with a Macintosh Floppy System Disk" on page 50 before proceeding with this operation. That section describes when the left option key should be typed.

Wait for the STARTUP FROM menu

After the self test is finished, a blank hourglass window may be displayed while the X/Lisa waits for the parallel port hard disk to warm up.

Check for your parallel port hard disk

When the **STARTUP FROM** menu appears (similar to that shown in figure 18), check that your parallel port hard disk (if any) is shown as one of the items (do not select the hard disk).

If your parallel port hard disk does not appear in the `STARTUP FROM` menu:
- Press the reset button on the back of the X/Lisa
- Type the space bar during the self-test
- If the disk still does not appear:
  Turn off the X/Lisa, wait 20 seconds, and repeat the test

If the disk cannot be made to appear, see the "Trouble-Shooting" section on page 74.

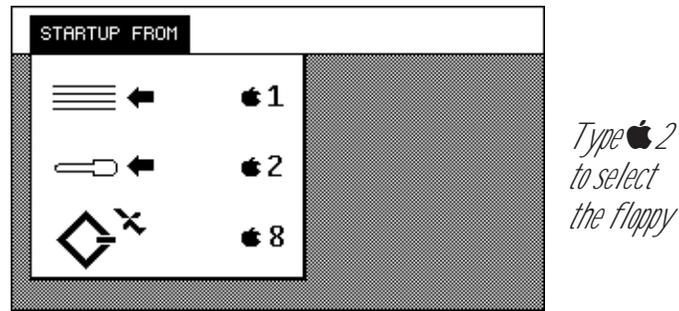You will not be able to install MacWorks Plus II on a parallel port hard disk if the hard disk does not appear in the `STARTUP FROM` menu!

*Type 2
to select
the floppy*

Figure 18. Sample `STARTUP FROM` menu, your menu may differ.

Insert the boot disk

Insert the MacWorks Plus II Boot Disk into the floppy drive and click on or type 2 to select the floppy as the `STARTUP FROM` device.

Wait while MacWorks Plus II loads

The hourglass icon shown in figure 19 indicates that you should wait while MacWorks Plus II is loaded from the floppy disk.

If desired, hold down the space bar to obtain the over-ride menu

Figure 19. MacWorks Plus II beginning to load.

You do not need to hold down the space bar or mouse button unless you wish to configure an XLerator installed in your X/Lisa or "zap" the PRAM.

Watch for messages

As MacWorks Plus II is configuring the X/Lisa, messages may be displayed in the hourglass window. Refer to the section entitled "Messages that may appear while loading MacWorks Plus II" on page 89 for explanations.

The number of "sectors left to read" indicates the loading progress. When there are zero sectors left to read, MacWorks Plus II has been completely loaded into memory and Macintosh operation begins.
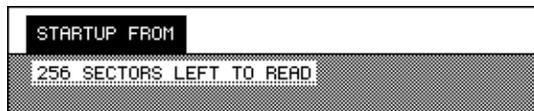
The progress display is not shown for LSAC boot

Figure 20. MacWorks Plus II loading progress is displayed.

After the Boot Disk is ejected and before the floppy disk icon appears, the icons of the parallel ports and the SCSI port are displayed on the screen. The icons are shown as each port is examined for an attached hard disk. These icons will be displayed very briefly if no hard disk is found on the corresponding port. After this initial scan for hard disks, the floppy disk icon will be displayed with a flashing question mark.

Insert a System Disk if necessary

At this point, MacWorks Plus II has been loaded into memory, and your X/Lisa has started to operate as though it were a Macintosh Plus.

The disk icon indicates that the X/Lisa is ready to accept a Macintosh System Disk. If there is a hard disk that is a valid System Disk, it will be used to start-up unless the left option key was typed as directed in the section "Starting up with a Macintosh Floppy System Disk."

If a hard disk is still warming up when the X/Lisa checks for System Disks, there is a chance that it will seem to be a non-System Disk. Typing the right option key will cause the X/Lisa to re-examine every disk to see if it is a valid System Disk.

When this manual refers to a "System Disk," it is referring to a disk with boot blocks and System and Finder files, ie. a "Startup Disk."

The X/Lisa will try to use the hard disk that has been specified as the System Disk via the Startup Device control panel. If that disk is not a valid System Disk, or is not present, the other hard disks will be searched until a System Disk is found.

Operate Macintosh

If you have Macintosh manuals and books, they will help you with the operations that follow.

Protect your Boot Disk!

Make sure you put the MacWorks Plus II Boot Disk away after using it. As it is a special X/Lisa **STARTUP FROM** disk, it is not recognized as a Macintosh disk once MacWorks Plus II is running. If this disk is subsequently inserted, the X/Lisa will report that "This is not a Macintosh disk: Do you want to initialize it?" If this occurs, *you must eject the disk*, as initializing it will destroy your copy of MacWorks Plus II!

The space bar over-ride menu

If you hold down the space bar or the mouse button when MacWorks Plus II has started to load, the menu shown in figure 21 will appear. (You must wait until the over-ride message appears before holding the space bar down.) If you do not have an XLerator installed, the primary purpose of the space bar over-ride menu will be to "zap" the PRAM.
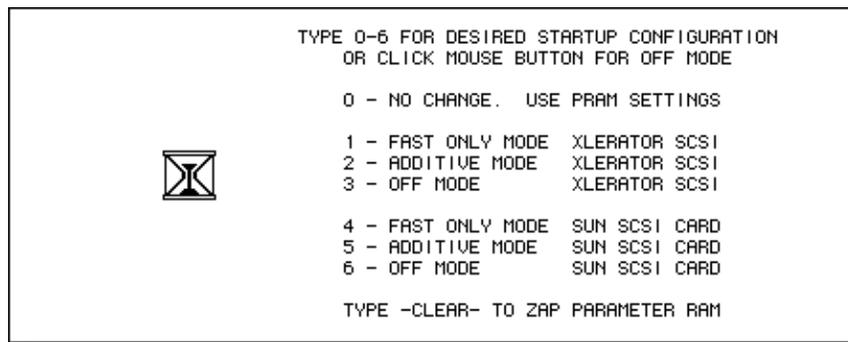
```
        TYPE 0-6 FOR DESIRED STARTUP CONFIGURATION
            OR CLICK MOUSE BUTTON FOR OFF MODE

        0 - NO CHANGE.  USE PRAM SETTINGS

        1 - FAST ONLY MODE   XLERATOR SCSI
        2 - ADDITIVE MODE    XLERATOR SCSI
        3 - OFF MODE         XLERATOR SCSI

        4 - FAST ONLY MODE   SUN SCSI CARD
        5 - ADDITIVE MODE    SUN SCSI CARD
        6 - OFF MODE         SUN SCSI CARD

        TYPE -CLEAR- TO ZAP PARAMETER RAM
```

Figure 21. The MacWorks Plus II space bar over-ride menu.

If you are debugging software, you may select non-aliased mode by typing the key before selecting the desired startup configuration (this over-ride command is not displayed in the menu). You will be asked to confirm non-aliased memory mode as described in the Debug control panel section.

If your X/Lisa has an XLerator installed, you may select Fast Only, Additive, or Off Mode by typing the number shown. This allows you to over-ride the setting in the XLerator control panel. The over-ride selection will remain in effect until MacWorks Plus II is re-loaded after the next self-test; if you wish the change to be persistent, select the desired mode in the XLerator control panel.

If you have the optional SCSI port installed on your XLerator, you may select it via 1, 2, or 3. If you wish to use a Sun SCSI card instead of the XLerator SCSI port, use 4, 5, or 6 (the XLerator SCSI port will be disabled).

Zapping the PRAM

"Zapping the PRAM" will reset the parameter RAM on the PFG to the default settings. This will change many control panel settings, so use this command with care. "Zap" the PRAM by typing the "Clear" key on the numeric keypad; the message "PFG PARAMETER RAM INITIALIZED" will appear.

After zapping the PRAM you may select an XLerator startup configuration by

number, or type a 0 (zero) key to use the default startup configuration in PRAM.

Starting up with a Macintosh Floppy System Disk

On the X/Lisa, you may indicate to MacWorks Plus II that you wish to use a floppy disk as the System Disk by typing the left option key before or during the startup beep; you do not need to hold down the option key. The X/Lisa will then wait until you insert a valid System Disk.

Type the left option key

If you are restarting (eg. from the Finder's Special menu), the startup beep will occur shortly after the screen is drawn grey. You may type the left option key a few times if you are unsure of the exact moment.

If you are re-loading MacWorks Plus II (from the MacWorks Plus II Boot Disk, from a parallel hard disk, or from a SCSI disk via the LSAC), type the left option key when the floppy startup prompt appears as shown in figure 22.

The prompt appears just prior to the startup beep (when there are "0 sectors left to read"). You may also type the left option key during the beep.
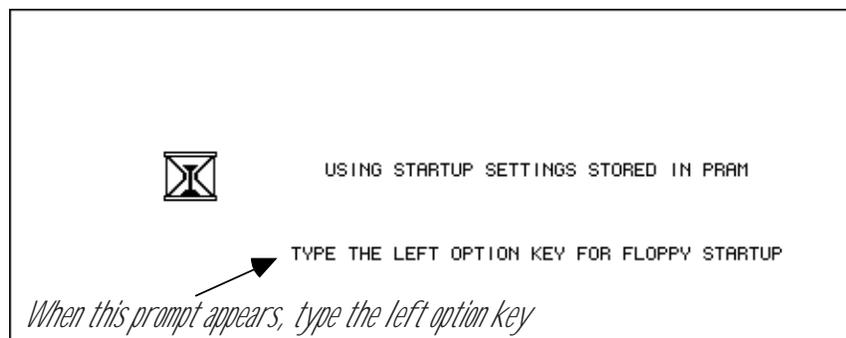
Figure 22. Selecting a floppy as the System Disk.

Before the floppy disk icon appears, icons of the parallel ports and the SCSI port are displayed on the screen. The icons are shown as each port is examined for an attached hard disk. These icons will be displayed very briefly if no hard disk is found on the corresponding port.

Insert a System Disk

Once you have indicated that you wish a floppy disk be used as the System Disk, the X/Lisa will display the floppy with the flashing question mark icon and wait until you insert a valid System Disk.

If you have typed the left option key too late, MacWorks Plus II may have started to use the attached hard disk as the System Disk. If this occurs, you may wish to restart and try again.

If you wish to use a hard disk instead…

If you decide that you want to use a hard disk instead of a floppy as the System Disk, type the right option key. The X/Lisa will then look for a hard disk that is a valid System Disk.

Using MacWorks Plus II

Once loaded, most of the operation of MacWorks Plus II is transparent. Simply operate the X/Lisa as you would any Macintosh. Some of the features of MacWorks Plus II can be adjusted to suit your preferences with the control panels described below.

Date validation

As the X/Lisa does not have the same clock circuitry as the rest of the Macintosh family, the X/Lisa will lose the time and date if power is disconnected for a suitable length of time (a few seconds for the Macintosh XL, a few hours for the Lisa 2).

MacWorks Plus II stores the date in the non-volatile PRAM on the PFG board. This is compared to the date read from the I/O board when you start-up the X/Lisa. If the date appears to be unlikely (ie. the date is earlier or much later than before), MacWorks Plus II will set the date to midnight on the day after the one stored in PRAM.

High-Low tones

There is a high-low tone sequence, which indicates the date has been adjusted, just after "Welcome to Macintosh" appears (before the startup documents have been loaded). When you hear these tones, you should use the Alarm Clock accessory or the General control panel to verify the date is correct and to set the correct time.

Special notes regarding floppy disks

Suspect floppy disks used with MacWorks Plus 1.1h and earlier

The Floppy disk driver in MacWorks Plus 1.1h and earlier did not correctly report disk errors (reading, writing, and initializing). MacWorks Plus II attempts to correct these problems, making the floppy disk drive much more reliable.

