

Apple Lisa Computer Technical Information

🍏 Apple Lisa 2 / Macintosh XL Computer Level 1 Technical Repair Procedures

🍏 Apple Lisa Computer
Technical Information
October 1988

Lisa Level I

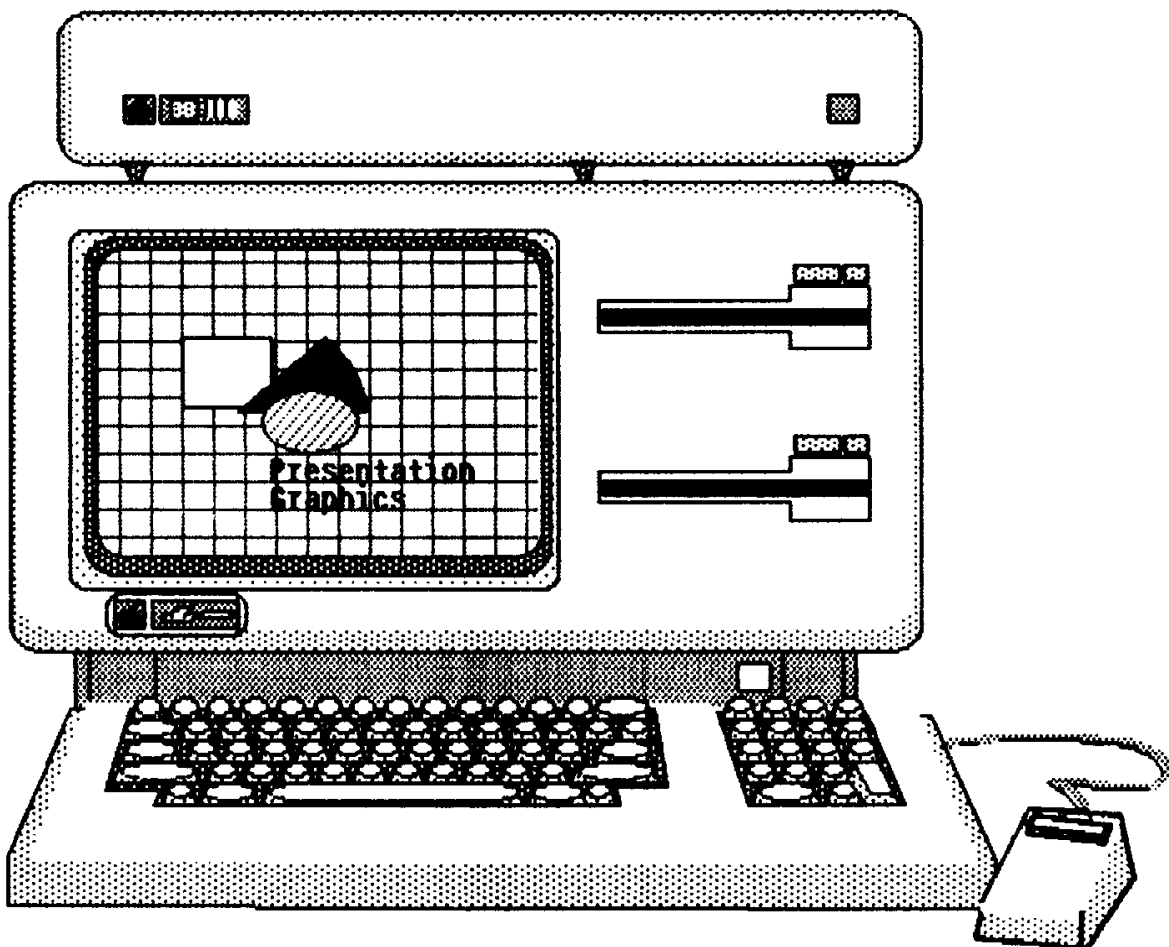
Technical Procedures

#072-0085

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LISA





LISA 2 / MACINTOSH XL

TECHNICAL PROCEDURES

Name Change

The Lisa 2/10 is now called the Macintosh XL. All references to the Lisa 2/10 contained in these procedures refer as well to those machines designated as the Macintosh XL.

LISA 2/MACINTOSH XL TECHNICAL PROCEDURES

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SERVICE AND SUPPORT NOTICE

THE FOLLOWING TECHNICAL PROCEDURE UPDATES ARE INCLUDED IN THE
MAY LISA/MACINTOSH XL TECHNICAL PROCEDURES MAILING

LISA/MACINTOSH XL TECHNICAL PROCEDURES MANUAL

Lisa 2/Macintosh XL

Video Take-Apart - We have added modified system information to the CRT and Video Board replacements sections. Remove and replace procedures for the Screen Kit Transformer have been added.

Video Adjustments - we have added a reference on where to find procedures for height and width adjustments on modified systems.

Diagnostics - added screen kit and ROM configuration information.

Troubleshooting - The Lisa Lite Adaptor has had a name change to the Lisa Drive Adaptor Card. We have identified the most current diagnostic diskettes and when and how to use them. Information was also added to "How to Repair a Crashed Disk".



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JUNE LISA/MACINTOSH XL TECHNICAL PROCEDURES MAILING

LISA/MACINTOSH XL TECHNICAL PROCEDURES MANUAL

Lisa 2/Macintosh XL

General Information - A new tab and section has been added to the Lisa 2/Macintosh XL section. This section includes information on system configurations for the Lisa 2, 2/5 and the XL (2/10), as well as the Modified Lisa 2/5 and Modified Macintosh XL. It contains peripheral configurations for printers and some basic troubleshooting and diagnostic tips. At the end of the section you will find some useful information on different types of error codes and their definitions.

Diagnostics & Troubleshooting - Some minor corrections have been made to these section.



Lisa 2/Macintosh XL Technical Procedures

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SYSTEM CONFIGURATIONS

There are five configurations of the Lisa 2/Macintosh XL system: Lisa 2, Lisa 2/5, Macintosh XL (formerly Lisa 2/10), Modified Lisa 2/5, and Modified Macintosh XL. General information about each system is listed below. Other sections of the **Lisa 2 Technical Procedures** give more specific information, and are referred to below. When you see a reference note, turn to the appropriate section in this manual and review the information given there.

Lisa 2

1. Has 512K of memory if only one memory board is installed.
2. Has maximum memory of 1 megabyte if both memory boards are installed. (However, two megabytes of memory are possible if third party memory boards are installed.)
3. All software is loaded via the microdisk drive on 3.5" diskettes.
4. Does not have internal or external hard disk.
 - a) Once the ProFile (5 or 10MB) is connected, Lisa 2 becomes Lisa 2/5.
 - b) Cannot install an internal hard disk because the I/O board and Motherboard do not support one.

Refer to **Section 6, Troubleshooting**, for the "Basic Lisa 2/Macintosh XL Configuration Table" and the "System Boards Compatibility Table."

Lisa Office System

- Must be loaded onto a hard disk (ProFile or internal hard disk) and therefore cannot run on a Lisa 2.

MacWorks

- a) Can be loaded via the microdisk drive; must boot MacWorks disk first, then insert each application as needed.
- b) In the MacWorks environment, the Lisa 2 behaves like a Macintosh without an external disk drive.

Workshop (for Software Development)

- a) Two memory boards are required to run all versions of the Workshop.
- b) Only versions 1.2 and 2.0 of Lisa Pascal will run without a hard disk. However a hard disk is recommended for the best system performance.
- c) All other versions of the Workshop require a hard disk, and therefore cannot run on a Lisa 2.



Lisa 2/5

1. This is a Lisa 2 with a 5 or 10 megabyte ProFile (external hard disk) connected to the built-in parallel port in back of the Lisa 2.
2. Additional ProFiles (up to 6) may be added by connecting them to optional parallel interface cards.
3. Software may be booted from the microdisk drive or from the ProFile(s).
4. Does not have an internal hard disk.
 - An internal hard disk cannot be installed because the I/O board and Motherboard do not support one.

Refer to **Section 6, Troubleshooting**, for the "Basic Lisa 2/Macintosh XL Configuration Table" and the "System Boards Compatibility Table."

Lisa Office System

ALL VERSIONS OF THE LISA OFFICE SYSTEM SHOULD BE UPGRADED TO VERSION 3.1

- a) Must be installed onto the ProFile. After the installation you do not have to boot any diskettes. Just turn the system on and the Office System comes up.
- b) All applications can be installed onto the ProFile.
 - 1) Applications are serialized (licensed to be used only on one Lisa) once they have been installed onto the ProFile.
 - 2) If the ProFile is transferred to a different Lisa, the Office System will come up, but you will not be able to open applications.
- c) The Office System and tools take up approximately 2.5 Megabytes of ProFile memory.
- d) ProFile may run Lisa Office System and Workshop only, or can share Lisa and MacWorks operating systems.

MacWorks

ALL VERSIONS OF MACWORKS XL SHOULD BE UPGRADED TO THE LATEST VERSION (CURRENTLY VERSION 3.0).

- a) This environment can be installed onto the ProFile.
- b) Most MacWorks applications can be also be installed onto the ProFile.
- c) ProFile may run MacWorks only, or can share MacWorks and Lisa Office System operating systems. In this case, the booting process is different for each environment. (See **MacWorks Owner's Manual**.)
- d) MacWorks supports the built-in parallel port only.



Workshop (for Software Development)

- a) Two memory boards are required to run all versions of the Workshop.
- b) Is compatible with the Lisa Office System and can be loaded onto the same ProFile
- c) Pascal is available

Refer to **Section 6, Troubleshooting** for "Hard Disk Operating Systems."

Macintosh XL (formerly Lisa 2/10)

Lisa 2/10 was renamed Macintosh XL in January, 1985. The purpose was to make it clear that the Macintosh XL (using MacWorks) and the Macintosh are compatible."

- 1. Has a 10 megabyte internal hard disk.
- 2. Up to six ProFiles can be added by connecting them to optional parallel interface cards.
- 3. Software may be booted from the internal hard disk, the ProFile(s) (if connected), or the microdisk drive.
- 4. The I/O board and motherboard are different from those in the Lisa 2.

Refer to **Section 6, Troubleshooting**, for the "Basic Lisa 2/Macintosh XL Configuration Table", and the "System Boards Compatibility Table."

Lisa Office System

ALL VERSIONS OF THE LISA OFFICE SYSTEM SHOULD BE UPGRADED TO VERSION 3.1

- a) Must be installed onto the internal hard disk. You do not have to boot any diskettes. Just turn the system on and the Office System comes up.
- b) All applications can be installed onto the internal hard disk.
 - 1) Applications, except LisaWrite and LisaProject 3.1, are serialized (licensed to be used only on one Lisa) once they have been installed onto to ProFile.
 - 2) If the internal hard disk is transferred to a different system, the Office System will come up, but you will not be able to open applications.
- c) The Office System and tools take up approximately 2.5 Megabytes of memory.
- d) The internal hard disk may run Lisa Office System only, or can share Lisa and MacWorks operating systems.



MacWorks

ALL VERSIONS OF MACWORKS SHOULD BE UPGRADED TO THE LATEST VERSION (CURRENTLY VERSION 3.0).

- a) This environment can be installed onto the internal hard disk.
- b) Most MacWorks applications can be also be installed onto the internal hard disk.
- c) The internal hard disk may run MacWorks only, or can share MacWorks and Lisa Office System operating systems. In this case, the booting process is different for each environment.
- d) MacWorks supports the internal hard disk only.

Workshop (for Software Development)

- a) Two memory boards are required to run all versions of the Workshop.
- b) Is compatible with the Lisa Office System and can be loaded onto the same internal hard disk.
- c) Pascal is available

Refer to **Section 6, Troubleshooting**, for "Hard Disk Operating Systems."

Modified Lisa 2/5 and Modified Macintosh XL

Because Macintosh pixels are square and Lisa pixels are rectangular, Macintosh documents will appear to be slightly taller than their actual size when displayed on a Lisa. However, when you print a Macintosh document using a Lisa, the printout will look exactly the way the document would be displayed on a Macintosh (not a Lisa) screen.

1. Modified Lisa 2/5 and Modified Macintosh XL have the same features as the unmodified systems except for three CPU board ROM chips.
2. Additional transformer is installed between the CRT and the video board..

Refer to **Section 6, Troubleshooting**, for the "Basic Lisa 2/Macintosh XL Configuration Table" and the "System Boards Compatibility Table."

Refer to "Installing the Kit" in **Section 4, Macintosh XL Screen Modification Kit** under the tab **Upgrade and Retrofit**, for installation instructions.



Lisa Office System

- Cannot run on a modified Lisa 2/Macintosh XL.

Macworks

ALL VERSIONS OF MACWORKS SHOULD BE UPGRADED TO THE LATEST VERSION (CURRENTLY VERSION 3.0).

- a) This environment can be installed onto the internal hard disk.
- b) Just turn on the system to boot MacWorks from hard disk drive.
- c) Most MacWorks applications can be also be installed onto the internal hard disk.
- d) The internal hard disk runs MacWorks only.

Workshop (for programming)

- Cannot run on a modified Lisa 2/Macintosh XL.

Refer to **Section 6, Troubleshooting**, for the "Basic Lisa 2/Macintosh XL Configuration Table."