Suspect data copied to or from floppy disks

If you have copied files to or from floppy disks on an X/Lisa with MacWorks Plus 1.1h or earlier, you should assume that they may have been copied incorrectly. In the case of application software, you may have noticed that the software would not run properly after being copied; similar copying errors may have affected your data files. When using MacWorks Plus 1.1h and earlier, the probability of a copying error was much reduced by using the X/Lisa to initialize the floppy disk to be used; however, the Macintosh XL has a serious problem when used to re-initialize a floppy disk—see below.

Suspect initialized floppy disks

If you have initialized floppy disks on an X/Lisa with MacWorks Plus 1.1h or earlier, you should assume that they may not be correctly initialized; if there was an initialization failure (eg. because the disk was defective) MacWorks Plus would continue to use the bad disk without warning. To have confidence in these floppy disks, you should re-initialize them on a Lisa 2 with MacWorks Plus II or on any Macintosh other than a Macintosh XL (because of the Macintosh XL problem described below). In practice, the floppy disks produced by most manufacturers rarely produce initialization failures, hence disks initialized on a Lisa 2 are usually correctly initialized; however, the Macintosh XL has a serious problem when used to re-initialize a floppy disk—see below.

You may verify that a disk has been initialized correctly by using a disk editor application. Open the floppy volume and attempt to read every sector on the disk (eg. by putting a weight on the mouse such that it scrolls through the sectors). If all of the sectors can be read (regardless of their content), the disk does not have an initialization problem.

Note that although this test may show that the disk does not have an initialization problem, this test may, or may not, reveal other disk problems. If the test fails, there may be a cause other than having initialized the disk with MacWorks Plus 1.1h or earlier. If the test passes, the disk does not have an initialization problem, but the disk may have other problems.

If your X/Lisa has an XLerator…

The @XLerator software attempted to patch MacWorks Plus 1.0.18 and 1.1h so that floppy disk errors were reported. However, as the @XLerator software could not completely repair the floppy disk driver, you should still suspect that you have some incorrectly copied files (especially those copied before you installed the XLerator).

400k HFS and 800k MFS disks

MacWorks Plus 1.1h and earlier did not handle these non-standard disk formats properly (it corrupted the organization of data on the disk). If you have disks like these that you have used with MacWorks Plus 1.1h or earlier, copy the data to a standard disk format before switching to MacWorks Plus II. This will allow you to access the data on these disks after upgrading to MacWorks Plus II (and on other Macintosh computers too).

You can recognize HFS and MFS disks by opening them in the Finder and selecting View by Icon. HFS disks have the extra pixel at the left end of the title bar as shown in figure 25 below. (System 7 does not display this extra pixel, so you must use a Macintosh running System 6 to examine your disks.)

You can determine the size of the disk by adding the "K in disk" to the "K available."

If the sum is about 400 and the disk is HFS (the distinguishing pixel is black), the disk is non-standard and should be copied to a standard disk.

If the sum is about 800 and the disk is MFS (the distinguishing pixel is white), the disk is non-standard and should be copied to a standard disk.

A standard disk is any Macintosh hard disk, a 400k MFS floppy, or an 800k HFS floppy.
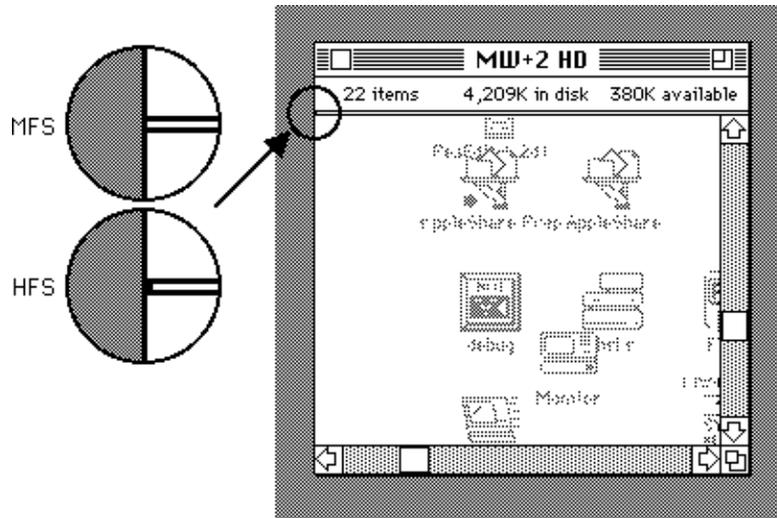
Figure 25. Locating the HFS/MFS distinguishing pixel.

If you have a Macintosh XL…

(The peripheral connector panel details in figures 33 and 34 on page 98 may be used to determine if your X/Lisa is a Macintosh XL.)

Do not re-initialize floppy disks!

Note that the PFG does not fix the Macintosh XL's Floppy Disk Controller problem, which prevents re-initializing a floppy disk successfully. This problem occurs only on Macintosh XL computers with the 800k floppy disk upgrade. This problem does not occur with the Lisa 2.

If you attempt to initialize (eg. via the Finder's "Erase Disk…" command) any floppy disk that has *already* been initialized as a Macintosh disk, the initialization will usually fail. The partially initialized disk will be unusable until initialized on another Macintosh (any Macintosh other than a Macintosh XL).

You must use fresh, un-initialized floppies if you wish to initialize them on the XL. If you wish to re-use a disk on the XL, select the entire contents of the disk and put the contents in the trash or use a floppy disk bulk eraser.

Check that the backup program you use does not insist that it re-initialize the backup floppies, as this will make the backup fail, or be unreliable (or useless!).

Strongly suspect your re-initialized disks!

If you have re-initialized floppy disks on a Macintosh XL with MacWorks Plus 1.1h or earlier, these disks are almost certainly *not* correctly initialized, and the error would not have been reported. To have confidence in these floppy disks, you should re-initialize them on another Macintosh (any Macintosh other than a Macintosh XL) or use a floppy disk bulk eraser.

If your Macintosh XL has an XLerator…

The @XLerator software attempted to patch MacWorks Plus 1.0.18 and 1.1h so that floppy disk errors were reported. You may have noticed that the Macintosh XL reported "Initialization Failed" if you attempted to re-initialize a disk; however, as the @XLerator software could not completely repair the floppy disk driver, you should still suspect that you have some incorrectly initialized disks (especially those made before you installed the XLerator).

Monitor control panel

The Monitor control panel (shown in figure 23) provides the means to control the brightness of the X/Lisa's monitor screen. Use the Monitor control panel in conjunction with the contrast and focus controls at the back of the X/Lisa to adjust the monitor screen to your preference.
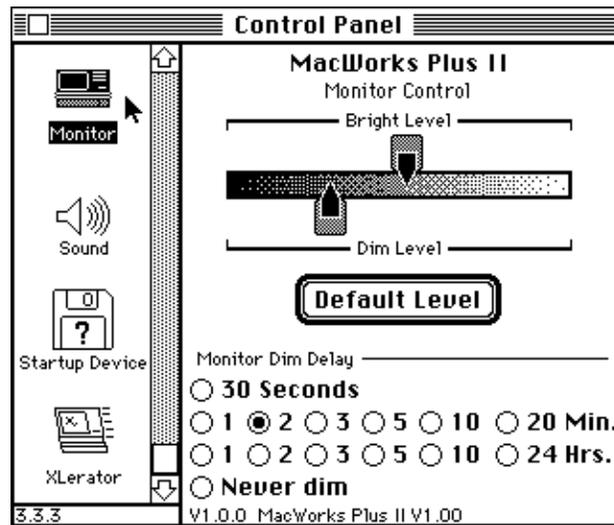

Figure 23. The Monitor control panel.

Click the desired dim delay time

MacWorks Plus II includes a built-in screen saver which will dim the screen to the desired level after the X/Lisa is idle for the time selected in the Monitor control panel.

Drag the level knobs

Adjust the bright level by dragging its knob until the screen is at a comfortable working brightness.

Should the screen become too dark to see while adjusting the bright level, type the return key to reset the levels to the defaults.

Adjust the dim level by dragging its knob until the screen is at the desired brightness.

The dim level will be the brightness level after the X/Lisa has been idle for the dim delay time.

To preserve the monitor screen in your X/Lisa, adjust the settings so that the screen is quite dim when you are not using the X/Lisa screen. The X/Lisa will continue to work (eg. print long documents, copy files, etc.) while the screen is dim.

You will find that this screen saver consumes very little processor time, so background tasks continue virtually unimpeded by the screen saver.

Floppy control panel

The Floppy control panel provides the means to adjust the operation of the Floppy disk drive and the use of the PFG. This allows you to control the amount of time that MacWorks Plus II may consume when attempting to read from or write to a floppy disk.
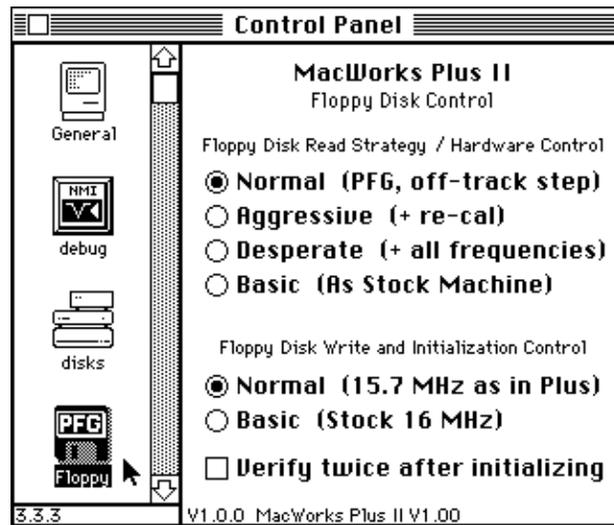
Figure 24. The Floppy control panel.

Floppy Disk Read Strategies

As the PFG must make repeated attempts to read data until it finds a frequency that works for a particular disk, it may take a long time to conclude that a disk cannot be read. This may be frustrating when unimportant or unknown disks are inserted. Thus MacWorks Plus II provides control over the number of frequencies and other strategies used by the PFG to read the floppy disk.

It is expected that the Normal (PFG, off-track step) setting will be appropriate for most use, and that the more complex settings will be used only when attempting to recover important data from un-cooperative disks.

Normal (PFG, off-track step)

The Normal setting is the recommended one for regular use. This setting is adequate for reading almost all disks that are readable by other Macintosh computers.

The Normal setting uses 8 of the available PFG frequencies that tend to be the most likely ones to successfully read data. If these 8 common frequencies fail, the floppy disk drive head is stepped to the next track and back again, providing a slight re-positioning of the track-head alignment. The 8 common frequencies are then tried again.

Aggressive (+ re-cal)

The Aggressive setting can be used to try to read disks that cannot be read by the Normal setting. If you need to use this setting for a particular disk, you should back-up the data on that disk, as the X/Lisa will continue to have difficulty reading the original disk.

The Aggressive setting will perform as Normal, then re-calibrate the disk drive head by seeking to track zero and again attempt to read the data with each of the 8 common frequencies.

Desperate (+ all frequencies)

The Desperate setting may be used to try to read disks that cannot be read by the Aggressive setting.

The Desperate setting may take a few minutes to read one sector of a difficult-to-read disk (an 800k disk has 1600 sectors). If you need to use this setting for a particular disk, you should back-up the data on that disk immediately, as the X/Lisa may have difficulty reading the original disk again.

The Desperate setting will proceed as Aggressive, then will try every available frequency before returning an error indicating that the disk cannot be read.

Basic (As Stock Machine)

The Basic setting operates as though there were no PFG installed. This setting is included for completeness. It is unlikely that it will be used except in the event of a PFG hardware failure.

Using the Basic setting, the Floppy Disk is read with the same strategy and frequency (16 MHz) as in an un-modified X/Lisa.

Once it appears that there is a problem reading the data, the cursor is set to a floppy disk icon. The 1, 2, and 3 indicate the read strategy in progress.

 is shown when the PFG has observed some difficulty in reading the floppy disk, and is proceeding with the Normal read strategy.

 is shown when the PFG has observed significant difficulty in reading the floppy disk, and is proceeding with the Aggressive read strategy.

 is shown when the PFG has observed substantial difficulty, and is proceeding with the Desperate read strategy.