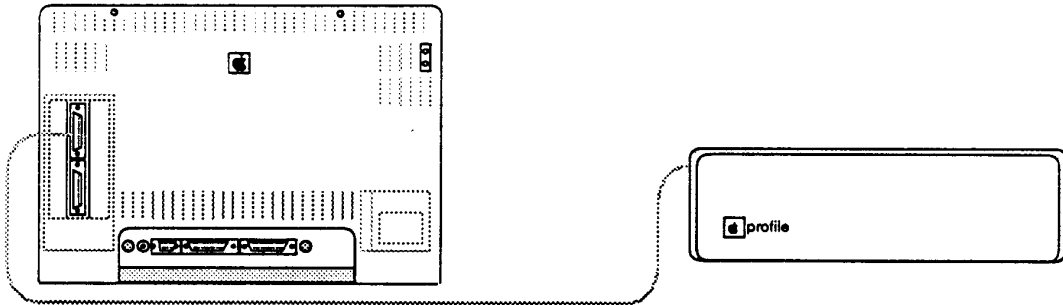
CONFIGURING PERIPHERALS

To use a peripheral device, an operating system (Lisa Office System or MacWorks) must know to which port the device is connected, how to communicate with it, and how to operate it.

Hardware and software configuration information is given for each peripheral listed below.

ProFile

1. Connects directly to the built-in parallel port for Lisa 2 or 2/5.
2. Connects via parallel interface card for Macintosh XL as shown below.



If there is more than one hard disk attached, follow the procedures below to select which disk you want to start up from.

1. Turn the system on. After you hear the first "click", press the **<SPACE BAR>**.
2. After the system performs its self-diagnostic test, the **STARTUP FROM** menu will appear at the upper left corner of the screen. Use the mouse to select the startup device.

Lisa Office System

Boot the Office System Environment and set **Preferences**. (Refer to **Lisa Office System Manual**, "Setting Preferences.")

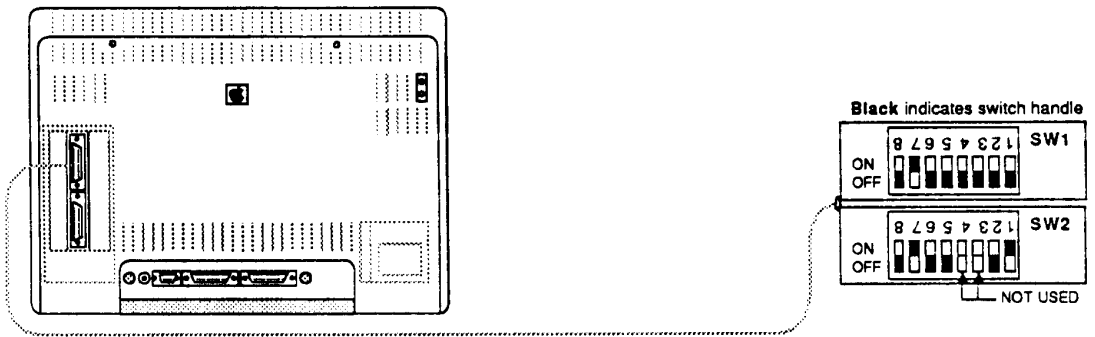
MacWorks

MacWorks can be installed only if the ProFile is attached to the built-in parallel port.



Dot Matrix Printer (DMP)

1. For Lisa 2 (without ProFile), connect to the built-in parallel port.
2. For all other systems, connect via the parallel interface card as shown below.



DOT MATRIX PRINTER

Lisa Office System

Boot the Office System Environment and set **Preferences**.
(Refer to **Lisa Office System Manual**, "Setting Preferences.")

MacWorks

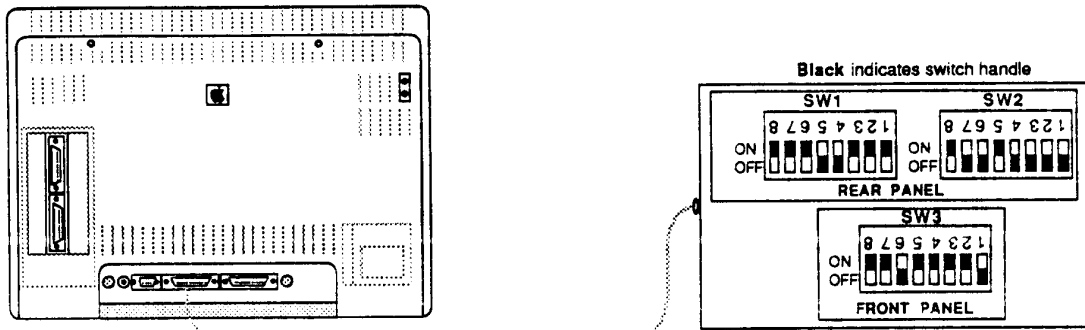
Must install parallel printer driver.

- a) Boot the MacWorks Environment.
- b) Insert the MacWorks System Disk and select the **Parallel Printer Install** icon. The install program will guide you through the procedure.



Daisy Wheel Printer (DWP)

- Connect directly to one of the serial ports at the back of the system as shown below.



DAISY WHEEL PRINTER

Lisa Office System

Boot the Office System Environment and set Preferences.
(Refer to **Lisa Office System Manual**, "Setting Preferences.")

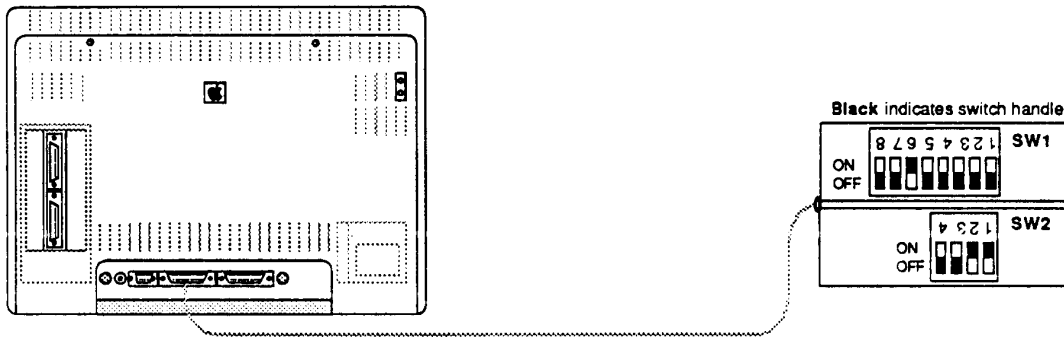
MacWorks

There is no current software driver sold by Apple that runs the Daisy Wheel Printer using MacWorks. However, there are several third party vendors who market driver software to run any letter quality printer using MacWorks.



ImageWriter Printer

- Connect directly to one of the serial ports at the back of the system as shown below.



IMAGEWRITER (Serial)

Lisa Office System

Boot the Office System Environment and set **Preferences**.
(Refer to **Lisa Office System Manual**, "Setting Preferences.")

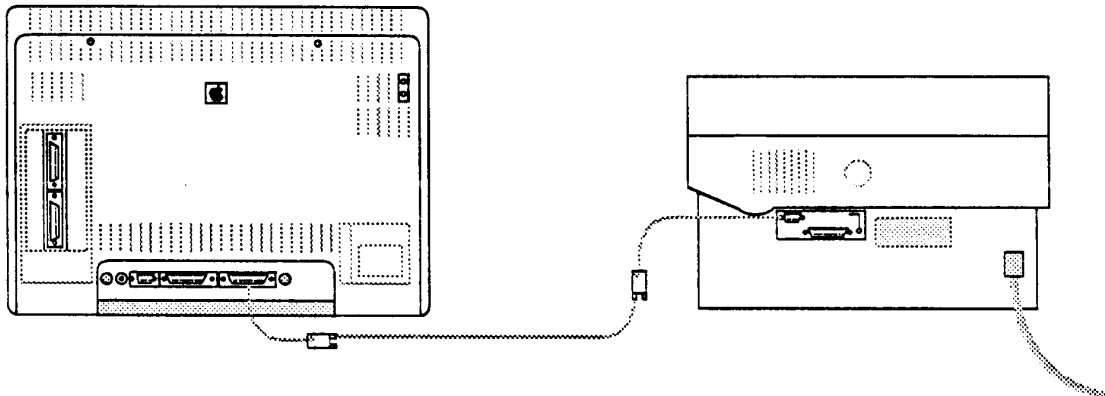
MacWorks

ImageWriter driver is on the MacWorks System Disk. It is transferred to the hard disk when the System Folder is copied onto the hard disk.



LaserWriter Printer

- Connect to serial port B via AppleTalk connector boxes as shown below



Lisa Office System
Does not support Laserwriter.

MacWorks
Must install LaserWriter driver onto the MacWorks hard disk. Driver installation diskette comes with the LaserWriter package.



LISA 2/MACINTOSH XL BASIC TROUBLESHOOTING AND DIAGNOSTICS

Before you can use the diagnostic diskette to analyze the system, the system must be able to boot the diagnostic diskette. The video circuit must be functioning well enough that you can see the diagnostic menus on the screen.

To get the system up and running well enough to boot a diagnostic diskette, follow the steps in the "Primary Troubleshooting Flowchart" in **Section 6, Troubleshooting**.

When you've finished the flowchart procedures, go to **Section 5, "Using the Diagnostic Diskette,"** for instructions on running the diagnostics.

Identifying a Defective Video State ROM

The Lisa 2/Macintosh XL Video State ROM is a multipurpose chip on the CPU board at location 6-C. It contains the serial number and AppleNet number of the system in which it is installed. One of the Video State ROM functions is to serialize Lisa Office System applications to the particular system on which they are installed. This serialization process does not occur when installing applications in the MacWorks environment. The Video State ROM is also involved with the video display and memory allocation.

Whenever the CPU board is replaced, you must be sure to install the customer's Video State ROM on the replacement CPU board.

CONTINUED ON THE NEXT PAGE



The following symptoms can be caused by a defective or incorrect Video State ROM. The most likely cause and a solution is provided below each symptom described.

Symptom

When trying to open a Lisa Office System application, a message comes up saying that the application tool is not licensed for use on the system.

Probable Causes

- a) The CPU board has been replaced with the wrong Video State ROM installed.
- b) The software has previously been installed on a different system.

Solution

- a) Remove the Video State ROM from the customer's original CPU board and install it in the new board. If this is not possible, record the serial number and the AppleNet of the system. Call your TAC and order a replacement ROM.
- b) If the customer tried to install the Lisa Office System applications on a second system, tell them that they will have to buy a second set of software.

Symptom

When trying to open **Preferences** in the Lisa Office System environment, a message is displayed saying that the system is having difficulties displaying **Preferences**.

Probable Cause

The Video State ROM is defective or the wrong ROM has been installed.

Solution

- a) Install the customer's original Video State ROM.
- b) Install another CPU board with a different Video State ROM. Reinstall the Lisa Office System onto the hard disk. Once the installation is complete, insert the Office System 1 diskette and select **Repair** from the first menu. When the repair process is complete, turn the system off and back on again. Try opening **Preferences**. If **Preferences** is displayed, turn the system off, replace the



customer's original Video State ROM, and try opening **Preferences** again. If **Preferences** still cannot be displayed, record the system serial number and the AppleNet number, then call your TAC to order a new ROM.

Symptom

No video or incorrect video.

Probable Cause

The Video State ROM is bad, or there is no ROM installed.

Solution

- a) Verify that the Video State ROM is installed on the CPU board. If not, install the customer's original ROM.
- b) Put in a new CPU board with a different Video State ROM installed. If the system works, the original ROM was bad. Record the system serial number and AppleNet number, then call your TAC to order a new ROM. Install the new ROM before returning the system to the customer.



Error Codes

The Lisa 2/Macintosh XL may display some type of error code/tone when the system fails during operation. Error codes are listed in **Section 6, Troubleshooting**. The different types of error codes are listed and defined below. Review them so that when they come up, you will know what kind of error code you are dealing with.

Startup Error Icons

When the system fails during its initial self-test or while booting something, an icon representing the bad component is displayed with an "X" through it.

Startup Error Codes

A number is displayed while booting software.

Startup Error Tones

A combination of two or three "Low/High" tones is emitted during the initial self-test or while trying to boot software.

"Sad Macintosh" Error Codes

These occur only on systems using MacWorks. A "Sad Macintosh" Icon appears just when you would expect the Macintosh desktop to appear on the screen.

Operating System Error Codes

These numbers are displayed when there is an error while using an application. Usually they represent a software error.



Lisa 2 Technical Procedures

Section 1

Take-Apart

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- * These procedures apply to Lisa 2/10 only
- ** These procedures apply to Lisa 2 and Lisa 2/10

NOTE: Procedures not marked with an asterisk apply to Lisa 1.0 and all versions of Lisa 2.



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The Disk Drive Cable Assembly (Lisa 2 and Lisa 2/10 only)

** Removing the Disk Drive Cable Assembly.....25
** Installing the Disk Drive Cable Assembly.....26

For the procedures not listed, refer to the Lisa 1.0
Technical Procedures.

** These procedures apply to Lisa 2 and Lisa 2/10

NOTE: Procedures not marked with an asterisk apply to Lisa
1.0 and all versions of Lisa 2.



REMOVING AND INSTALLING THE FRONT PANEL

Removing the Front Panel

1. Turn off the Lisa by pressing the on-off button (see Figure 1). Wait until the light inside the on-off button is out.
2. Turn off all peripheral devices. Unplug the Lisa and all peripherals from the wall outlet.
3. Place one finger on each of the two dished pads beneath the front panel (see Figure 2).
4. Push the pads up and pull the bottom of the panel forward and down.

Replacing the Front Panel

1. Hold the panel with one finger on each dished pad along the bottom edge.
2. Insert the upper edge of the panel behind the lip of the top housing on the Lisa.
3. Pressing the dished pads up, push the bottom edge of the panel against the Lisa until the panel snaps into place.

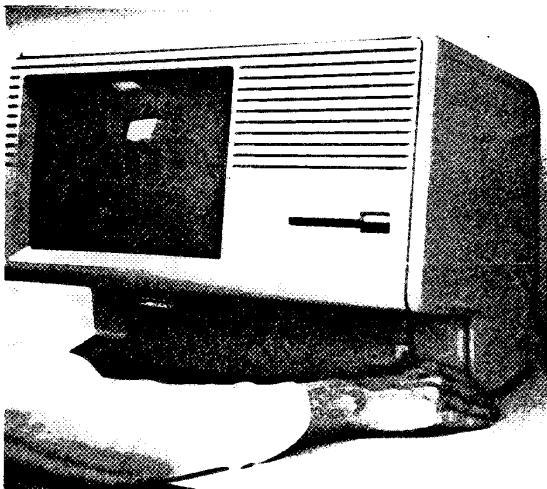


FIGURE 1

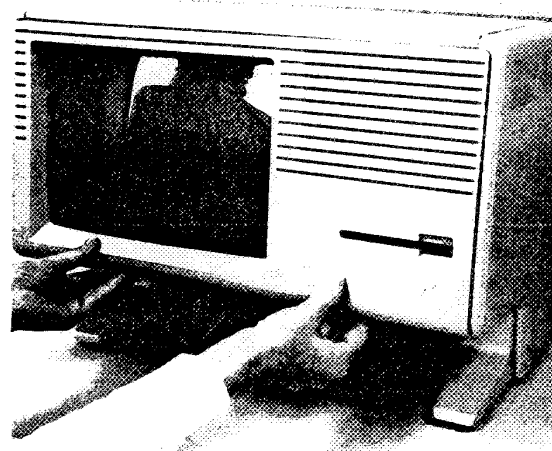


FIGURE 2

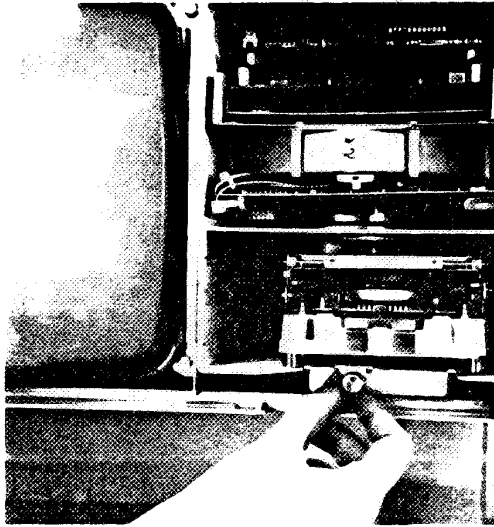


FIGURE 3

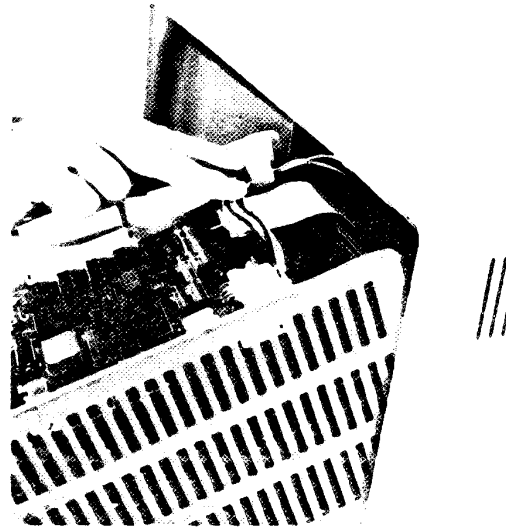


FIGURE 4



FIGURE 5

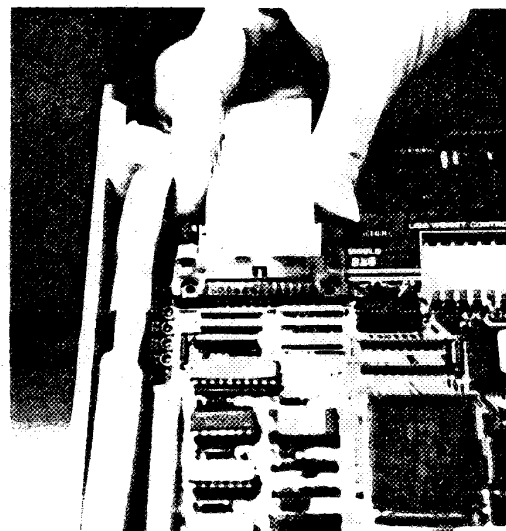


FIGURE 6



REMOVING AND INSTALLING THE DISK DRIVE MODULE

Removing the Disk Drive Module

1. Power down. Turn off and disconnect all peripherals from the Lisa.
2. Remove the front cover.
3. Loosen the thumbscrew at the base of the disk drive carrier by turning it counterclockwise. (See Figure 3.)

This screw loosens but does not come free from the carrier. When it's loose, you can feel the pressure of the spring at the base of the screw, and the screw can be pulled slightly in and out.

4. Grasp the thumbscrew and slowly pull the disk drive module out until you can see the cable connectors at the back edge of the uppermost PC board.

LISA 1.0: Place the module face down and disconnect the cable connectors from both drives (pull the ejection tabs apart). Disregard the following procedures.

LISA 2: Go to step 10.

LISA 2/10: Continue with step 5.

5. Locate the plastic cable clamp glued to the inner left wall of the carrier, just behind the uppermost PC board.
6. While supporting the bottom of the carrier with one hand, pry open the plastic cable clamp and remove the power cable (see Figure 4).
7. Locate the plastic power connector at the right side of the uppermost PC board (see Figure 5). Gently work it out of its socket.
8. Identify the HDA connector located at the left of the power connector. It has ejection latches on either side of the connector. (See Figure 6.)
9. Pull the latches apart to eject the cable connector from its socket.
10. Carefully rotate the disk drive module downward until you can see the micro disk drive connector (mounted on the back of the carrier, next to the fan). Disconnect the micro disk drive connector.

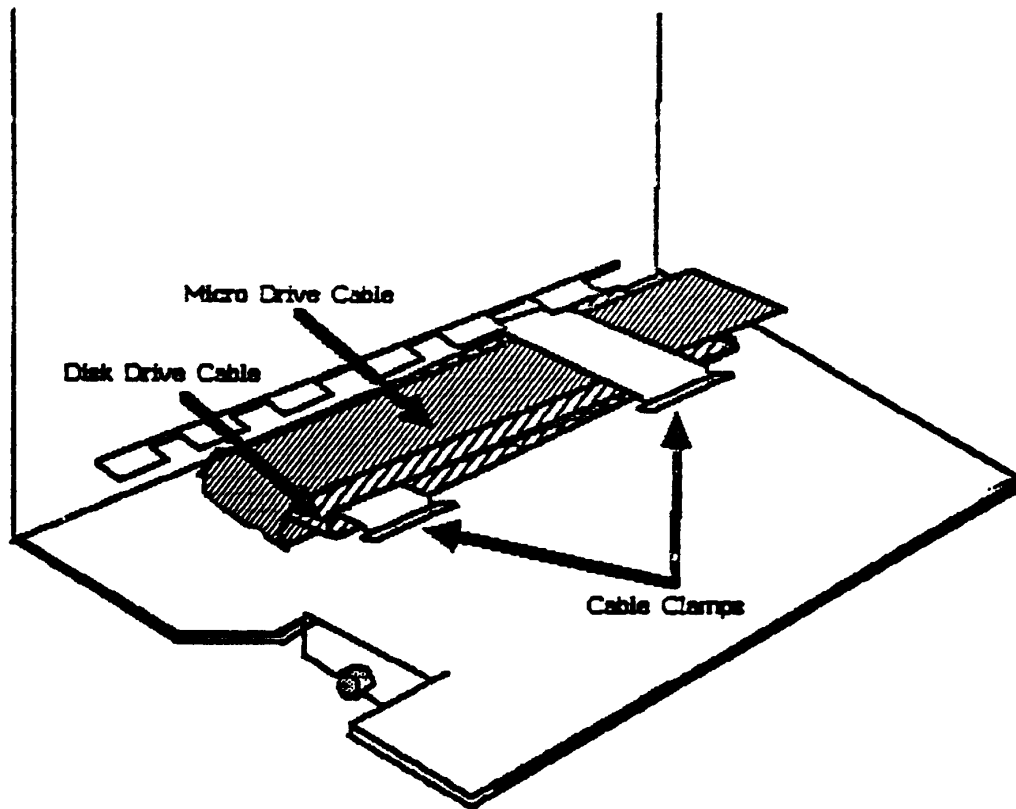


FIGURE 7



Installing the Disk Drive Module (Lisa 2 and 2/10)

1. Make sure that the disk drive (ribbon) cables are routed through both cable clamps as shown in Figure 7.
2. Set the Disk Drive Module face down in front of the Lisa 2 disk drive compartment.
3. Rotate the disk drive module about 1/4 of the way into the drive chamber of the Lisa.
4. Connect the shortest ribbon cable inside the Lisa to the micro disk drive connector (mounted on the back of carrier, next to the fan).

LISA 2: Slide the disk drive module all the way into its compartment and secure it by tightening the thumbscrew. Disregard the following procedures

5. Rotate the module about a third of the way into its compartment and place the longer of the cable connectors into the latched (HDA) connector socket. Push in firmly on the cable connector until the ejection latches snap into place.
6. Tuck the power cable under the cable clamp located on the left inner wall of the carrier.
7. Connect the nylon power connector to its socket located at the right of the latched (HDA) connector.
8. Fold down the ribbon cable on the top left side as you slide the disk drive module all the way into its compartment.
9. Secure the module by pushing in on the thumbscrew at the base of the carrier and turning it clockwise until it is snug.



Removing the HDA (Lisa 2/10)

1. Remove the disk drive module.
2. Disconnect the two-pin fan connector (see Figure 8) located on the right side of the controller card (upper board).
3. Turn the carrier over on its vented side. Remove the three screws from the solid side.
4. Set the carrier on its solid side with the front (mouth of micro drive) facing you. Remove the three Phillips screws on the vented side.
5. Locate the fan wire cable clamp (see Figure 9) on the vented wall of the carrier, just above the power connector.
6. Carefully pry open the clamp and remove the fan wire. Then gently lift up on the vented wall and move the fan wire back and completely out of the way.
7. With one hand, gently lift up on the vented wall of the carrier and carefully slide the HDA out toward the front of the carrier.
8. Set the HDA on a foam pad.

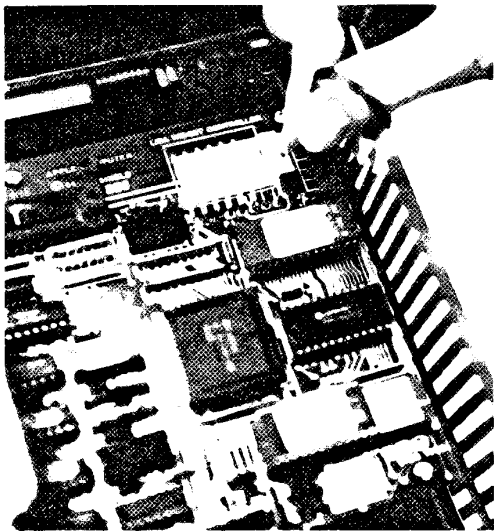


FIGURE 8

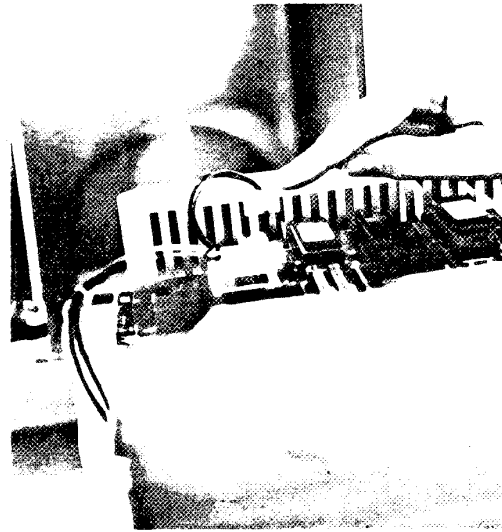


FIGURE 9



Removing the Micro Disk Drive (Lisa 2 and Lisa 2/10)

CAUTION: ALWAYS REMOVE THE HDA MODULE BEFORE REMOVING THE MICRO DISK DRIVE TO PREVENT DAMAGE TO THE HDA MOTOR ASSEMBLY.

1. Remove the HDA.
2. Turn the carrier on its solid side with the front (mouth of micro disk drive) facing you.
3. While supporting the micro drive with one hand, remove the four mounting screws located at the bottom of the carrier. When the last mounting screw has been removed, gently rest the micro disk drive against the lower wall of the carrier. Do not remove the micro disk drive from the carrier yet.
4. Disconnect the ribbon cable connector (see Figure 10) from the back of the micro disk drive (not from back of carrier).