Aborting a slow floppy disk operation

Occasionally a floppy disk will take a long time to read on the X/Lisa. This may be due to the time that the PFG needs to try different frequencies when reading the disk. Note that without the PFG, many of these disks simply could not be read at all.

A floppy disk abort feature is included in MacWorks Plus II to allow you to terminate the attempts to read or write to a difficult floppy disk. This provides the ability to "give up" on a floppy disk if desired, rather than waiting for the selected read strategy to run to completion (this can be many minutes with the Desperate setting).

The abort is generated by typing both option keys simultaneously. A short beep will announce that the abort has been recognized. Once you have initiated the abort sequence, the floppy disk driver will stop trying additional PFG frequencies and report an error if the disk could not be read.

If the driver should be successful in reading the disk with the frequency in use when the abort was initiated, the abort will be ignored and the read will continue normally. In this situation, you may need to request the floppy disk abort more than once to stop a multiple sector read.

For those floppy disks that can be read easily with the default PFG frequency, the abort may *never* occur, no matter how many times it is requested (this has been designed to prevent aborting a floppy disk operation that is proceeding properly, even though it appears to be taking a long time).

Floppy Disk Write and Initialization Control

The Normal setting is recommended for all but extraordinary use.

As with the Reading control, a Basic setting is provided for Writing and Initializing as the un-modified X/Lisa did. You may wish to use this setting for making disks to be used on an X/Lisa that does not have MacWorks Plus II, although the Normal setting should always produce disks that can be used on a stock machine.

The nominal clock frequency of the Macintosh Floppy Disk Controller is 15.672 MHz as opposed to 16 MHz in the X/Lisa. This is a small difference, but for completeness, the Normal setting provides the ability to write to, and initialize, floppies on the X/Lisa at 15.7 MHz instead of 16 MHz.

Verify Twice control

Unlike the Macintosh Plus, the Floppy Disk Controller in the X/Lisa automatically verifies a disk after formatting it. The Macintosh System Software typically requests a disk be verified after it is formatted, which used to result in the disk being verified twice on the X/Lisa. The Floppy control panel provides the means to perform or ignore this second verify, which makes initializing floppy disks faster.

Startup Device control panel

Included on your MacWorks Plus II Install Disk is a "Startup Device" control panel. This is Apple's Startup Device control panel from System 6.0.7, but is slightly modified so that it will appear in the Control Panel on the X/Lisa.

This control panel allows you to choose the Macintosh System Disk (SCSI or Parallel) to be used at startup. If present, this disk will be checked first for a valid System file and boot blocks after loading MacWorks Plus II from the `STARTUP FROM` *device (set by the "Disks" control panel).*

Refer to your Macintosh System documentation (not included with MacWorks Plus II) if you require more information on the Startup Device control panel.
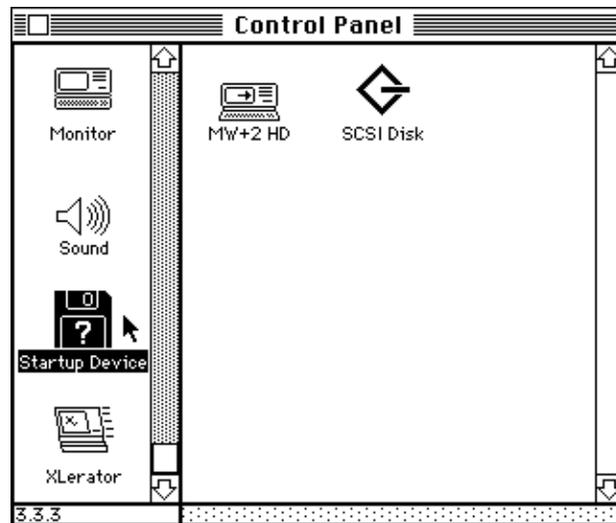
Figure 26. The Startup Device control panel.

Compatibility note

This control panel is not compatible with MacWorks Plus 1.1h and earlier. Do not attempt to open the Startup Device control panel unless MacWorks Plus II is running!

Newer versions of the Startup Device control panel

If you wish to use a Startup Device control panel with a System version 6.x higher than 6.0.8 (if released), copy it to your System Folder from your System Update Kit Disk, and use Query's Software Patcher to patch the new version. Without the patch, the new Startup Device will not appear in the Control Panel.

XLerator control panel

The XLerator control panel is for those X/Lisa computers with an XLerator installed. You do not need to keep the XLerator control panel on your disk if you do not have the XLerator installed.

New, improved…

The XLerator control panel replaces the "@XLerator" control panel software that came with your XLerator hardware. Many improvements to XLerator operation have been made in MacWorks Plus II, including incorporating the XLerator memory configuration routines such that no restart is necessary to start using the XLerator memory.

The XLerator control panel is very similar in operation to the @XLerator control panel described in your XLerator manual, hence you should refer to that manual for most information about your XLerator.
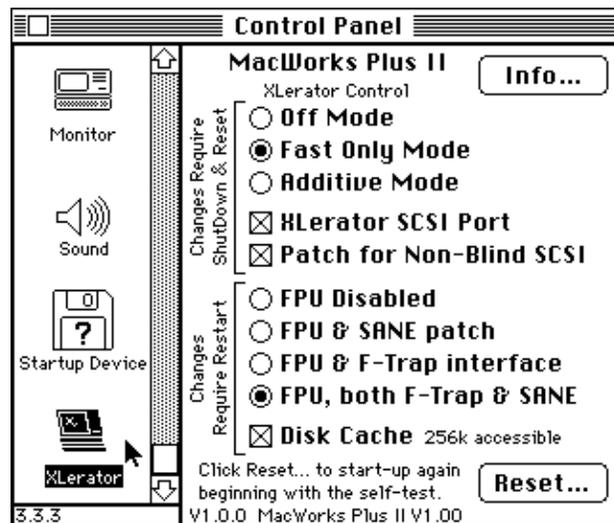
Figure 27. The new XLerator control panel for MacWorks Plus II.

The major changes to MacWorks Plus II have made the following XLerator related items different from MacWorks Plus 1.0.18/1.1h and @XLerator v2.1:

Changing the startup configuration

You may change the XLerator Memory Mode and SCSI port when MacWorks Plus II is about to load by holding down the space bar or mouse button when instructed to do so (see the section "The space bar over-ride," on page 49). You may then select the desired configuration by typing a number from 1 to 6 as shown in the over-ride menu. This will temporarily select a configuration, but does not change the PRAM. If you wish the configuration to be persistent, you must adjust the XLerator control panel which will save the desired configuration in PRAM.

The XLerator startup configuration cannot be changed once "Welcome to Macintosh" has appeared. Holding down the mouse button when the XLerator icon appears does prevent the Disk Cache and FPU software from being installed. To change the Disk Cache and/or FPU software options, you must change the settings in the Control Panel and Restart. To change the memory mode, SCSI port and/or SCSI Blind Patch, you must change the settings in the Control Panel and re-load MacWorks Plus II by going back to the self-test.

The default XLerator configuration

If you Zap the PRAM at startup, (or should the PRAM become corrupted and then be re-initialized), the XLerator will default to Off Mode, with the SCSI port on, and the FPU off. The Patch for Non-Blind SCSI will default to on.

XLerator SCSI port

If installed, the XLerator SCSI port is now enabled when MacWorks Plus II is loaded from the **STARTUP FROM** device. Hence you do not need to insert a Macintosh System Disk to turn on the SCSI port to access your SCSI disks.

Patch for Non-Blind SCSI

If your hard disk driver software has an option to "use blind transfers" or use a "fast driver," it is best to not select it. Blind transfers are not as reliable as non-blind transfers, and with the XLerator, the performance improvement is usually negligible. In some cases the "fast driver" will directly access the SCSI hardware and will fail at the increased speed of the XLerator.

The increased speed of the XLerator prevents some SCSI disks from performing correctly when the disk's SCSI driver uses "blind" SCSI transfers. Previously, the @XLerator software used an additional startup document to patch blind transfers. Now the XLerator is turned on before MacWorks Plus II is fully loaded, so a different provision is required. The MacWorks Plus II XLerator control panel includes an option to patch blind SCSI transfers into non-blind ones.

When this option is checked, each call to the SCSI dispatcher is checked to see if it is a blind read or blind write, and if so, the call is converted to a non-blind transfer. This will not patch those hard disk drivers that fail because they access the SCSI hardware directly.

When the PRAM is "Zapped" or initialized, this option is selected by default. If you have a disk that does perform correctly with blind transfers when the XLerator is in Fast Only Mode or Additive Mode, you may find turning this option off will improve the disk's performance.

Setting the desired configuration

Changing the setup of the XLerator in the Control Panel will store the desired setup in PRAM once the XLerator control panel is closed. Note that this does not immediately change the XLerator mode. Changing some settings requires that you Restart; changing other settings requires that you Reset, as indicated in the control panel.

Current Info…

The Info… button will provide a report as to the current status of the various parameters of the XLerator (which options are not installed, installed but off, installed and on, etc.)

Subtle changes in the new XLerator software:

Shadow Mode (an unsupported feature of @XLerator v2.1) has been removed as it is incompatible with the PseudoRAM feature of MacWorks Plus II PRO.

The XLerator Disk Cache which uses the left-over slot memory is now functional in Additive Mode as well as Fast Only Mode.

With 4Mb of fast RAM installed, Additive Mode will now produce more free memory than Fast Only Mode. Fast Only Mode continues to provide the most speed.

MacWorks Plus 1.1h and earlier were limited to a maximum of 3.875 Mb of memory—MacWorks Plus II is not. If you have 4Mb of fast RAM, Additive Mode and Fast Only Mode will produce more free memory than in MacWorks Plus 1.1h and earlier.

The F-Trap Interface implements a number of fixes for bugs that caused some compatibility problems in v2.1. As with the previous F-Trap Interface and SANE patch software, you should be aware that some operations will not yield the same accuracy as those operations without the FPU. It is your responsibility to ensure that the software you use gives results that are sufficiently accurate for your needs.

The XLerator configuration is now stored in PRAM, whereas previously it was stored in the @XLerator file. Hence starting up with different System Disks will result in the same operating configuration. However, the Disk Cache and FPU software are loaded from the XLerator file; if this file is not present in your System Folder, these options are not installed.

Due to improvements in MacWorks Plus II, the Sun Hard Disk Patch is no longer required.

The AppleTalk Patch is automatically installed, and has been improved to work more reliably with current LocalTalk devices.

Reset…

The Reset… button provides the opportunity to go back to the self-test as shown in figure 28.

Note that you should always close your documents and applications before using this feature, as once you select Shutdown/Reset or Immediate Reset, all work in progress will be lost.

Shutdown/Reset calls the Shutdown manager before going back to the self-test.

Immediate Reset goes directly back to the self-test.

If you wish to use the Reset button on the back of the X/Lisa, the safest procedure is to use the Finder's "Restart" command, then press the Reset button when you hear the startup beep.
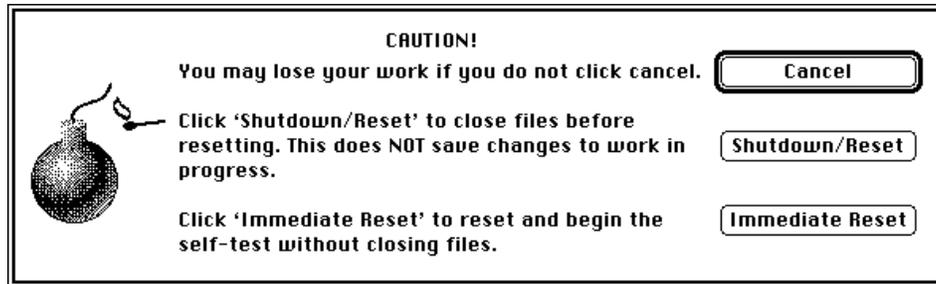
```
                          CAUTION!
          You may lose your work if you do not click cancel.    Cancel

          Click 'Shutdown/Reset' to close files before
          resetting. This does NOT save changes to work in    Shutdown/Reset
          progress.

          Click 'Immediate Reset' to reset and begin the      Immediate Reset
          self-test without closing files.
```

Figure 28. The Reset… command should be used with caution.