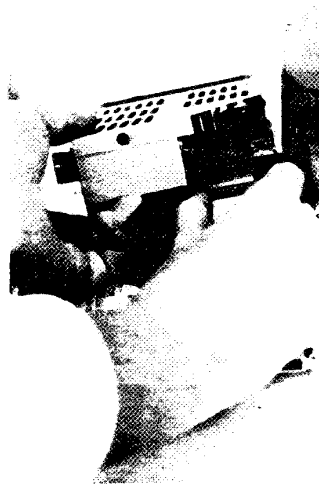


FIGURE 10



Installing the HDA (Lisa 2/10)

1. Remove the HDA from the carrier.
2. Install the customer's micro disk drive.
3. Pry open the fan wire cable clamp and move the fan wire back and completely out of the way.
4. Place the carrier on its vented side and orient it so that the top (open side) of the carrier is facing you. (See Figure 11B.)
5. Set the HDA down to the left of the carrier. Orient it so that the uppermost PC board is facing you and the ribbon cable is at the top. (See Figure 11A.)
6. Fold the ribbon cable (see Figure 7A, #1) over the PC board. Slide the HDA straight into the carrier from left to right. Make sure that the ribbon cable does not get caught between the HDA and the wall of the carrier.

NOTE: At this point, the rounded side of the HDA should be on the same side as the mouth of the micro disk drive.

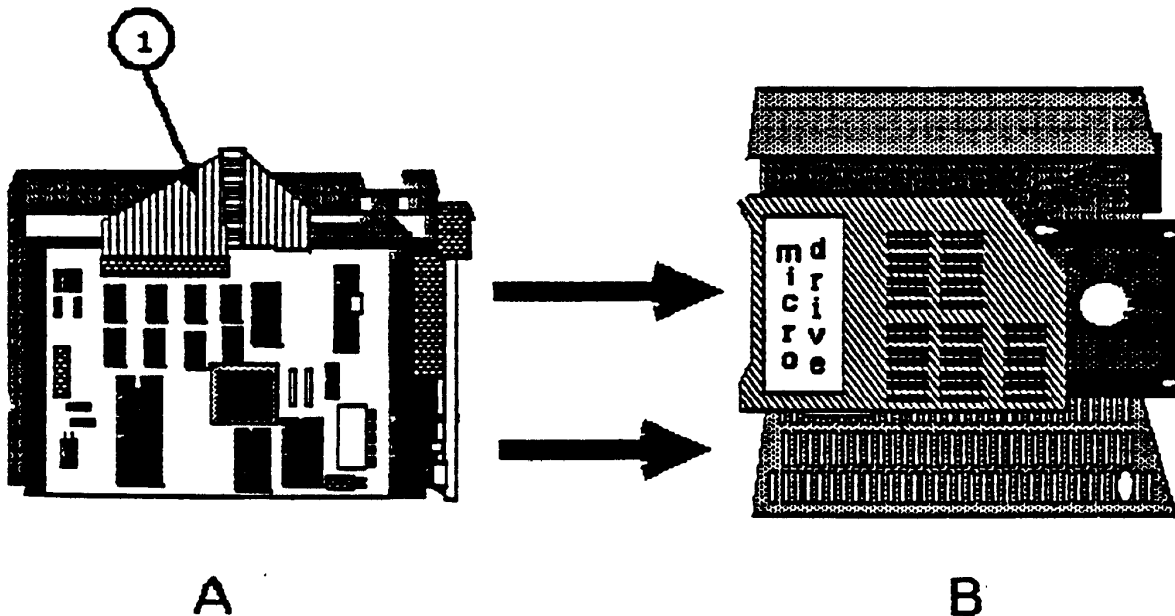


FIGURE 11



7. Line up the three holes on the side of the base plate with those on the carrier wall. Tighten the three mounting screws.
8. Place the carrier on its solid side.
9. Gently pull up on the vented wall of the carrier and place the fan wire in the base plate notch, just next to the screw hole above the fan.
10. Tuck the fan wire back under the cable clamp on the vented wall of the carrier and reconnect the two-pin fan connector.
11. Grasp the fan wire closest to the fan and carefully pull it down, tucking any excess fan wire between the fan and the vented wall of the carrier.
12. Tighten the three mounting screws on the vented side of the carrier.
CAUTION: BE SURE THAT THE FAN WIRE REMAINS IN THE BASE PLATE NOTCH TO AVOID DAMAGING THE WIRE.
13. Tuck the ribbon cable between the HDA and the solid wall of the carrier.

Installing the New Micro Disk Drive (Lisa 2 and Lisa 2/10)

1. Remove the HDA.
2. Place the micro disk drive inside the carrier.
3. Reconnect the ribbon cable connector to the 20-pin socket on the back of the micro disk drive.
4. While supporting the micro disk drive with one hand, turn the carrier on its solid side. Align the spacer (leg) holes with the carrier screw holes and tighten the four mounting screws.



Removing the Fan (Lisa 2/10)

1. Remove the HDA.
2. Remove the micro disk drive.
3. Turn the carrier so that the back is facing you and lay it on its solid side.
4. Remove the three screws (see Figure 12, #1) that attach the fan to the carrier.
5. Set the fan aside.

Installing a New Fan (Lisa 2/10)

1. Place the fan back over the proper carrier screw holes and orient it so that the fan wire (see Figure 12, #2) comes out against the vented wall of the carrier.
2. Replace and tighten the three fan mounting screws.

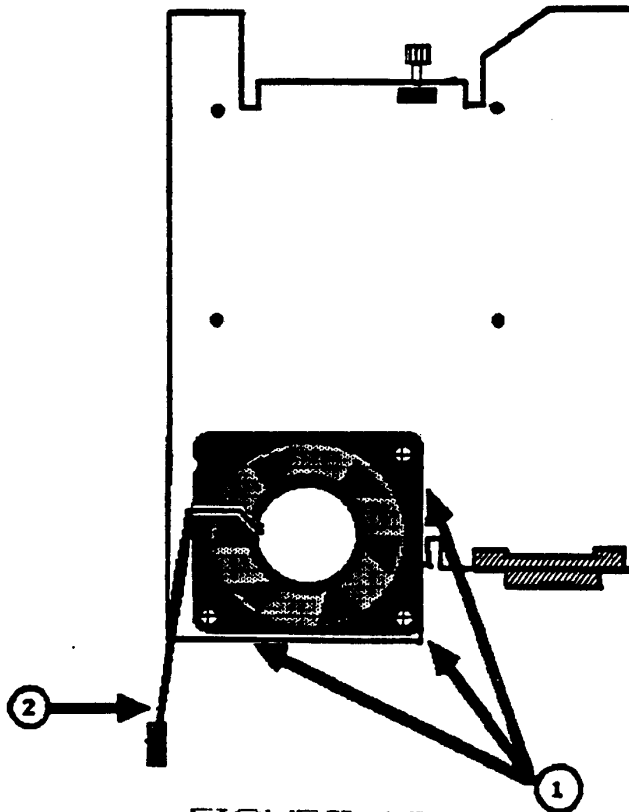


FIGURE 12



REMOVING AND REPLACING THE REAR PANEL

Removing the Rear Panel

1. Turn the two thumbscrews (see Figure 13, #1) along the upper edge of the rear panel counterclockwise until they won't turn any further.

These screws loosen but do not come free from the rear panel.

2. Pull the panel up and toward you.

Replacing the Rear Panel

1. Make sure that the metal prongs attached to the two screws are pointed to the left.
2. Insert the tabs along the lower edge of the back panel into the slots at the base of the Lisa.
3. Push the panel flat against the back of the Lisa. If you encounter resistance, check to make sure that the power supply is pushed as far into the Lisa as it will go.
4. Turn the two thumbscrews clockwise until they are snug.

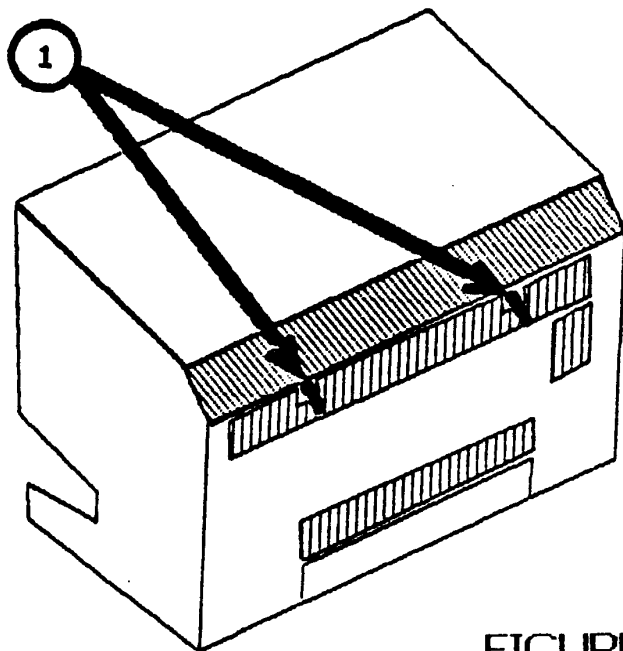


FIGURE 13

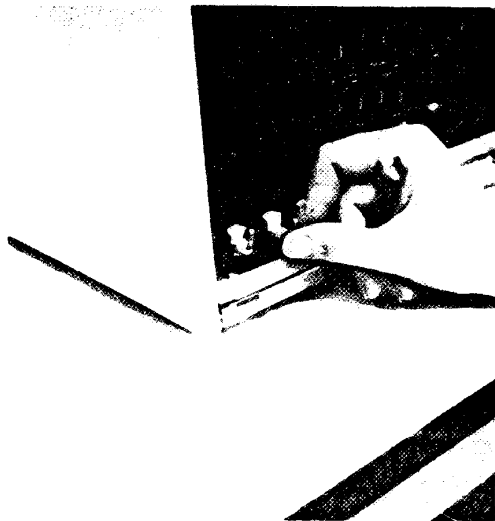


FIGURE 14

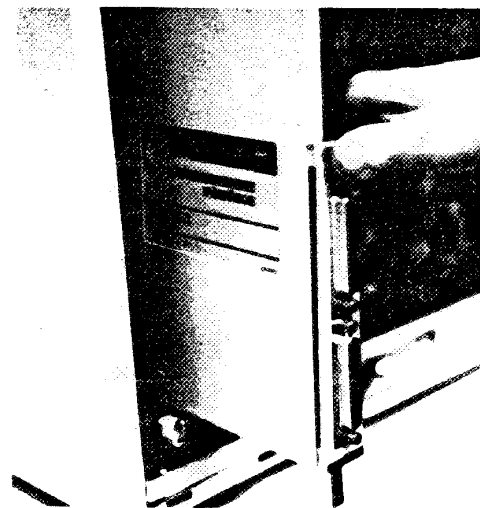


FIGURE 15



INSTALLING AND REMOVING EXPANSION CARDS

Installing Expansion Cards

1. Remove the rear panel.
2. Determine which of the three expansion slots (on the lower left of the card cage) will hold the card.
3. Pull out the metal lever extending from the plastic cap at the bottom of the card slot. (See Figure 14.)
4. Turn the lever clockwise 90 degrees, to the 3 o'clock position.
5. Hold the expansion card by the metal edge, with the green plastic facing right and the white cover facing left. Insert the bottom of the card into the connector slot and the top of the card into the plastic slot above the connector. Slide the card into the cage as far as it will go. (See Figure 15.)
6. Turn the metal lever counterclockwise 90 degrees, back to the 12 o'clock position.
7. Push the lever back into the plastic cap.
8. A set of slot covers on Lisa's back panel blocks the electromagnetic emissions from inside Lisa. If you have just installed a card into a slot that did not previously contain a card, follow steps a through e for removing the cover that protects that slot.
 - a. On the back panel, locate the slot cover for the card you have just installed.
 - b. Loosen the screw at the top of the metal plate.
 - c. Pull the plate over the head and out from behind the retaining notch.
 - d. Loosen one of the three screws in the middle of the back panel.
 - e. Slide the metal plate behind the retaining tab and over the screw head, and tighten both screws.

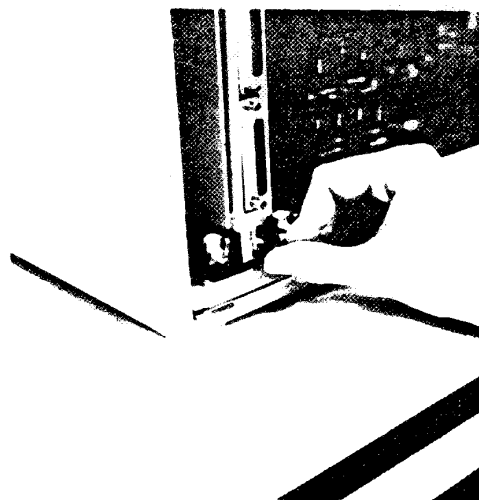


FIGURE 16



Removing Expansion Cards

1. Turn off the Lisa and disconnect the AC cord.
2. Remove the rear panel.
3. Pull out the metal lever extending from the plastic cap at the bottom of the card you want to remove. (See Figure 16.)
4. Turn the lever clockwise 90 degrees, to the 3 o'clock position.
5. Holding the card by the metal edge, pull it straight out of the slot.
6. The slot covers are designed to block the electromagnetic field generated by Lisa. Each expansion slot should be covered either by an expansion card or by one of the slot covers. If you do not intend to install an expansion card in the slot from which you remove one, then follow steps a through e.
 - a. Locate the slot cover, stored on the inside rear panel.
 - b. Loosen the screw just enough to let the metal plate slide over the screw head and out of the restraining notch. Remove the cover and retighten the screw.
 - c. Locate and loosen the screw over the opening in the rear panel where your expansion card used to be.
 - d. Slide the metal plate into the restraining notch and over the screw head.
 - e. Tighten the screw to secure the slot cover.

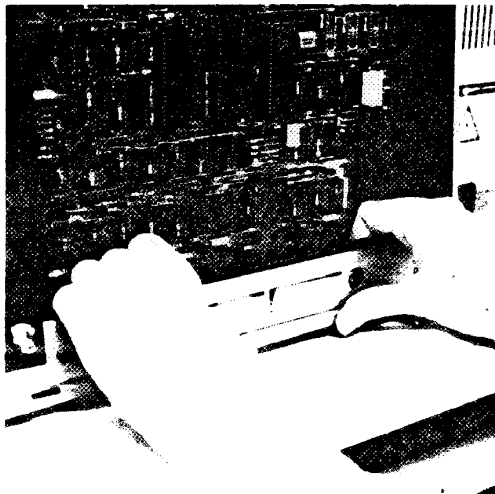


FIGURE 17

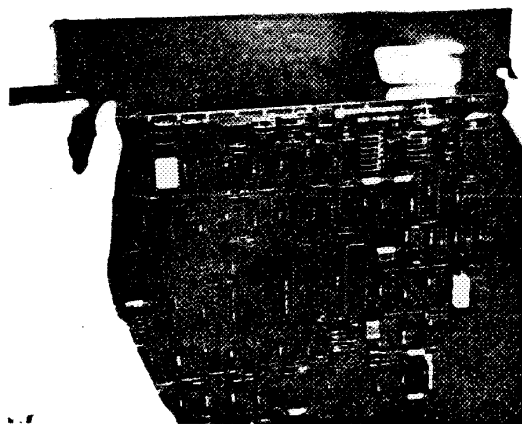


FIGURE 18



REMOVING AND INSTALLING THE CARD CAGE AND BOARDS

Removing the Card Cage

1. Remove the rear panel.
2. Brace your thumbs against the lower edge of Lisa and pull hard on the bar that runs just above the row of connectors along the bottom of the card cage. (See Figure 17.)

CAUTION: Be careful not to put any pressure on the small components just behind the bar.

3. Pull the cage straight out and set it aside.

Removing Boards

1. Remove the rear panel.
2. Remove the card cage.
3. Identify the board to be removed.

NOTE: The colored levers on the upper left side of the boards match the colored pointers imprinted on the cage next to the board levers.

- a. The CPU board has a brown lever on the right and a blue lever on the left.
- b. The I/O board has a brown lever on the right and a red lever on the left.
- c. The memory boards have brown levers on the right and yellow levers on the left.

NOTE: Handle the boards by the levers and plastic edges only.

4. Place one thumb on either lever and simultaneously flip up the colored locking levers at the top of the board; then pull the board up and out of its slot. (See Figure 18.)

CAUTION: If you are servicing a memory board and there is an expansion card in slot 3, be careful not to scrape the yellow lever against the expansion card. If you have trouble handling the levers in the tight space, remove the expansion card before servicing the memory boards.

5. Place the board carefully on a flat surface.



IMPORTANT! IF YOU ARE SERVICING A CPU BOARD, READ PAGE 1.8 OF THE LISA 1.0 TECHNICAL PROCEDURE FOR INFORMATION ON TRANSFERRING THE VIDEO STATE MACHINE ROM!

Installing Boards

1. Identify the slot into which the board will be inserted. All boards are installed with brown locking levers on the right.

If you have only one memory board, install it in the slot labeled MEM 1.

2. If the colored tabs on the board are not already in an up position, flip them up.
3. Holding the board by the levers, with the brown lever on the right, slide it into the thin grooves located on the inner walls of the card cage.

NOTE: The slots' connectors in the bottom of the cage are staggered to prevent you from inserting the board into the wrong slot.

The tabs on the CPU and I/O boards should be resting in the notches along the top of the cage.

The tabs on the memory boards should be resting on the card cage frame.

4. Push down the levers simultaneously to lock the board into place. You may have to center the bottom edge of the board in the slot connector. If so, touch only the plastic edges of the board. Do not touch the copper strips at the edge of the board.

NOTE: At this point, the rounded tabs below the levers should be set in the lower notches on the plastic card cage.

Replacing the Card Cage

1. Slide the card cage back into the Lisa.
2. The cage will offer some resistance for the last 1/4 inch, while the cage connectors slide into their slots inside the Lisa. You might have to hold the frame with your fingers and press with your thumbs against the bottom of the cage.
3. Replace the rear panel.



REMOVING AND INSTALLING THE MOTHERBOARD:

Removing the Motherboard

1. Disconnect the AC power cord from the wall outlet and from the back of the Lisa.
2. Disconnect all peripheral connectors from the back of the Lisa.
3. Remove the rear panel.
4. Remove the card cage.
5. Remove all expansion cards. Note that the colored levers on the left side of the cage boards match the indicator arrows imprinted on the card cage right next to the levers.
6. Remove the I/O, CPU, and Memory boards from the card cage.
7. Turn the card cage upside down and remove all six Phillips screws.
8. Lift off the motherboard (with pan).

Installing a New Motherboard

1. Place the empty card cage so that the bottom is facing up.
2. Place the motherboard (with pan) on the card cage and orient it so that the row of external connectors is just above the cage bar (see Figure 8, #4).
3. Replace, but do not tighten, all six Phillips mounting screws.
4. Tighten the six mounting screws.
5. Turn the card cage right side up.
6. Replace the CPU, I/O, and Memory boards.
7. Replace any expansion cards previously removed.
8. Replace the card cage.
9. Replace the back panel.

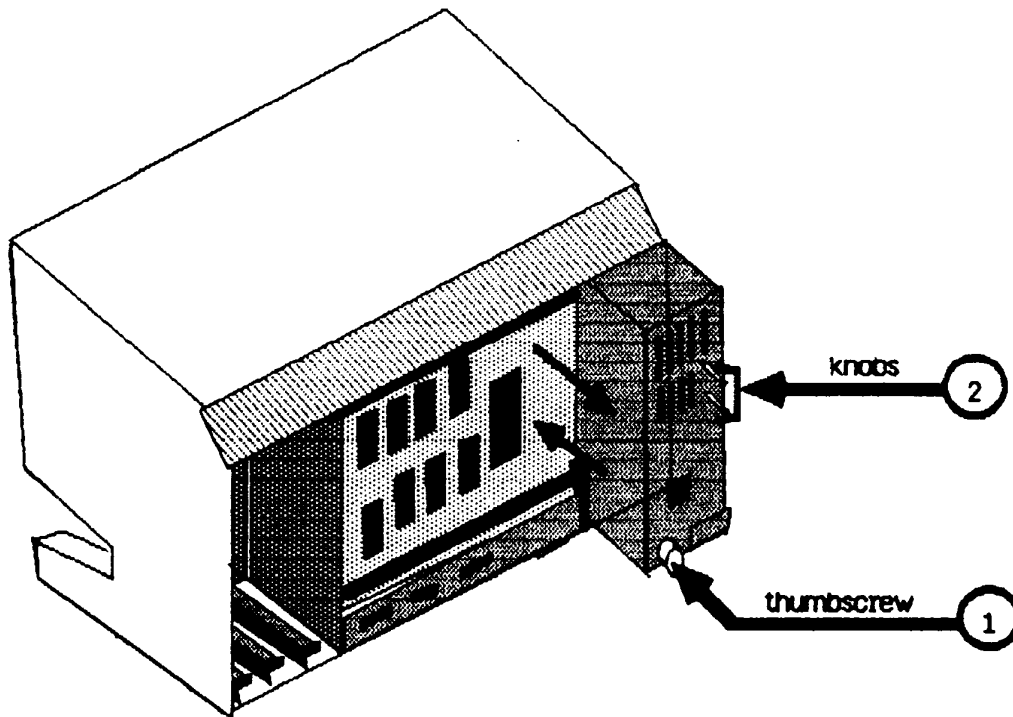


FIGURE 19



REMOVING AND REPLACING THE POWER SUPPLY:

Removing the Power Supply

1. Turn off the Lisa and disconnect the AC power cord.
2. Turn off and disconnect all peripheral connectors from the back of the Lisa.
3. Remove the rear panel.
4. Turn the thumbscrew (see Figure 19, #1) at the base of the power supply counterclockwise.

The screw loosens but does not come free from the module.

5. Hold the module by the metal tab and pull it out of the cabinet. You might have to jiggle the module to loosen it.

Replacing the Power Supply

1. Orient the new power supply with the two white knobs (see Figure 19, #2) pointed toward you, and the edge connector pointed towards the Lisa.

CAUTION: Do not touch the edge connector fingers.

2. Holding the power supply by the metal tab, slide it into the Lisa.
3. For the last 1/4 inch, the module will resist insertion. Put one thumb on the bottom and one thumb on the top of the module, and jiggle the power supply into place. It is in place when the top is even with the frame and the bottom is about 1/4 inch inside the frame.
4. Push the thumbscrew down, and then turn it clockwise until it is tight.
5. Replace the rear panel.



REMOVING AND INSTALLING THE SOFTSWITCH ASSEMBLY (ON-OFF SWITCH)

Removing the Softswitch Assembly

1. Remove the front panel.
2. Remove the rear panel.
3. Remove the card cage.
4. Remove the top panel.
5. Remove the disk drive assembly.
6. Remove the disk drive cables from the two clamps on the bottom of the disk drive chamber. Apply downward pressure to the tab on the right side of the clamp and simultaneously pull up on the body of the clamp. Move the two cables back and out of the way.
7. Locate the softswitch assembly in the well of the disk drive chamber (right behind ON-OFF switch).
8. Remove the cable from the softswitch PC board connector. (Push the tabs apart to release the cable.)
9. The softswitch is attached to the floor of the Lisa by two Phillips screws, one on each side of the softswitch assembly. Remove the screws and lift the softswitch out.

Installing a New Softswitch Assembly

1. Place the new softswitch inside the well of the disk drive chamber and position it so that the switch and keyboard jack fit through the openings at the lower front of the Lisa.
2. Replace the two Phillips screws.



REMOVING AND INSTALLING THE DISK DRIVE CABLE ASSEMBLY
(Lisa 2 and Lisa 2/10)

Removing the Disk Drive Cable Assembly

1. Turn off the Lisa.
2. Turn off and disconnect all peripherals.
3. Remove all the parts listed below to access the disk drive cable:
 - a. Front panel
 - b. Disk drive module
 - c. Rear panel
 - d. Card cage
 - e. Top panel

WARNING: THE CRT MUST BE DISCHARGED BEFORE REMOVING IT.

- f. CRT
 - e. Video board
4. Remove the disk drive cables from the two clamps on the bottom of the disk drive chamber. Push down on the tab at the right side of the clamp and simultaneously pull up on the body of the clamp.
5. Remove the cable from the board of the ON-OFF switch (push the tabs apart to release the cable).
6. Use a 1/4 inch nutdriver to remove the nuts from the card cage side of the connector.
7. Lift the connector out through the disk drive chamber.



Installing the Disk Drive Cable Assembly (Lisa 2 and Lisa 2/10)

1. Place the edge connector in the cutout closest to the disk drive chamber. Tighten the nuts from the card cage side.
2. Plug the softswitch cable connector into the PC board just behind the ON-OFF switch. Press down firmly on the connector until the locking latches snap into place.
3. Follow steps a through d to route the two drive cables properly through the cable clamps on the floor of the disk drive chamber.
 - a. Place the smaller ribbon cable underneath the larger one.
 - b. Route the cables through the clamp nearest the back of the drive chamber, leaving the clamp open.
 - c. Carefully place the cables in the clamp nearest you and push down on the body of the clamp to lock it.
 - d. Route the cables back through the rearmost cable clamp and lock into place.



Lisa 2 Technical Procedures

Section 1.A

HDA Packing For Shipment

Contents:

The HDA Packing For Shipment Procedure.....1.A.3

NOTE: This procedure applies only to the HDA in the Macintosh XL (Lisa 2/10) computer.



HDA Packing For Shipment

Introduction:

The HDA is a Winchester type hard disk drive and must be packaged properly to avoid damage to the media during shipment.

It is often not intuitively obvious how the HDA fits into its packaging materials.

To perform this task, patiently follow the instructions in this procedure and pay particular attention to the illustrations.

Equipment Needed:

Lisa Technical Procedures Manual
Service HDA Packaging Kit

Procedure:

1. Remove the disk drive module from the Macintosh XL (Lisa 2/10) following the Lisa Technical Procedures.
2. Remove the Micro disk drive from the disk drive module following the Lisa Technical Procedures (in the process of removing the Micro disk drive the HDA must be removed).
3. Reinstall the HDA into the carrier following the Lisa Technical Procedures.

(continued on the next page).