Notes for advanced users:

The Control Panel cache software changed significantly in System Software 6.0.7. As a result of this change, the cache is flushed whenever an application quits. This is a more rugged cache strategy, however it may appear that the cache is not working as there is more disk activity compared with previous system versions. If you have relied on a large amount of slot memory being used as cache to improve performance, you may find System 6.0.5 is preferred.

The SCSI port and FPU options may be changed immediately (without a restart/reset) by holding down the option key when you change the setting. This is an unsupported feature and will lead to a system error in many situations. It is provided so that adventurous users may easily compare performance with and without the SANE patch and the F-Trap Interface and to switch from the XLerator SCSI port to a Sun SCSI card to use the faster/slower port for a particular device.

Note that switching the SCSI port immediately without special cabling will make your SCSI disks inaccessible, which may cause errors. Immediate switching usually requires connecting both SCSI ports together; do so at your own risk.

Note that switching off the F-Trap Interface immediately while MultiFinder is in operation always causes a crash.

In order to switch the FPU options immediately, at least one of the FPU software options must have been loaded at startup (either the SANE patch or the F-Trap Interface).

Disks control panel

The Disks control panel allows selection of the default **STARTUP FROM** *device.*

The **STARTUP FROM** *device is the device that is used to load an operating environment (eg. MacWorks Plus II, Lisa 7/7 etc.) after the self-test. If you have more than one operating environment available (on more than one hard disk), you may use this control panel to select the one that will be used when the X/Lisa is turned on.*

Note that this control panel does not select the Macintosh "Startup Disk" (ie. the System Disk) to be used once MacWorks Plus II has been loaded; the "Startup Disk" is selected via the "Startup Device" control panel.
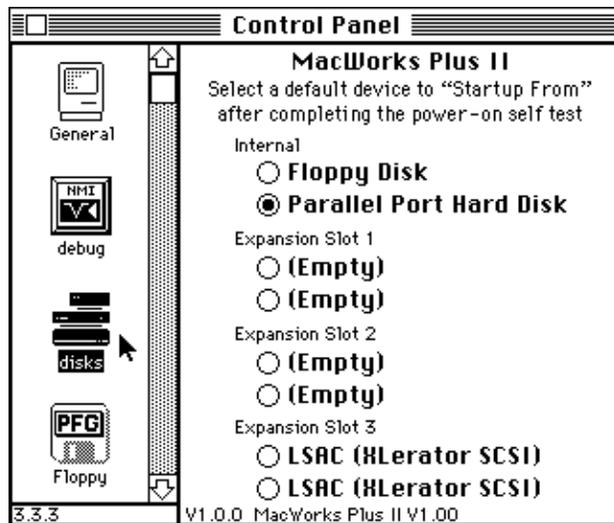
Figure 29. The Disks control panel.

This control panel shows the recognized interface cards installed in the expansion slots. As each slot has two designations (upper and lower), each card is shown available as two selections; in some cases, the two selections are equivalent. The Apple Dual Parallel Interface Card will appear as distinct upper and lower ports. A Sun SCSI Card will show in both the upper and lower locations, but is not a bootable device with the ROM normally supplied with the SCSI card.

You may over-ride the default **STARTUP FROM** *device by typing the space bar during the X/Lisa self-test, and then selecting the desired device from the menu.*

The default **STARTUP FROM** *device selection is stored in the PRAM on the X/Lisa I/O board, not in the PFG's non-volatile PRAM. As a result, if power is disconnected from the X/Lisa, this setting will default to "Internal Parallel Port Hard Disk." The time will be lost simultaneously, which may alert you to this fact.*

Note that with the XLerator and revision H ROMs installed, the error 42 and AutoBoot problems (documented in your XLerator manual) prevent the default selection from having a noticeable effect. Contact Dafax Processing Corp. for information if you wish to upgrade your ROMs to fix this problem.

Note that if an LSAC is installed and has DIP-Switch 7 down, it will over-ride the default **STARTUP FROM** *device and insist that it be the* **STARTUP FROM** *device. The control panel will remind you if you make a selection that the LSAC will over-ride.*

Debug control panel

The Debug control panel is intended for the use of programmers and those advanced users that require MacsBug for debugging. You do not need to keep the Debug control panel on your disk if you do not need any of its features.

MacWorks Plus II is compatible with MacsBug v6.2.2, which has much to recommend it over previous versions of MacsBug.
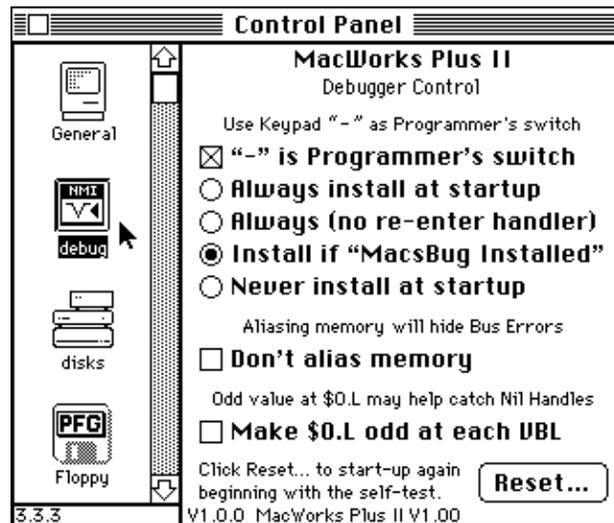
Figure 30. The Debug control panel.

Programmer's Switch

As the Lisa 2 does not have a programmer's switch, MacWorks Plus II provides a facility to use the – (minus) key on the keypad as a programmer's switch.

The check box indicates the current status of the – (minus) key. When checked, typing the keypad – (minus) key will generate a level 7 (non-maskable) interrupt as does pressing the interrupt programmer's switch on other Macintosh computers.

Provision is made to install this programmer's switch at startup. The default setting is to install when "MacsBug Installed." The other settings are provided for unusual cases, when using a non-MacsBug debugger for example, where you wish the programmer's key to be installed even when "MacsBug Installed" does not appear, or where you wish to install MacsBug, but use the – (minus) key for other purposes than entering MacsBug.

The level 7 interrupt is handled differently by various debuggers. Some debuggers (eg. MacsBug 6.x) will suffer fatal problems if a level 7 interrupt occurs while in the debugger. Other debuggers (eg. MacsBug 5.x) correctly ignore level 7 interrupts while in the debugger. MacWorks Plus II includes a re-enter handler for the level 7 interrupt for those debuggers that do not protect against re-entering while in the debugger. This re-enter handler is automatically installed if required when the default setting is used.

If you wish to use a debugger that is installed differently from MacsBug, select "Always install at startup" or "Always (no re-enter handler)" according to whichever works best with your debugger.

Note that if you select "Never install at startup" and subsequently select the checkbox to start using the – (minus) key, the re-enter handler is not installed.

Nil Handles

Many Macintosh software errors involve de-referencing Nil handles. As the software may continue to execute in spite of this error, these bugs are sometimes difficult to catch.

MacWorks Plus II provides the means to make the long word at address $0 odd at each VBL, providing an indication (via an address error) if software tries to use a Nil handle. Like the non-aliased memory mode, this mode may cause system errors to appear where software might otherwise be able to proceed, hence it is not enabled automatically at startup. Even if this mode is stored in PRAM, you must open the Debug control panel for it to become active. Once activated, you may restart to test INITs etc., and it will remain active. Once MacWorks Plus II is re-loaded, the mode will become dormant until the Debug control panel is opened again.

Reset…

The Reset… button operates as described in the XLerator control panel section on page 66.

Memory Aliasing

In the Macintosh Plus, bus errors are not generated for any access in the logical address space. In the X/Lisa, however, a bus error can be generated for unused address ranges. Under normal circumstances, MacWorks Plus II aliases the unused address space so that careless software does not cause system errors.

For debugging purposes, the aliasing can be disabled so that only physical memory and I/O are accessible, other accesses will generate a bus error. As this configuration is more likely to lead to system errors, you are asked to confirm that you desire this mode when MacWorks Plus II is configuring the memory at startup (see figure 31). If there is no response within approximately one minute, MacWorks Plus II proceeds with the aliased mode.

You may also select the non-aliased mode at startup by using the space bar over-ride, typing the key, then selecting the desired memory mode. You will be asked to confirm your choice of non-aliased mode as usual.

In contrast to MacWorks Plus 1.1h and earlier, MacWorks Plus II does not literally alias the memory. Unused memory pages are mapped to the CPU board ROM space where reads and writes do not generate bus errors.

NON-ALIASED RAM MODE HAS BEEN SELECTED
WHICH IS A LESS ROBUST CONFIGURATION

ARE YOU SURE.. Y/N?
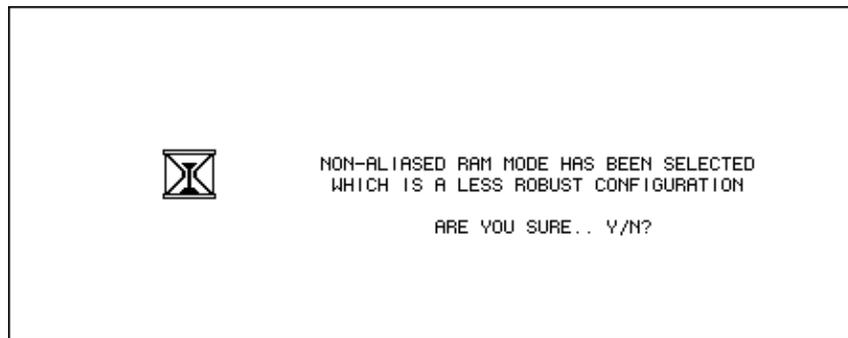
Figure 31. Using the non-aliased memory mode requires your confirmation.

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Query Engineering Inc.'s Software Patcher

The MacWorks Plus II Install Disk includes "Query's Software Patcher" to simplify patching software to work with MacWorks Plus II.

As patches are developed to improve the compatibility of MacWorks Plus II and the XLerator, they may be added to the Patcher application for easy installation.

The Patcher is self-explanatory and very easy to operate. Simply open the application, select the desired patch and then select the software to which you wish to apply the patch. If the Patcher cannot find the software in the folder where it is located, move the Patcher and the software to be patched to the root level of the disk and run the Patcher again. The Patcher works best if MultiFinder is not active, as applying some patches involves loading a large file into memory.

If you use the Patcher to patch some software, make sure you do not alter the original copy of the software. In most cases the patch can be successfully removed by the Patcher, but in some cases it can not.

Current patches provide modifications to Apple's Startup Device control panel (such that it will show up on the X/Lisa), modifications to Microsoft Excel so that it uses the XLerator's FPU option, etc.

Trouble-Shooting

The various trouble-shooting suggestions below may be useful in determining the cause of a problem with MacWorks Plus II or your X/Lisa. Although the trouble-shooting suggestions are split into sections, please read all of the sections before concluding that there are no relevant suggestions; you may find a solution in a different place than where you expected it.

Contacting Technical Support

If the trouble-shooting suggestions below are not sufficient to solve the problem with MacWorks Plus II, contact your supplier for further technical assistance.

Depending on the type of problem, you may be asked for the following information: Computer type, ROM version, amount of RAM in memory slots, expansion cards, hard disk types, MacWorks Plus II version and level (number, Basic or PRO), error messages reported while MacWorks Plus II is loading, System and Finder versions, third party control panels and startup documents in use, etc.

In many cases, the X/Lisa stops working properly after something new has been installed. The failure in these cases can be due to a conflict with some part of the system other than the X/Lisa and MacWorks Plus II. If this is the case, it is very important that you determine what combination of things cause the problem to appear.