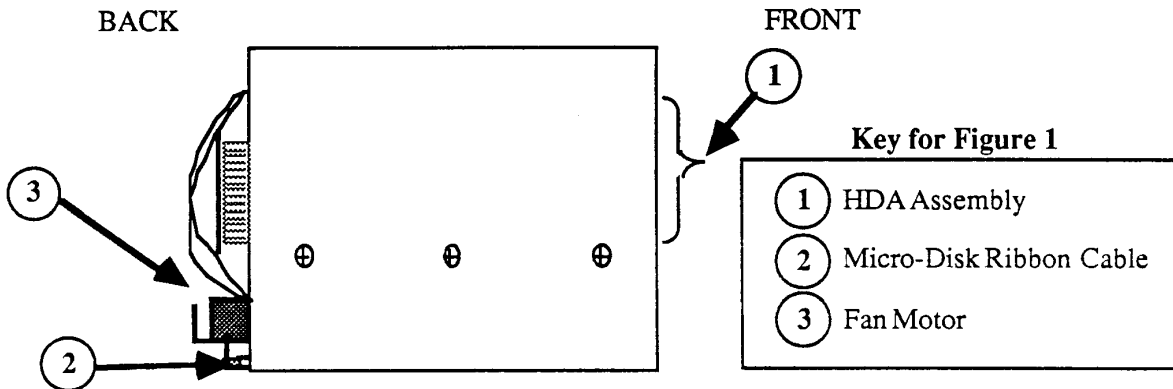


FIGURE 1: CARRIER VIEWED FROM THE LEFT SIDE

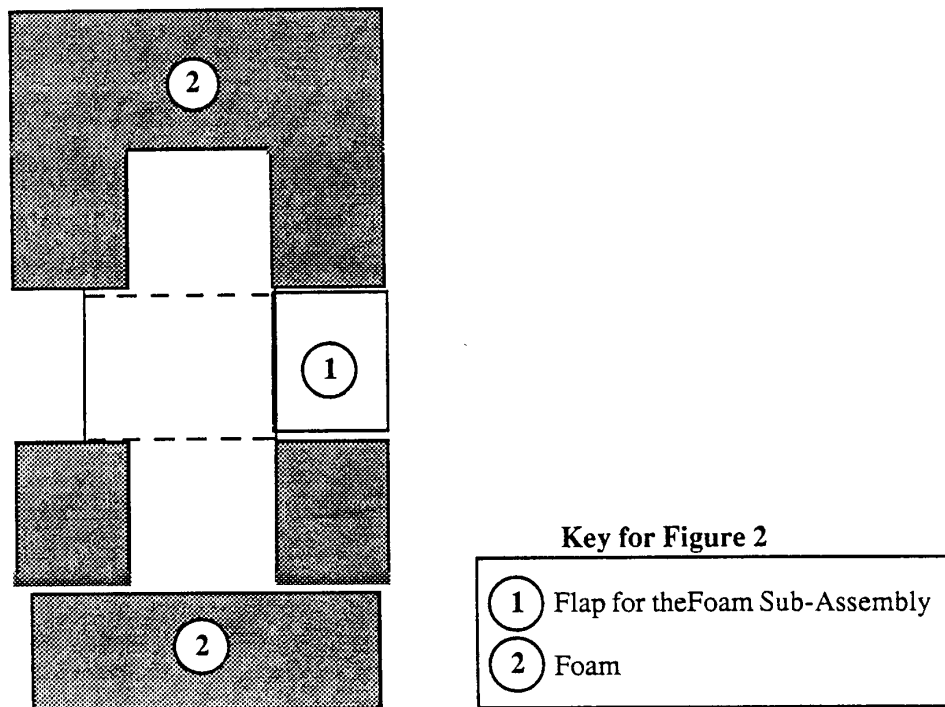


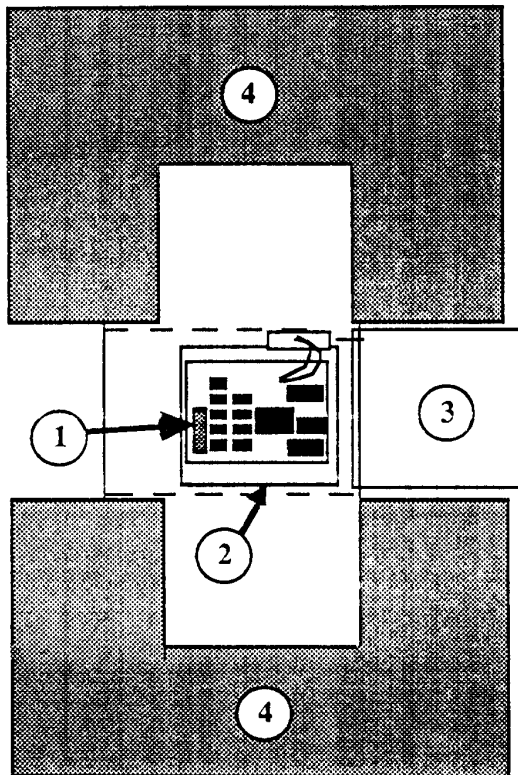
FIGURE 2



4. Check the disk drive carrier to ensure that the following items are installed.
 - a. The entire HDA assembly (including five PCBs; Figure 1, #1).
 - b. The Micro disk drive's multicolored ribbon cable (Figure 1, #2).
 - c. The disk drive module fan motor with its two-pin fan connector inserted into J2 of the top HDA PCB (Figure 1, #3).

5. Obtain the foam sub-assembly from the HDA packing kit and lay it flat on the floor as shown in Figure 2.

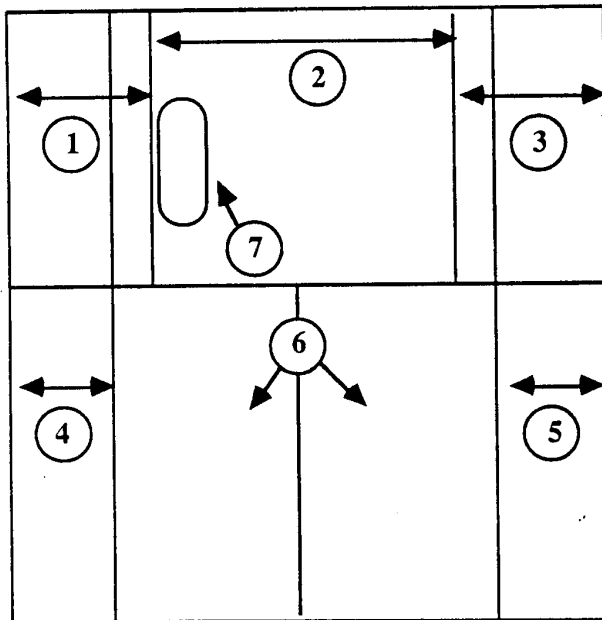
NOTE: The grey area in all illustrations of the foam sub-assembly indicate foam.



Key for Figure 3

- 1 J3 Ribbon Cable Connector
- 2 Front of Carrier
- 3 Flap for Foam Sub-Assembly
- 4 Foam

FIGURE 3



Key for Figure 4

- 1 Spacer Panels
- 2 Spacer Panels
- 3 Spacer Panels
- 4 Spacer Panels
- 5 Spacer Panels
- 6 Spacer Flap
- 7 Spacer Notch

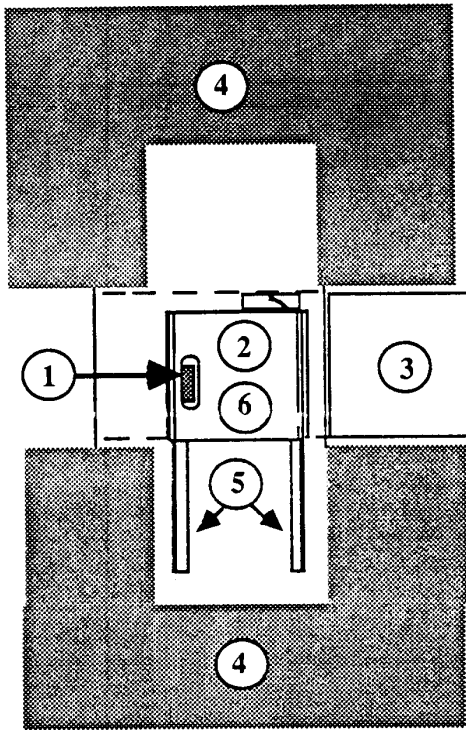
FIGURE 4: SPACER



6. Position the disk drive carrier on the foam sub-assembly as shown in Figure 3.

NOTE: The cardboard spacer from the HDA packing kit will be used to protect the top of the HDA.

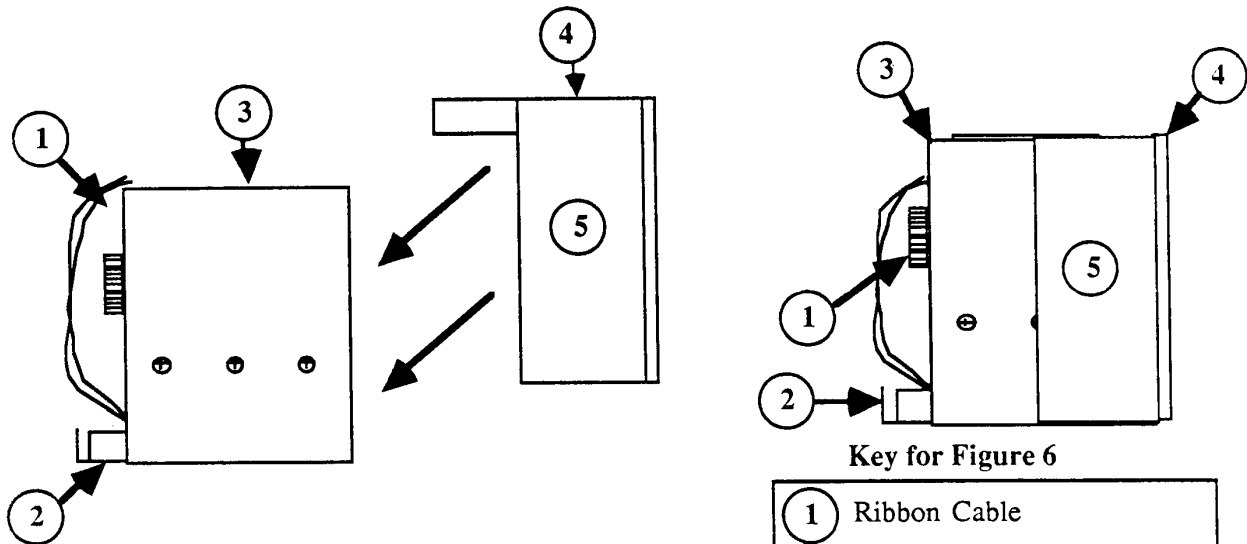
7. Hold the spacer panel in front of you as shown in Figure 4. Remove the notch (Figure 4, #7) from its cutout and become familiar with the spacer panels as labelled in Figure 4.



Key for Figure 5

- 1 J3 Ribbon Cable Connector
- 2 Spacer Panel 2
- 3 Flap for the Foam Sub-Assembly
- 4 Foam
- 5 Spacer Panel's 4, 5, and Spacer Flaps
- 6 Spacer Panels 1 and 3 Folded Up

FIGURE 5



Key for Figure 6

- 1 Ribbon Cable
- 2 Fan
- 3 Disk Drive Carrier
- 4 Spacer
- 5 Spacer Flap

FIGURE 6



NOTE: The following step will have you install the spacer into the top of the carrier. This will require a little maneuvering and the spacer may tend to pop out because it is a tight fit.

8. Insert panel 2 into the top of the carrier so that the notch hole fits over the J3 ribbon cable connector on the top PCB (Figure 5, #1). You will have to fold panels 1 and 3 up to do this step. (view the folded spacer from the **top** and compare it to Figure 5 to ensure a correct fit).
9. Leave the spacer in the carrier and fold panels 1 and 3 in until they meet and are flat over the HDA. At this point panels 1, 2, and 3 should form a small box in the top of the carrier with panels 1 and 3 meeting on the top.
10. While holding panels 1 and 3 together fold the flaps down so that panels 4 and 5 cover the front of the carrier and the flaps are wrapped around its sides (view the foam sub-assembly and the carrier and spacer setting on it **from the side** and compare it to Figure 6 to ensure a correct installation).

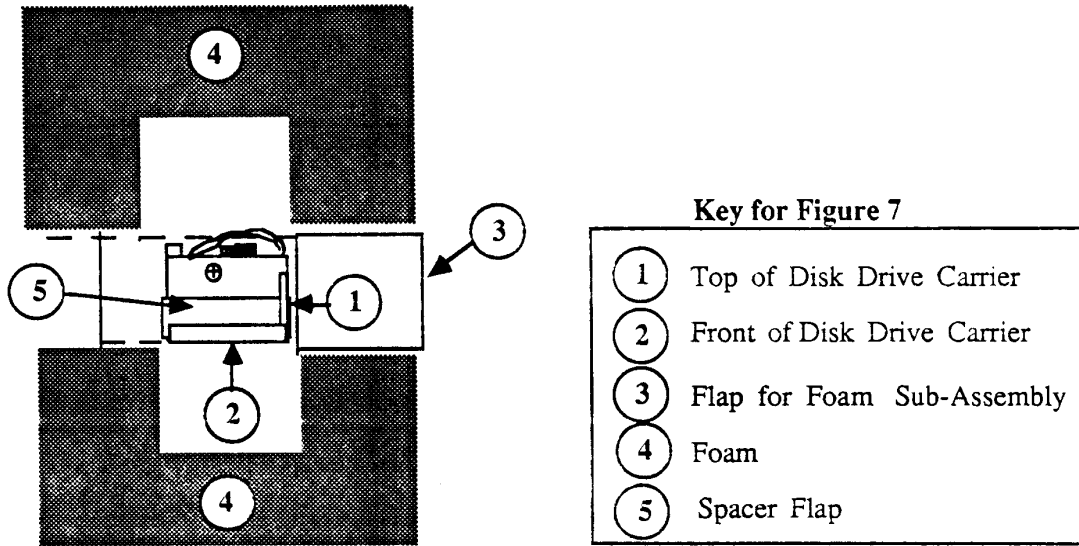


FIGURE 7



11. While holding the flaps next to the sides of the carrier, lay the carrier on its side on the foam sub-assembly (Figure 7).

NOTE: The following step will require some force because the foam sub-assembly is sized slightly smaller than the carrier.

12. Fold the foam sub-assembly's flap (not a spacer flap) up against the carrier and hold it there while you fold the sides of the foam sub-assembly up over the carrier and spacer.

NOTE: The carrier should now be fully encased in the foam sub-assembly.

13. Hold the foam sub-assembly together while you put it into the box (it may be a tight fit).



Lisa Technical Procedures

Section 2

Set-up

Contents:

Introduction.....2.3
Material Requirements.....2.3
A. Unboxing the Lisa.....2.5
B. Installing the Pull-out Reference Cards.....2.5
C. Checking the Battery Switch.....2.6
D. Installing the Lisa Accessories.....2.7
E. Installing the ProFile.....2.8
F. Installing the Office System Software.....2.9
G. Putting the Icons in Order.....2.13
H. Installing an Apple Daisy Wheel Printer.....2.17
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INTRODUCTION

This job aid includes all the steps in a Lisa installation. Appendix 2, a checklist, is a summary of the procedure.

If you have had Lisa Level 1 training, you will have all the background you need for these procedures. If you have not had that course, be sure to go through LisaGuide and the Service section of the Lisa Owner's Guide before you attempt these procedures.

Before you leave the users' site, be sure to give them the Lisa Customer Orientation card and get them started on the Lisa.

MATERIAL REQUIREMENTS:

<u>Item</u>	<u>Part Number</u>
Lisa, with Lisa Accessories Kit	A6P0001 (A6M0101)
ProFile, with Lisa ProFile Accessories Kit	(A9M0005) (A6C0005)
Apple Dot Matrix Printer with Lisa DMP Accessories Kit	A2M0058 (A6C0350)
or	
Apple Daisy Wheel Printer with Lisa DWP Accessories Kit	A3M0025 (A6C0351)

IMPORTANT: The Lisa accessories kit that comes with each peripheral contains the cables necessary to connect the peripheral to a Lisa. In most cases, the peripherals will not work correctly if you try to use cables meant for an Apple II or other computer. If you don't have the proper Lisa accessories kits, get them!

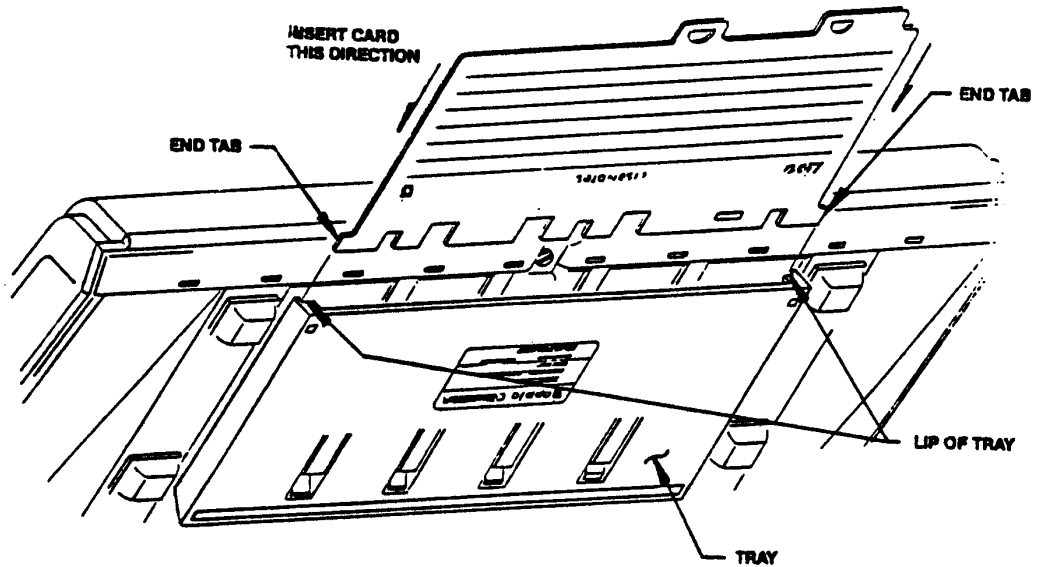


FIGURE 1

INSTALLING PULL-OUT REFERENCE CARDS



A. UNBOXING THE LISA

The Lisa comes in two boxes. One holds the Lisa itself; the other holds the accessories kit, including the keyboard, the mouse and the power cord.

1. Slide the Lisa out of its carton. Remove the foam padding.
2. Set the cabinet on a hard, flat surface. (Watch your back - it's heavy.) Leave at least 2 inches of clearance on each side, to allow for proper ventilation.
3. Unbox the keyboard, the mouse and the power cord.

B. INSTALLING THE PULL-OUT REFERENCE CARDS

A set of pull-out reference cards is packed in the accessories box of every new Lisa. These cards fit into the tray under the Lisa keyboard.

IMPORTANT: BEFORE INSTALLING THE CARDS, FILL OUT THE "SUPPORT INFORMATION" SECTION OF CARD 4, "CONFIGURATION/SUPPORT". CUSTOMERS NEED THIS INFORMATION FOR ANY WARRANTY REPAIRS AND PHONE SUPPORT THEY MAY REQUEST.

1. Prop up the keyboard so that the bottom is facing you.
2. Start with the Configuration/Support card, labelled 4 on the front and 1 on the back.
 - a) Hold the card upside down as shown in Figure 1, with the blank side facing you and the end tabs next to the keyboard.
 - b) Align the two end tabs with the lips at the ends of the tray.
 - c) Using both hands, simultaneously push both end tabs behind the lips of the tray so that the card slides into the tray.
3. Repeat with the Windows/Text card (labelled 3 on the front and 2 on the back), installing it behind the Configuration/Support card.
4. Repeat with the Icons card (labelled 2 on the front and 3 on the back), and then with the Keyboard card (labelled 1 on the front and 4 on the back).



To remove the pull-out reference cards (in case of error):

- a) Prop up the keyboard so that the bottom is facing you (see Figure 1).
- b) Starting with the card closest to the keyboard, pull the card out as far as it will go.
- c) Hold the card firmly on either the right or left side, as close to the keyboard as possible.
- d) Insert a straightened paper clip (or any other pointed tool) into the square hole in the tray at whichever side you are holding.
- e) Push in the paper clip while pulling the card out of the tray. When the end tab of the card clears the lip of the tray, the card can be removed from the tray.
- f) Repeat steps b through e for each card, always removing the card closest to the keyboard.

C. CHECKING THE BATTERY SWITCH

1. Remove the back panel and find the set of four batteries on the lower right side of the I/O board.
2. Find the switch next to the batteries, and make sure the switch is set to ON (toward the left).

If you are installing a Dot Matrix Printer, leave the back cover off until you have installed the Parallel Interface Card (see next page).



D. INSTALLING LISA ACCESSORIES

1. If you have a Dot Matrix Printer to install, you must first install a Parallel Interface Card (PIC) in a Lisa expansion slot, following the steps below.
 - a) Install the PIC in expansion slot 2 at the right rear of the Lisa. Be sure to remove the slot cover and store it on the back panel.
 - b) Replace the back panel.
2. Attach the mouse cord to the mouse socket on the back panel of the Lisa.
3. Attach the keyboard cord to the front panel of the Lisa, under the square white Soft Switch (below the disk drives).
4. With the back panel replaced, connect the power cord to the Lisa; then plug it into the wall.



E. INSTALLING THE PROFILE

1. Unbox the ProFile and its cables. (The power cord and interface cable are in a small box within the main ProFile box.)
2. Connect the ribbon cable to the ProFile and to the built-in parallel port at the back of the Lisa.
3. With the ProFile power switch OFF, connect the power cord to ProFile and to wall current.
4. Turn on the ProFile and wait for the red ready light to become steady (about a minute).



F. INSTALLING THE OFFICE SYSTEM SOFTWARE

The Lisa Office System can be loaded on to the ProFile from two diskettes, called Office System 1 and 2, which are packaged with the Lisa Owner's Guide. Once the Office System is on the ProFile, you can copy the six basic Lisa tools (LisaDraw, LisaCalc, etc.) onto the ProFile from tool master diskettes. (The tool master diskettes are packaged with the tool manuals.) Thereafter, the tool master diskettes are only needed as a backup to the ProFile, in case the software needs to be reinstalled after a system crash.

Follow these procedures ONLY if your ProFile is blank or if you want to replace or reinstall all the software. (If you are replacing only one or two tools, use the method given in Appendix 1.)

NOTES:

a. If you are installing a new Lisa system, make sure that you are using new (i.e. never before copied) tool master diskettes, and that the diskettes you are copying are meant to be used on this particular Lisa. Tool master diskettes that have been copied by one Lisa can never thereafter be copied onto another Lisa, and copies made from them (whether on ProFile or on diskette) can never be used on another Lisa.

If you have more than one Lisa, you need a separate set of tool master diskettes for each. (This does not apply to the Office System 1 and 2 diskettes, nor to LisaTest, LisaGuide or data diskettes.)

b. Do not attempt to install LisaTest, LisaGuide or data diskettes onto the ProFile using this method. LisaTest and LisaGuide must be run from diskette and cannot be copied onto ProFile by this method.

c. Be careful to avoid accidentally trying to install a tool twice; attempting to do so will wipe out most of the software already installed, and you will have to repeat the entire process.

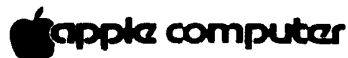
d. Start with the Lisa power off. If the Lisa is already on, turn it off by pressing the ON-OFF button.



1. Turn on the Lisa by pressing the ON-OFF button once. After a few seconds, you should hear a click, as the Lisa begins its self-test sequence. When you hear the click (or after about 15 seconds), hit any key (except CAPS LOCK).

After a few moments, the screen will prompt you to specify the startup device. (If you do not hit a key before the Lisa double-clicks, the Lisa will try to start up from the ProFile or one of the disk drives. If that happens, wait until the process is finished; then press the ON-OFF button to turn the Lisa off. Then repeat this step.)

2. Insert the diskette labelled "Office System 1" into drive 1 (the upper built-in drive). (Hold the diskette so that the cutout parts enter the drive first.)
3. Insert "Office System 2" into drive 2 (the lower built-in drive).
4. Use the mouse to select the icon of drive 1.
5. A screen like Figure 2 will appear (but with only three options). Roll the mouse on your desk until the pointer is over the box that says "Install".
6. Click the mouse button once. Now the Lisa will install the system software on the ProFile. (This will take several minutes.)
7. When the installation is finished, the lower disk drive will eject its diskette and the screen will say "The startup software has been installed." Take out the ejected diskette, put it in its envelope, and click "OK".



8. The next screen will ask if you have another diskette to add to the ProFile. Insert a new (i.e., never before copied or installed) tool master diskette into drive 2 (see NOTES at top of this section). When you insert a new diskette you will see this message:

The Lisa is about to make the first copy of the [tool name]. This copy and all future copies can be run only on this Lisa. Is that what you want?

If you want to proceed, click "Copy". (If not, click "Cancel".)

Lisa will automatically install the contents of the diskette on the ProFile, eject the diskette, and ask if you have another. Continue until all tool master diskettes have been installed. Then click "Done".
9. Now the Lisa will display the screen shown in Figure 2. This time, click "Finished".
10. Next the Lisa will ask if you want it to turn off or to start up from the ProFile. Select "Start up".