Report this information to your MacWorks Plus II supplier, or their designated support staff. Consider that in the case of problems not previously reported, the time it will take to provide a solution to a problem is often related to how much relevant and accurate information you can supply.

Problems with Hardware Installation

The PFG must be installed for MacWorks Plus II to operate properly. If messages indicating the PFG is not operating fully appear when loading MacWorks Plus II, you should investigate immediately by referring to the PFG installation instructions on pages 18–27 while performing the following checks:

Check that the PFG is installed in the correct socket (the one closest to the power supply).

Check that the PFG is correctly installed in the socket (all pins in receptacles, the bottom two pins under the PFG cut off, and the bottom two receptacles empty).

Check that the crystal at 10C has an insulating cover.

Check that the Z8530 SCC is installed in the PFG properly (all pins in receptacles, no pins bent under, notched end at the top).

Check that the wires from the PFG are connected to the correct component on the I/O board (74LS132 at location 6A).

Check that the wires from the PFG are connected to the correct pins (black wire to pin 1 which is closest to the red ejector-latch, red wire to pin 5 which is 0.4 ″ below pin 1).

Check that the clips from the PFG are well connected (the metal hooks are making contact with the appropriate metal pins and not adjacent ones; the plastic housing should apply spring pressure, trapping the pin).

If you have upgraded your PFG, check that the PAL is correctly installed in the PFG (all pins in receptacles, no pins bent under, correct end at the top).

Problems with Software Installation

Cannot start-up with the Boot Disk

If you cannot start-up MacWorks Plus II via the Boot Disk, the PFG may not be installed correctly. If the floppy disk drive does not make any noises, or if the X/Lisa hangs with the hourglass icon on the screen, refer to "Problems with Hardware Installation" above.

Cannot choose the parallel port hard disk

If you cannot choose your parallel port hard disk in the installer because the appropriate button is not enabled, turn off the X/Lisa. Turn on the X/Lisa, and type the space bar during the self-test. Make sure your parallel port hard disk is shown in the **STARTUP FROM** menu. If your parallel port hard disk is not shown in the **STARTUP FROM** menu, you will not be able to use the disk or install MacWorks Plus II! Continue with "If your parallel port hard disk does not appear in the **STARTUP FROM** menu…" below.

If your parallel port hard disk is shown in the **STARTUP FROM** menu, repeat the software installation process from the beginning. When opening the installer application, use the Expert Mode described on page 85. If using Expert Mode does not allow successful installation, perform the following tests:

Turn off and on your X/Lisa. Type the space bar during the self-test to indicate you wish to stop at the **STARTUP FROM** menu.

If you are attempting to install on a disk connected to the built-in parallel port,

skip the rest of this paragraph. If you are attempting to install on a disk connected to an Apple Dual Parallel Interface Card in one of the expansion slots, select the port to which the disk is connected. If error code 80, 81, 82, 83, or 85 is returned, the disk or cable is suspect. If you have a Lisa 2 with the built-in back panel parallel port connector, put the suspect disk on that connector and repeat the installation and trouble-shooting process as for a hard disk on a built-in parallel port. If the disk cannot be connected to the internal connector, or if the problem persists, continue with "Contacting Technical Support" above.

Once at the **STARTUP FROM** menu, observe whether the hard disk is shown in the menu. If so, the disk has passed its self-test successfully; continue with "Contacting Technical Support" above. If the disk does not appear in the menu, proceed with the following:

If your parallel port hard disk does not appear in the STARTUP FROM menu…

Check that your hard disk is truly a parallel port hard disk. SCSI disks (external or internal) are not "parallel port" hard disks, the MacWorks Plus II installer is not used with a SCSI hard disk.

Parallel port hard disks include:
• External: Apple 5Mb ProFile, Apple 10Mb ProFile.
• Internal: Apple 10Mb Widget, Sun 20, Sun 30, Sun 40 hard disks.

The following procedures may persuade the hard disk to appear in the menu:
> • Press the reset button on the back of the X/Lisa
> • Type the space bar during the self-test
> • If the disk does not appear:
>   Turn off the X/Lisa, wait 20 seconds, and repeat the test

If the disk still does not appear, continue with the disk hardware trouble-shooting sections below. If the disk appears to start working, begin the software installation again.

If you have an external disk:

Check that the connecting cable is fully connected at each end. Locate a replacement cable which you can use to verify the cable is not the problem. The cable is a 36" long, 25 pin, straight through, shielded cable, with pin 7 removed for polarization.

Check that the X/Lisa end is connected to the parallel port and not one of the serial ports (damage may occur if the disk is connected to a serial port).

Turn the disk off, then on again, and watch the "ready" light on the front of the

disk; the light should flicker for about one minute then remain on. There should not be any clunking noises from the hard disk. If the hard disk does not behave in this manner, it may need repair.

If you have an internal 10Mb Widget disk:

With the X/Lisa turned off, remove the front cover by pushing up on the two thumb tabs under the front. Withdraw the drive cage by undoing the thumbscrew below the drives until it is loose, then gently pulling out the cage.

Check that the cables to the Widget are properly seated. Disconnect and re-connect them to allow the contacts to wipe themselves. Re-install the drive cage.

Locate the exposed flywheel at the bottom of the Widget (above the floppy drive). Insert a spacer to over-ride the power interlock switch at the lower left of the screen (the switch has a metal spring that is visible through the bevelled opening in the plastic housing). While staying well clear of the internal apparatus, turn on the power. The flywheel should start to turn and emit a whining sound as the disk spins up, a few seconds later, the head lock is released with a clack sound. Observe the light on the Widget. It should flicker for about a minute while the disk makes squeaking sounds, then remain on. If the flywheel does not turn, the disk requires repair (you may be able to temporarily start the disk by spinning the flywheel with the eraser end of a pencil). If the head lock clicks periodically, it requires an adjustment which is beyond the scope of this manual (you may be able to persuade it to release by pressing the reset button on the back of the X/Lisa).

If you have an internal Sun hard disk:

Beware: Disconnecting the parallel cable (either internal or back-panel) and turning on the X/Lisa with the power cable still attached to the Sun hard disk may cause the Sun hard disk to be seriously corrupted, which will require that the unit be returned for a factory format! This problem is most evident with those Sun hard disks using the Rev. C ROM. (This ROM is visible when looking at the top of the hard disk assembly in the drive cage and is usually labelled "341-8005 REV C Sun Remarketing Inc.")

With the X/Lisa turned off, remove the front cover by pushing up on the two thumb tabs under the front. Withdraw the drive cage by undoing the thumbscrew below the drives until it is loose, then gently pulling out the cage.

Check that the cables to the Sun hard disk are properly seated. Disconnect and re-connect them to allow the contacts to wipe themselves. Re-install the drive cage.

Problems During Startup

Cannot start-up the X/Lisa

If you cannot start-up MacWorks Plus II via the hard disk or the floppy Boot Disk, the PFG clips may have been disconnected. If the floppy disk drive does not make any noises, or if the X/Lisa hangs with the hourglass icon on the screen, refer to "Problems with Hardware Installation" above.

Remember to try starting up with a floppy disk!

Many problems are more easily resolved after starting up via floppy disk. This provides better control over incompatible and/or corrupted system, startup, and application software. If you have problems with your X/Lisa and MacWorks Plus II, this should be one of the first things that you do in attempting to localize the problem.

New SCSI hard disks…

Many SCSI hard disks sold for use with the Macintosh family arrive pre-initialized. If you install a new SCSI hard disk on your X/Lisa, check that the version of the System on the SCSI disk is compatible with the level and version of MacWorks Plus II you are running. You may need to delete the System Folder from the new SCSI disk if it prevents your X/Lisa from starting up correctly. Start-up with a floppy disk to check the version of the System file on the new hard disk.

Floppy with flashing X icon
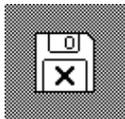
The floppy with the flashing X icon indicates the X/Lisa could not use the floppy as a System Disk because it does not have valid boot blocks.

Insert a floppy disk that is a valid System Disk.

If you decide to start-up with a hard disk instead, type the right option key; this will indicate that you wish the X/Lisa to attempt to locate an attached hard disk that is a valid System Disk.

Floppy with flashing question mark icon

The floppy with the flashing question mark icon indicates the X/Lisa is waiting for a valid System Disk with which it can start-up.

If you have typed the left option key to request that a floppy be used as the System Disk, insert the desired floppy now.

If you did not intend to start-up with a floppy disk, type the right option key; this will indicate that you wish the X/Lisa to re-attempt to locate an attached hard disk that is a valid System Disk.

If the Happy Mac appears briefly but is replaced by the floppy icon, then the X/Lisa found a disk with valid boot blocks, but could not find the System file in the System Folder.

Start-up with a floppy System Disk and check that your system is correctly installed in the System Folder.

If the System Folder does not have the correct icon, drag the System file out of the System Folder, release the mouse button, and drag the System file back into the System Folder.

If the problem persists, update your System Folder with your Macintosh System Tools Disk.

System Error 33 or "Memory Manager error"

If your X/Lisa reports this system error during startup, it is most likely due to some startup document or control panel absorbing more memory than is available. Test this theory by removing all startup documents and control panels from the System Folder and restarting.

Some startup documents and control panels consume such a large amount of memory that they cannot be installed on a computer with only 1Mb. Check the memory requirements of your startup document/control panel. Consider one of the X/Lisa upgrades that are available to increase your memory to 2Mb or 4Mb.

The usual cause of this problem is a large memory request via the "sysz" resource. When attempting to grow the system heap to comply with a "sysz" requirement, no check is made, so the system heap may expand over the stack and application heap. You may be able to alter or remove the "sysz" resource to prevent the error without affecting the operation of the software.

System Error 99 or "The 'System' File on this startup disk may be damaged. The Installer can be used to repair this disk."

If your X/Lisa reports this system error during startup, it is most likely due to an incompatible version of the System Software. Check that the version of the system is compatible with the level and version of MacWorks Plus II you are running.

Computer hangs or freezes at "Welcome to Macintosh"

If your X/Lisa hangs or waits forever with "Welcome to Macintosh" on the screen, it may be due to an incompatible version of the System Software. Check that the version of the System is compatible with the level and version of MacWorks Plus II you are running. If you have just connected a new hard disk, see "New SCSI hard disks…" above.

Sad Mac Error

A Sad Mac error indicates a problem occurred before the System file could be fully loaded.

If this is a recurring problem, note the appearance of the screen just before the Sad Mac appears, and the number below the Sad Mac.

Once the Sad Mac occurs, you must press the Reset button on the back of the X/Lisa. The power switch will not be operable.

If you have just updated MacWorks Plus II and your System Folder, you may have neglected to turn off and on your X/Lisa to load in the new version of MacWorks Plus II; check the instructions that came with your MacWorks Plus II update to see if this was required; if so, pressing the Reset button on the back of the machine is sufficient.

Check that the version of the system is compatible with the level and version of MacWorks Plus II you are running.

If you have just installed some new software on your X/Lisa, it may be

incompatible. Test this theory by starting up with a different System Disk (eg. a floppy disk), removing the new software, and restarting.

If the X/Lisa had been operating correctly with the same System Disk and no new software has been installed, the most likely cause of this problem is a corrupted System file. The System file should be deleted and restored from your backup or newly installed (not updated).

MacWorks Plus 1.1h and earlier would display the Sad Mac if a disk with good boot blocks but without a System was used as the System Disk. MacWorks Plus II handles this situation properly by displaying the floppy with a flashing X icon, and going on to examine the next disk.

Problems during Operation

Remember to try starting up with a floppy disk!

Many problems in operation are more easily resolved after starting up with a floppy System Disk. This provides better control over incompatible and/or corrupted system, startup, and application software. If you have problems with your X/Lisa and MacWorks Plus II, this should be one of the first things that you do in attempting to localize the problem.

System Error, Freeze or Erratic Behavior

If your X/Lisa reports a "System Error," freezes (ie. stops responding and the pointer does not move with the mouse) or behaves erratically while using MacWorks Plus II, the cause may be incompatible software, corrupted software, or a corrupted System Folder.

If the software worked previously, suspect that some software has been corrupted. This will often occur if your X/Lisa has been infected by a virus. Virus detection and recovery can be a complex task that is beyond the scope of this manual. Obtain assistance from your local Macintosh user group, or from one of the commercial companies that distribute virus combative software.

In cases of viral infection or other sources of software corruption, a solution usually involves deleting and re-installing fresh copies of the affected software (remember to lock your original disks!). If deleting and re-installing the application

software is not successful, or if the problem plagues more than one application, you should suspect your System Folder. Remove all third party startup documents and control panels from the System Folder, Restart, and attempt to reproduce the problem. If the problem persists, restart with a floppy System Disk and attempt to reproduce the problem. If using the system from a different disk solves the problem, you should delete the suspect System Folder and re-install the System and other components in your System Folder (eg. the MacWorks Plus II control panels etc.).

If the X/Lisa always fails performing the same operation, the software may not be compatible with the X/Lisa, MacWorks Plus II, or other software installed; before you conclude that a software package is incompatible with MacWorks Plus II, check if it works with the simplest X/Lisa configuration. Remove all startup documents , control panels, extensions etc. If the software begins to work correctly, the problem is almost certainly a conflict with other software installed in your X/Lisa. You may need to change the alphabetical order of your startup documents and control panels so that they will work together. On-line services (bulletin boards) and user groups are often very helpful in finding solutions to these problems.

Some older versions of software packages make assumptions about the hardware (screen size, etc.). Upgrading the software to the current version may cure the problem, and give you added features as well.

If the software uses sound, setting the volume to zero with the Control Panel, or turning off the sound in the software, may allow the software to run.

Software incompatibilities typically result from direct manipulation of the Macintosh Plus hardware. As a rule, this does not conform to Apple's guidelines, hence the software is at fault. This will occasionally occur for software that attempts to operate in a manner that Apple did not anticipate.

> *Examples are: directly accessing the serial ports to use the handshaking lines for communication or to use a mode not provided by Apple's serial driver; directly accessing the floppy disk hardware for copy protection, speed improvement, or to use non-standard data compression; directly accessing the VIA for timing purposes or sound control.*
>
> *If small parts of the screen appear to change unexpectedly and randomly when the software is attempting to control the hardware, it is an indication that the software is attempting to directly control the VIA or IWM, and thus will not operate properly.*

If you determine that some software is not compatible and is not listed on the MacWorks Plus II non-compatibility sheet, please inform us; improvements to MacWorks Plus II are a result of user feedback. Whenever possible, we attempt to find a solution to make products compatible. Occasionally, this may be a

quick patch or work-around that will get you up and running.

**System Error 25, "out of memory" or
System Error 28, "stack collision with heap!"**

If your X/Lisa reports one of these errors, attempt to provide the application with more memory. Allocate more memory via the Get Info… window in the Finder or turn MultiFinder off; remove unnecessary startup documents and control panels.

Some software consumes such a large amount of memory that it cannot be operated on a computer with only 1Mb. Check the memory requirements of your software. Consider one of the X/Lisa upgrades that are available to increase your memory to 2Mb or 4Mb.

Slow to start-up

If the X/Lisa is slow to start-up, either because of a long delay while the hourglass window is shown, or a long delay while waiting for the floppy disk icon, suspect that a parallel port hard disk is not operating properly. If the disk does not show up in the Finder, check to see if the disk shows up in the `STARTUP FROM` menu; if not see "If your parallel port hard disk does not appear in the `STARTUP FROM` menu…" above. If the disk does appear, check to see if the floppy disk drive is functional, if not, continue with the following:

Floppy disk problems

If the X/Lisa has difficulty reading a particular floppy disk, set the Floppy control panel to the Aggressive or Desperate setting as described in the section on the Floppy control panel. If this does not help, try the disk on another Macintosh computer. If the X/Lisa cannot read the disk with the PFG set to the Desperate setting, it is unlikely that the disk can be read on another computer; however, each floppy disk drive has slightly different alignment, which can make a difference.

If the floppy disk drive appears to be completely dead and always ignores floppy disks inserted, the problem may be mis-connection of the PFG clips. Review the suggestions in the "Problems with Hardware Installation" section above.

If the floppy disk drive continues to malfunction, set the Floppy control panel to Basic (As Stock Machine) and Basic (Stock 16 MHz).

If this does not help, turn off the X/Lisa, remove the back cover, and disconnect the PFG clips. Tape down or position the clips so that the grabber ends will not

come in contact with any components. With the clips disconnected, replace the back cover, turn on the X/Lisa and start-up to test the floppy drive again.

If the floppy disk drive does not work with the PFG clips disconnected, there is a problem with the I/O board or the floppy disk drive that is not due to the PFG.

If the floppy disk drive begins to work with the PFG clips disconnected, re-connect the PFG clips according to the PFG installation instructions. If the floppy disk drive stops working again, the PFG is not working properly or the clips are not making proper contact with the correct pins—call for technical support.

Expert Mode

The MacWorks Plus II Installer has an "Expert Mode" which is entered by holding down the and option keys immediately after opening the installer. In this mode, all buttons are accessible regardless of the state of the disks attached. This may be useful in case the installer does not recognize an attached parallel port disk.

NOTE: The MW+II Basic Install application is intended to run from a floppy disk only. If you wish to run it from a hard disk in order to install MacWorks Plus II on other hard disks, hold down the and option keys when launching to skip the "floppy only" message. Do not attempt to update MacWorks Plus II on the hard disk the installer or System file is running from; although unlikely, the hard disk could be corrupted.
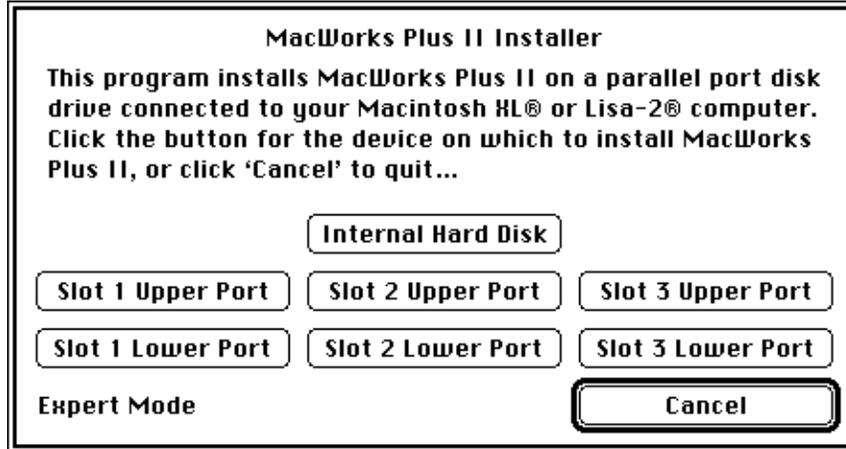
Figure 32. Opening the Installer in Expert Mode will enable all the buttons.

Icons used by MacWorks Plus II

MacWorks Plus II Installer icon

Query's Software Patcher icon

Query Engineering Inc. icon

Icons displayed as MacWorks Plus II checks for hard disks before startup

These icons are displayed before the floppy disk and question mark icon appears. Each icon remains on the screen while the X/Lisa is waiting for the corresponding disk(s) to respond; it is displayed very briefly if no hard disk is found on the corresponding port.

built-in parallel port icon

slot 1, lower port icon   slot 1, upper port icon

slot 2, lower port icon   slot 2, upper port icon

slot 3, lower port icon   slot 3, upper port icon

SCSI port icon

Icons used by the control panels supplied with MacWorks Plus II

Monitor control panel icon

Floppy control panel icon

Disks control panel icon

Debug control panel icon

XLerator control panel icon

Icons used by the XLerator control panel at startup

XLerator SCSI icon (shown when the XLerator SCSI port is active at startup)

XLerator SCSI icon (shown when the XLerator SCSI port has been turned off via the space bar over-ride at startup)

FPU icon (shown when the FPU is turned on at startup)

F-Trap Interface icon (shown when the F-Trap Interface is installed at startup)

SANE patch icon (shown when the SANE patch is installed at startup)

Disk Cache icon (shown when the XLerator Disk Cache is installed at startup)

cross icon (when superimposed on one of the above icons, indicates a feature was not installed because of an error)

XLerator not found icon (indicates that the X/Lisa does not appear to contain an XLerator; if this is so, remove the XLerator control panel from your System Folder)

resource error icon (indicates the XLerator control panel startup software could not operate properly because it could not read a required resource (F-Trap Interface, SANE Patch, or Disk Cache software)

X/Lisa Error Codes and MacWorks Plus II Messages

Self-test error codes   (From *Lisa 2 Owner's Guide*, Apple Computer, Inc. 1983)

Tone sequence			Indicates
High-Low			The time and date have been lost (If after "Welcome to Macintosh")
Low			No Memory board installed or CPU board failure
Low	Low		Memory board failure
Low	High		Card cage failure
Low	Low	Low	(unused)
Low	Low	High	CPU board error
Low	High	Low	I/O board error
Low	High	High	Memory board error
High	Low	Low	Expansion card error
High	Low	High	Keyboard error
High	High	Low	Keyboard not connected
High	High	High	Unbootable disk

Numeric error code	Indicates
Floppy Disk Errors	
23	Unable to read diskette
38	No startup file on diskette
39	Diskette controller timeout
CPU Errors	
40	MMU error
41	CPU board logic error
42	Video circuit error
43	Parity circuit error
44	NMI interrupt
45	Bus error
46	Address error
47	Other exception
48	Illegal 68000 instruction
49	Axxx or Fxxx instruction trap
I/O Errors	
50	COPS VIA error
52	I/O COPS error
53	Keyboard COPS error
54	Clock error
55	Serial A error
56	Serial B error
57	Diskette controller error

58		I/O access error
59		I/O COPS code error
60		I/O or keyboard error
	Memory Errors	
70		Read Write error
71		Parity error
	Startup Errors	
75		Startup disk is bad
	Hard Disk Errors	
80		Hard Disk not attached
81		Hard Disk not ready
82		Bad response from Hard Disk
83		Non-zero status bytes from Hard Disk
84		Invalid boot file on Hard Disk
85		Hard Disk timeout
	Expansion Slot Errors	
90		No expansion card
91		Expansion card not bootable
92		Expansion card ROM checksum error
93		Bad status from expansion card

Messages that may appear while loading MacWorks Plus II

```
HOLD DOWN SPACE BAR OR MOUSE BUTTON
  TO ADJUST STARTUP CONFIGURATION
```

Shown when MacWorks Plus II is preparing to configure the X/Lisa memory. If you hold down the space bar or the mouse button once you see this message, the over-ride menu will appear, allowing you to change the XLerator mode or Zap the PRAM.

```
USING STARTUP SETTINGS STORED IN PRAM
```

Shown if the space bar over-ride was not used, or if "0" was selected from the over-ride menu. The startup settings apply to the XLerator and memory aliasing.

```
TYPE THE LEFT OPTION KEY FOR FLOPPY STARTUP
```

Shown when MacWorks Plus II has been completely loaded and Macintosh Plus emulation is about to begin. This is the earliest time that the left option key will be recognized as indicating floppy startup.

```
XLERATOR NOT FOUND. USING SLOT MEMORY ONLY
```

Shown if Fast Only or Additive Mode has been requested, but an XLerator has not been found in the X/Lisa. MacWorks Plus II will default to using the slot memory.

SLOT MEMORY ONLY MODE

Shown if the XLerator Off Mode has been selected via the space bar over-ride. This message does not appear when Off Mode is set in the XLerator control panel if the over-ride is not used (to prevent confusion when no XLerator is installed).

FAST MEMORY ONLY MODE

Shown if Fast Only Mode has been selected for the XLerator.

ADDITIVE MEMORY MODE

Shown if Additive Mode has been selected for the XLerator.

NOT ENOUGH FAST MEMORY FOR REQUESTED MODE

Shown if there is not enough memory on the XLerator for the desired mode. MacWorks Plus II will default to using the slot memory. Additive Mode requires a minimum of 512k of fast memory; Fast Only Mode requires a minimum of 1Mb of fast memory.

FAILED TO APPLY APPLETALK PATCH

Shown if the AppleTalk patch (which adjusts the AppleTalk timing for the XLerator) was not installed. If an XLerator is installed, this will prevent AppleTalk from functioning properly unless the XLerator is in Off Mode.

FAILED TO APPLY BLIND SCSI PATCH

Shown if the SCSI patch (which converts blind SCSI reads and writes into non-blind accesses) was not installed. If booting via an LSAC, this may be due to a left-over MW+Patch file that should be removed from the System Folder.

PFG PARAMETER RAM INITIALIZED

Displayed if the PRAM has been "zapped" to its default configuration. The PRAM can be zapped by typing the Clear key from the space-bar over-ride menu. If the PRAM is found to be invalid at startup, MacWorks Plus II will "zap" the PRAM and display this message. This indicates that many of the control panel settings will have reverted to the default setting.

TYPE 0-6 FOR DESIRED STARTUP CONFIGURATION
    OR CLICK MOUSE BUTTON FOR OFF MODE
    ... (etc.)

This message does not indicate an error. This is the space bar over-ride menu. See "The space bar over-ride" on page 49 for directions.

NON-ALIASED RAM MODE HAS BEEN SELECTED
 WHICH IS A LESS ROBUST CONFIGURATION
     ARE YOU SURE.. Y/N?

This message does not indicate an error. This is a request that you confirm that

you wish to use the non-aliased configuration. This option is for the use of programmers, if you do not understand the implications of the non-aliased mode, type the "N" key to use the normal (aliased) mode. See "Debug control panel" on page 70 for more information. If you do not respond with "N" or "Y" within approximately one minute, MacWorks Plus II will assume that you wish to use the normal (aliased) mode.

```
--- TYPE A KEY TO CONTINUE ---
```

Shown if there has been an error at startup which may prevent proper operation. One or more of the following messages will indicate the specific error found. The X/Lisa will wait approximately one minute for you to observe the error message before continuing automatically; you may type a key to continue immediately. You should investigate the possible sources of the problem as directed in the section "Problems with Hardware Installation" on page 74.

```
PFG NOT RESPONDING - CHECK INSTALLATION
```

Shown if the X/Lisa cannot control the PFG properly. This indicates a serious problem that may prevent correct operation of the serial ports, the PRAM, and the floppy disk drive.

```
TIMEOUT WAITING FOR FDC - CHECK PFG CLIPS
```

Shown if the X/Lisa cannot communicate properly with the Floppy Disk Controller (FDC). This will prevent correct operation of the floppy disk drive. The most likely source of this problem is mis-connection of the red clip from the PFG.

```
PFG CANNOT CONTROL FDC - CHECK PFG CLIPS
```

Shown if the X/Lisa cannot control the Floppy Disk Controller (FDC) via the PFG. This will prevent optimal operation of the floppy disk drive, but the drive will probably continue to work with easy to read disks. The most likely source of this problem is mis-connection of the clips from the PFG.

```
FAILED TO INITIALIZE PFG PARAMETER RAM
```

Shown if the X/Lisa was unable to verify the PRAM after initializing it. This indicates the PFG is not installed correctly or is malfunctioning.

Changing the PAL and Technical Details of your PFG

Changing the PAL

If you upgrade your level of MacWorks Plus II, from Basic to PRO for example, you may be required to change the PAL in your PFG. This is a simple procedure requiring only a small screwdriver or other thin instrument.

◆ **Be especially careful to observe ESD control guidelines** ◆
◆ **when handling parts to be installed in a circuit board** ◆

It is not necessary to remove the PFG from the I/O board, but it is recommended that you remove the I/O board from the computer (as described in "Programmable Frequency Generator (PFG) Installation" on page 12).

Refer to figure 36 to locate the PAL to be changed. As in removing the Z8530 SCC from the I/O board, remove the PAL as follows: With a screwdriver or other thin instrument, alternately pry up each end of the component against its socket, a little at a time (do not pry the socket from the PC board!). After a few alternations, the component should be easily removable from the socket.

Store the removed component in anti-static material to protect if from ESD.

When inserting the new PAL, be careful to orient it as shown in the diagram. Make sure the end of the PAL labelled with an arrow is closest to the white triangle on the PFG. Position the PAL over its socket such that all pins are aligned with receptacles, and press the component into the socket.

Inspect your work to ensure that all pins are properly inserted in the socket; look especially for pins that may have been inadvertently folded under the component. Damage will occur if the PFG is used with the component installed incorrectly.
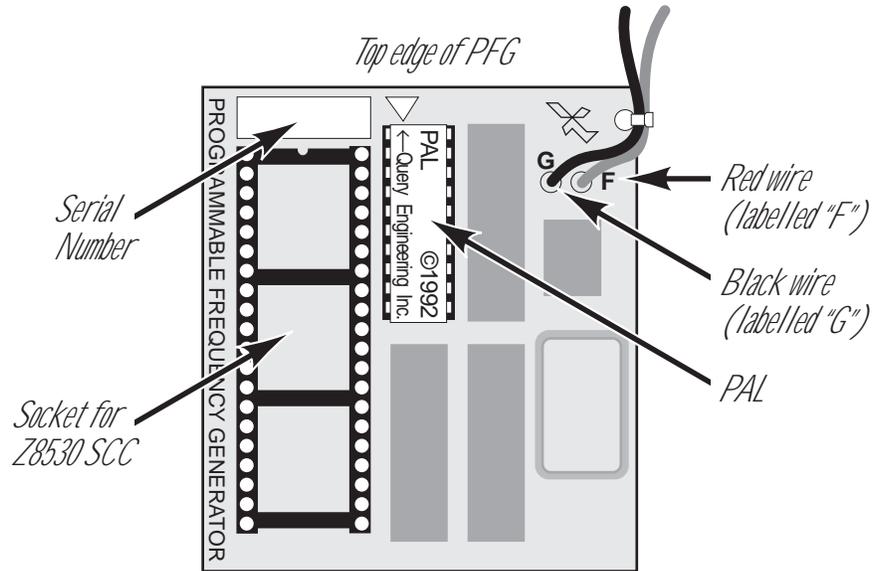
Figure 36. The PFG hardware upgrade circuit board layout.

Technical Details of the PFG

MacWorks Plus II includes the PFG circuit board which provides three major enhancements to the X/Lisa hardware.

1: Improved Serial Port Compatibility Serial Communications Controller

The PFG provides a 3.672 MHz clock to the SCC. This is the same frequency as used in the Macintosh Plus, which provides greater compatibility with communication applications that access the serial ports directly, and enables the modem port to increase its baud rate to 57,600.

2: Reliable Parameter RAM

The PFG includes 256 bytes of EEPROM. The data stored in EEPROM is retained indefinitely during power interruptions, whereas the X/Lisa's Parameter RAM loses its contents after the battery (if installed) loses its charge (typically after one day). Additionally, the X/Lisa had about 30 bytes of Parameter RAM available, which was not enough to store the many settings required. Although the PFG EEPROM does store the date, it does not prevent losing the time setting during a power interruption.

Note that the EEPROM used in the PFG has a rating of 10,000 changes per bit. Some settings (eg. the date) are stored in EEPROM in a fashion that will minimize transitions, but nevertheless, one should attempt to preserve the life of the EEPROM by minimizing changes. It is advisable to avoid carelessly changing Control Panel settings or zapping the PRAM needlessly. The Control Panel settings are written to the PRAM when the Control Panel is closed or another is selected, so it is somewhat difficult to abuse the PRAM casually.

3: Improved Floppy Disk Compatibility

The X/Lisa has a Floppy Disk Controller that is very different from later Macintosh computers. Historically, the 800k disk drive has worked reasonably well, but occasionally has been unable to read disks created on other machines. The PFG provides the means to adjust the synchronization of the Floppy Disk Controller by modulating the clock frequency of the Floppy Disk Controller's State Machine. The PFG varies the floppy data clock frequency under software control (hence Programmable Frequency Generator). The PFG provides more than 50 distinct frequencies which make the X/Lisa more tolerant of bit timing and disk speed than other machines. MacWorks Plus II incorporates a new Floppy Disk Driver which uses the PFG in combination with other strategies to allow reading essentially all valid 800k floppy disks.

What happens when you turn on your X/Lisa

When you turn on your X/Lisa, the following events occur before MacWorks Plus II finally transfers control to the Macintosh system.

The CPU board ROMs execute the self-test.

The X/Lisa checks to see if you have typed any keys on the keyboard; if so, it takes this as an indication that you wish to select the `STARTUP FROM` *device manually, and displays the* `STARTUP FROM` *menu. If no keys have been pressed, the* `STARTUP FROM` *choice (set via the Disks control panel) is taken from the X/Lisa PRAM, and if valid, that device is used as the boot device.*

Once MacWorks Plus II starts to load, it checks to see if you are holding down the space bar or the mouse button; if so, you are presented with the list of startup configurations. If a selection is not made within about 1 minute, loading continues with the configuration stored in PRAM (set via the XLerator control panel).

If non-aliased mode was selected (either with the apple key or via the Debug control panel), confirmation is requested when it is time to alias the memory.

After loading all of MacWorks Plus II, the screen is greyed and the startup beep occurs.

Each hard disk is then examined for a valid driver, which is opened when found. The disks are checked starting with the internal parallel port, parallel port slot cards, and then SCSI devices. As each port is checked, an icon is shown indicating the device(s) under examination.

Once the drivers have been opened, the disk icon is shown with the flashing question mark, indicating that a Macintosh System Disk is required.

If the left option key has been typed since loading MacWorks Plus II, the hard disks are ignored and the X/Lisa waits for a floppy System Disk to be inserted. Otherwise, the desired startup device is retrieved from the PRAM (as set by the Startup Device control panel); this disk is checked to see if it has valid boot blocks, if not, the other disks are checked to find the first one with valid boot blocks.

Once valid boot blocks are found, the disk icon changes to the Happy Mac icon, and the System file is loaded from the disk.

If there is no System file on the disk, the icon changes to the disk and X icon, and the next disk with valid boot blocks is used.

Once the System file is operating, MacWorks Plus II does its final setup and checks that the date corresponds to the date stored in PRAM. If the date is found to be unlikely, the high-low tones sound to indicate the date and time should be checked.

X/Lisa and Macintosh Plus Differences

There are many small differences between the X/Lisa and the Macintosh Plus; only the significant differences are listed here.

See the MacWorks Plus II non-compatibility sheet for a list of specific applications that may not be completely compatible with the X/Lisa running MacWorks Plus II.

Screen

On X/Lisa computers with revision H ROMs, the pixels shown on the screen are taller than they are wide. This distortion is not present in printed documents. A screen modification kit is available from your supplier which makes the pixels on your X/Lisa square.

The X/Lisa screen is a different size than the Macintosh Plus (512x342). The X/Lisa screen is 720x364 with revision H ROMs or 608x431 with the 3A ROMs or SFK (Screen Fix Kit). This causes the Command-Shift-3 screen dump to be a different size on the X/Lisa. Some games written specifically for the Macintosh Plus assume the screen is the size of the Macintosh Plus, and therefore do not work properly on the X/Lisa.

Keyboard

The command key is labelled with (the apple symbol), whereas other Macintosh keyboards are labelled with ⌘ (the cloverleaf symbol).

The keyboard hardware is different on the X/Lisa than on the Macintosh Plus; this prevents most startup documents from being disabled by their special key combinations.

Programmer's Switch

The X/Lisa's reset button is on the connector panel at the back of the X/Lisa.

The Lisa 2 does not have an interrupt programmer's switch. The Debug control panel provides a similar capability.

Floppy Disk Hardware

The X/Lisa floppy disk controller design is different from that on the Macintosh Plus, hence software that directly accesses the floppy disk controller will not work properly. This includes some floppy duplication applications and some applications that use a non-standard floppy disk for copy protection (these applications often have a "key-disk").

VIA

The X/Lisa VIA is addressed differently from that in the Macintosh Plus, hence applications that directly access the VIA will not work properly. These applications are very rare, as the Time Manager is usually used instead of direct access to the VIA. The "profiler" routines in some software development packages are sometimes written to directly access the VIA. MacWorks Plus II does support calls to the "Revised Time Manager" however.

Sound

The X/Lisa does not have the same sound hardware built-in as the Macintosh Plus.

Serial Ports

The Serial A port corresponds to the Modem port on the Macintosh Plus, and the Serial B port corresponds to the Printer port.

The Serial ports on the X/Lisa have different connectors than does the Macintosh Plus. Thus different cables or adapters are required for connecting peripheral devices. For detailed information, see "X/Lisa Serial Port Connectors" below.

Back Panel Peripheral Connectors

The Macintosh XL has a built-in parallel port; however, the connector for this parallel port is internal (for connecting to the internal hard disk).

Reset Video Button Out — Mouse Connection — Modem Port — Printer Port — Programmer's Switch
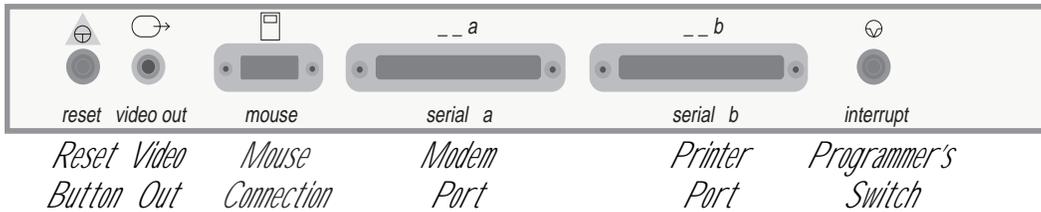
Figure 33. Macintosh XL peripheral connector panel detail

The Lisa 2 does not have a programmer's switch built-in. The mouse connector on some Lisa 2 computers is a self-locking type, which prevents using a standard Macintosh Plus mouse unless one of the connectors is changed.

Reset Video Button Out — Parallel Port — Mouse Connection — Modem Port — Printer Port
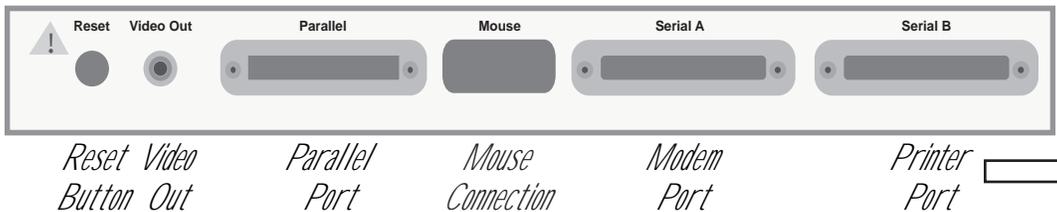
Figure 34. Lisa 2 peripheral connector panel detail

X/Lisa Serial Port Connectors

The serial ports on the X/Lisa are constructed with different connectors than those of the Macintosh Plus. The following information may help if you need to (have someone) make a cable for a peculiar serial device. If you prefer, you may obtain an adapter from your supplier or Dafax Processing Corp.
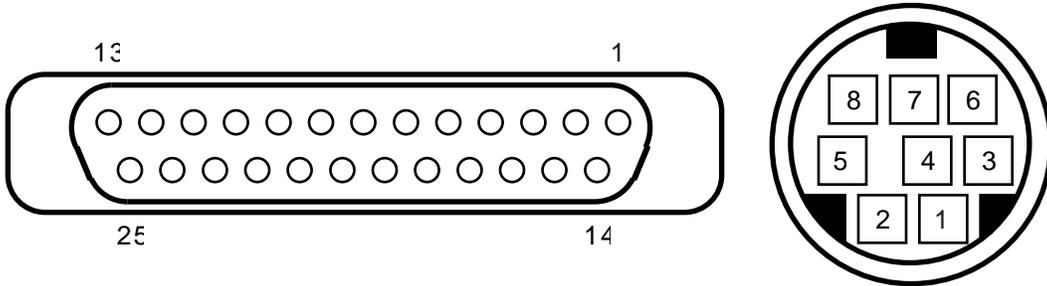
Figure 35. DB-25 & 8 pin Mini-DIN socket signal numbering

Table 1. Serial port connector signals on the X/Lisa and the Macintosh Plus

Serial Signal Name	X/Lisa DB-25 Pin Number	Macintosh Plus 8 Pin Mini-DIN Pin Number	Serial Port Signal/Pin Description
RxD–	3	5	Data to X/Lisa
TxD–	2	3	Data from X/Lisa
HSKo	20	1	Handshake driven by X/Lisa
HSKi	6	2	Handshake observed by X/Lisa
GPi	8	7	DCD input on Serial A only
GND	7	4	Signal Ground

The following complementary data lines are available on Serial Port B when it is in differential (ie. LocalTalk) mode.

RxD+	19	8	Differential Data to X/Lisa
TxD+	20	6	Differential Data from X/Lisa

RS-422 (differential) vs RS-232 (single-ended) serial connection

The Serial A port does not have a differential driver/receiver, hence it is not possible to use the Modem port for LocalTalk without a special adapter. It must be connected as an RS-232 device.

The Serial B port has a switchable differential driver/receiver. Like the Macintosh Plus, this allows the port to be used for LocalTalk. Unlike the Macintosh Plus, the driver/receiver is switched to non-differential mode when not being used for LocalTalk.

As both Serial A and Serial B operate as single-ended RS-232 devices, Printer and Modem cables should use single-ended wiring (very few Printers and Modems expect a differential connection).

If connecting the X/Lisa to a device that has a differential receiver (RS-422), wire the cable as an RS-422—RS-232 adapter; ie. connect RxD+ (of the differential peripheral) to ground. This provides a reference for the bipolar signal at RxD–. Connect RxD– to TxD– and TxD– to RxD– (each to the other device). Leave TxD+ (of the differential peripheral) floating.

Details for serial trouble-shooters

The SCC pins mentioned herein are "active-low" inputs and outputs as described in the Z8530 documentation. Although all of these SCC pins use active-low signals, no indication of this fact is given in this manual (ie. a convention such as a slash, asterisk, or overbar is not used).

Handshaking

As on the Macintosh Plus, the handshake driven by the X/Lisa is the output of the SCC's DTR pin, inverted.

On Serial B, as on the Macintosh Plus, the handshake to be observed by the X/Lisa is passed to the SCC's CTSB pin (and the TRxCB pin) un-inverted.

On Serial A, the handshake to be observed by the X/Lisa is inverted and passed to the SCC's SYNCA pin. This is the handshake input used by the X/Lisa serial driver. This differs from the Macintosh Plus, which has the handshake input connected to the CTSA pin.

Baud Rate Generation

The SCC in the X/Lisa drives its baud rate generator from the PCLK pin at 3.672 MHz. This frequency is provided by the PFG to allow the SCC to operate at asynchronous data rates up to 57,600 baud. Unlike the Macintosh Plus, the RTxCA and RTxCB pins are not connected to this oscillator. On Serial A, pin 17 is inverted and passed to RTxCA. RTxCB has no external connection.

General Purpose Input

On Serial A, pin 8 is inverted and passed to the SCC's DCDA pin. However the Macintosh Plus makes no connection to DCDA.

Less useful serial port details

On Serial A, the signal input on pin 5 is inverted and passed to the SCC's CTSA pin, however this signal is not used by the X/Lisa serial driver.

On Serial A, the SCC's RTSA pin is inverted and passed to pin 4. This signal is not used by the X/Lisa serial driver. On Serial B, pin 4 is pulled up to 5V by a 10k resistor.

To allow driving Serial A with an external clock, pin 15 passes through a single transistor inverter to TRxCA. To allow Serial A to provide an external clock, pin 24 is the output of the SCC's TRxCA pin, inverted.

Glossary

   Apple Symbol—Represents the "Command" key beside the space bar. The notation "2" indicates press and hold the  key and type the 2 key. May also indicate the Apple Menu at the extreme left of the Menu bar.

AppleTalk   AppleTalk—Apple's Local Area Network, the inexpensive serial port hardware implementation has been renamed recently as "LocalTalk" to distinguish it from newer implementations (eg. "EtherTalk")—collectively known as AppleTalk.

Boot (strap)   Boot Strap—Colloquial term referring to the start-up of a computer. "Booting" typically involves loading an environment from a boot-disk.

Circuit Board   Circuit Board—A thin fiberglass panel with conducting paths that join the electronic components installed on the board. The I/O board and the PFG are examples of circuit boards.

Connector   Connector—Used to join electrical parts together. Eg. cables are joined to the computer via connectors.

CPU   Central Processing Unit—The part of the computer that interprets instructions and runs software. In the X/Lisa, the Motorola 68000.

EEPROM   Electrically Erasable Programmable Read Only Memory—The physical type of PRAM used in the PFG.

EPROM   Erasable Programmable Read Only Memory—The physical type of ROM used in the X/Lisa.

ESD   Electo-Static Discharge—Transfer of static electrical charge which can result in damage or destruction of electronic components.

FPU   Floating Point Unit—A specialized part which is designed to execute mathematical operations faster than a regular microprocessor. Eg. the MC68881.

HFS   Hierarchical File System—Usual format of Macintosh disks larger than 400k. See Apple's System Software documentation for more information.

I/O   Input/Output—refers to the interchange of information with external devices, hence the I/O board is the link to peripherals such as printers.

LocalTalk   LocalTalk—see AppleTalk.

LSAC   X/Lisa SCSI Accessories Card—The expansion card for the X/Lisa manufactured by Query Engineering Inc. This card provides the facility to load MacWorks Plus or MacWorks Plus II directly from a SCSI disk.

MHz   MegaHertz—Millions of cycles per second. Used in CPU specifications to indicate the clock rate of operation. The Motorola 68000 normally

	executes a 0 wait state bus cycle in 4 clock cycles; 1 wait state bus cycles take 5 clock cycles. Instruction execution may require additional clock cycles to those needed for bus access.
PAL	Programmable Array Logic—Parts that can be factory programmed to perform a variety of functions.
PFG	Programmable Frequency Generator—The name of the circuit board hardware upgrade included with MacWorks Plus II.
PRAM	Parameter RAM—memory used to store variable settings. Like RAM, this memory can be changed. Like ROM, this memory is retained when the computer is turned off.
RAM	Random Access Memory—the main memory of the computer, erased when the computer is turned off.
ROM	Read Only Memory—Memory retained when the computer is turned off, used to start-up the computer operating system.
SCC	Serial Communications Controller—The Z8530 SCC is the component on the X/Lisa I/O board that operates the serial ports.
SCSI	Small Computer Standard Interface—A reasonably fast and flexible byte serial interface used for hard disks and other peripherals.
SIMM	Single In-line Memory Module—A physical form of memory board—used on the XLerator and in most Macintosh computers.
Startup Disk	Startup Disk—The floppy or hard disk with System and Finder files (usually in a System Folder) that was/is used to start-up once the floppy with the flashing question mark is observed.
STARTUP FROM	Startup From menu—The Startup From menu is used to select the device which the X/Lisa will use to load an operating environment.
System Disk	System Disk—In most Macintosh usage, this is the disk that holds the system currently in use. In this manual, it is assumed to be the "Startup Disk" as well.
VIA	Versatile Interface Adapter—A general purpose component that performs a variety of functions in the X/Lisa such as parallel port interface, volume control, timing etc.
XLerator	XLerator—The accelerator board for the X/Lisa manufactured by Query Engineering Inc. With a 16MHz 68000 and 4 SIMM sockets, this board can bring the X/Lisa up to 4Mb and 3 times the speed.
X/Lisa	Macintosh XL or Lisa 2—Colloquial term used in this text when referring to both Macintosh XL and Lisa 2 computers.
Zap	Zap—Colloquial term used to indicate erasing, as in "Zap the PRAM."

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