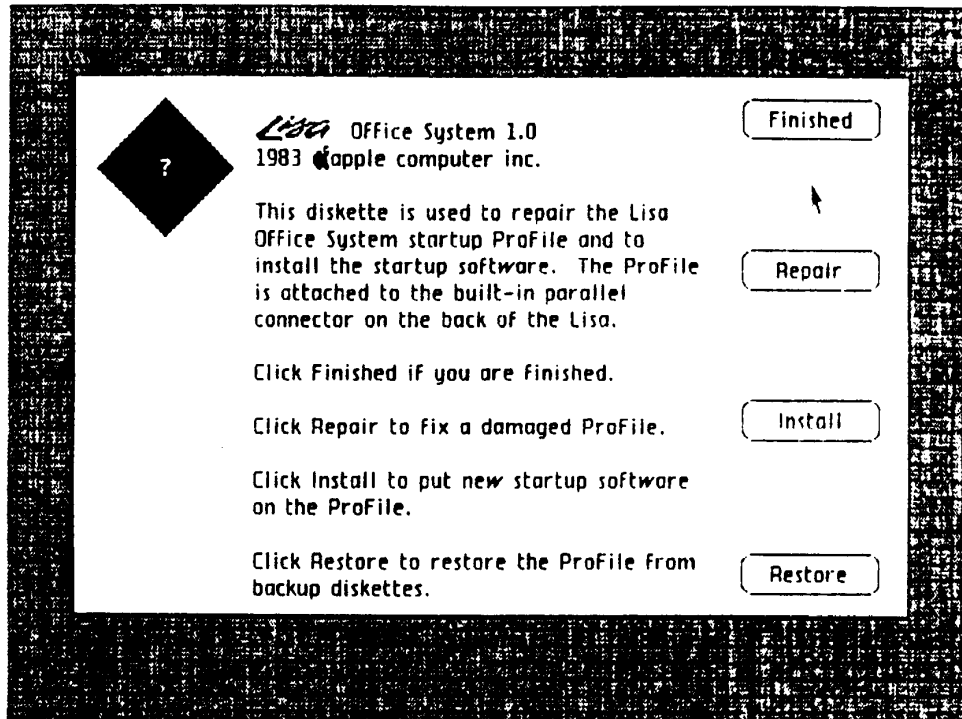


FIGURE 2

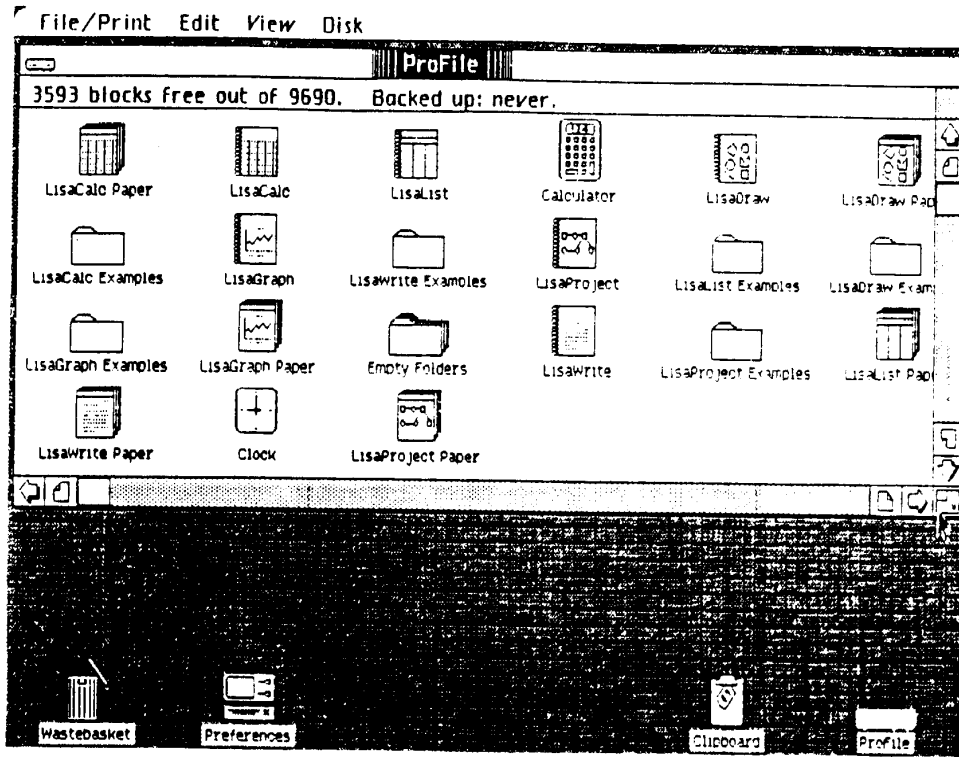


FIGURE 3

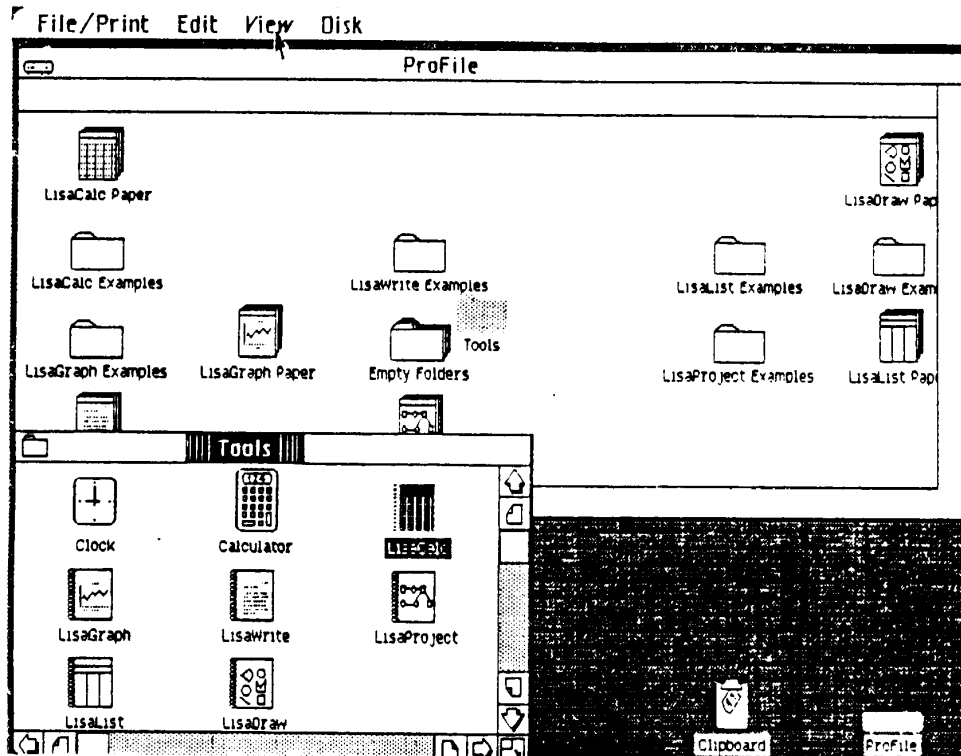


FIGURE 4



G. PUTTING THE ICONS IN ORDER

Each tool diskette puts three icons onto the ProFile: a **pad of paper** (e.g. "LisaCalc Paper"), a **file folder of examples** (e.g. "LisaCalc Examples"), and a **spiral notebook** (e.g. "LisaCalc"). (Find these items in Figure 4 to see what the different icons look like.) When you first open the ProFile window after installing the software, these icons will be stacked one on top of another, so that many will not be visible. They need to be unstacked and repositioned to match the diagrams in the user training materials. To do that, follow the steps below.

1. Open the ProFile icon (double-click). Use the mouse to enlarge the ProFile window to the approximate shape and size shown in Figure 3.
2. Pull down the View menu and select "Straighten Up Icons". (This will unstack any stacked icons and straighten the rows and columns of the display.)
3. If necessary, use the mouse to enlarge the ProFile window so that you can see all the icons (see Figure 3).
4. Find the "Empty Folders" icon and double-click on it. The Lisa will create a new folder with the label "Untitled".
5. Make sure that "Untitled" is selected (black); if not, click once on the icon. Then type Tools, and that word will replace "Untitled" on the title line.
6. Open the new Tools folder (double-click), and use the mouse to give the Tool and ProFile windows the size and shape shown in Figure 4. Position them so that they overlap as little as possible.
7. The tool icons are the spiral pads labelled "LisaWrite," "LisaDraw," etc. You can identify them by the spiral along the left side of the icon. Use the mouse to move the tool icons, and the Clock and Calculator, from the ProFile window onto the Tool window, in the positions shown in Figure 4.
8. Make sure the Tools window is active (title should be white-on-black as in Figure 4; if not, click once anywhere on Tools window). Pull down the View menu and select "Straighten Up Icons". (If the icons rearrange themselves into more or fewer columns than you had planned, the window is too wide or too narrow: use the mouse to change its size. Then repeat steps 7 and 8.)

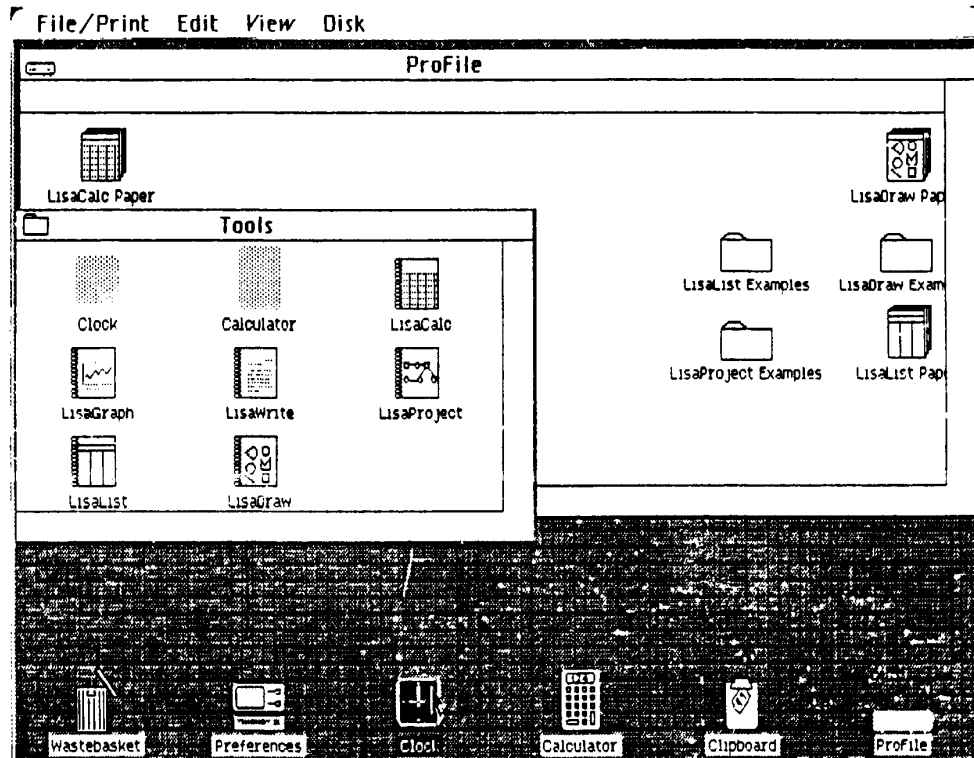


FIGURE 5

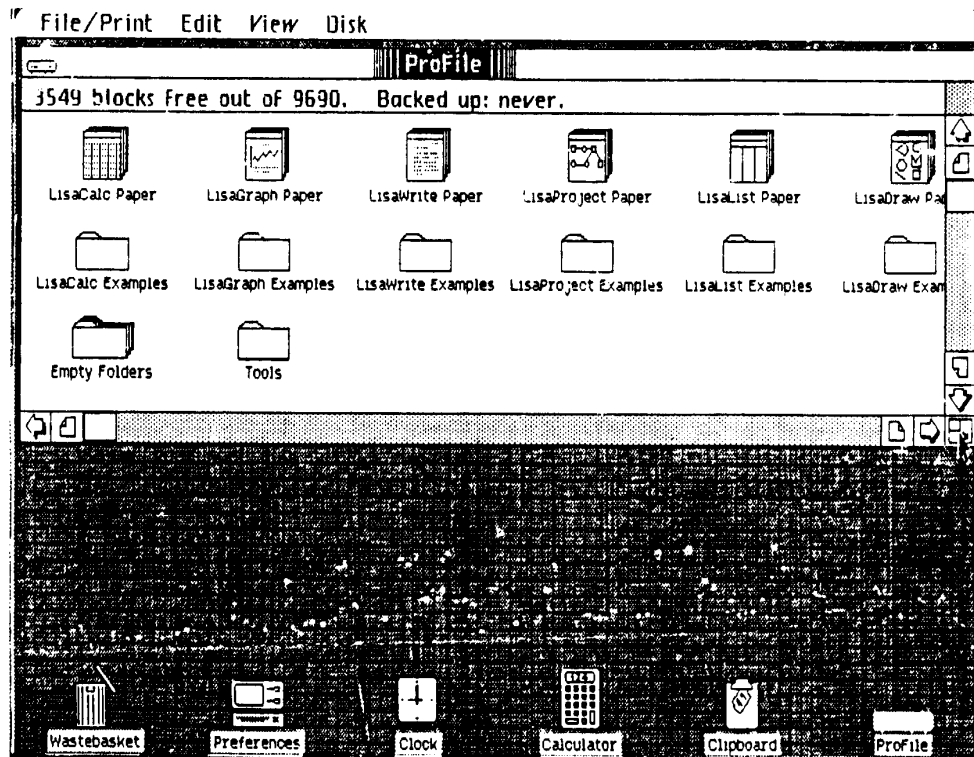


FIGURE 6



9. Move the Tools window into the position shown in Figure 5.
10. Use the mouse to move the Clock and Calculator from the Tools window onto the desktop. Position them as in Figure 5.
11. Put away "Tools" on ProFile (double-click on small icon at upper left corner of Tools window).
12. Move the remaining icons into the positions shown in Figure 6.
13. Make the ProFile window the size and shape shown in Figure 6.
14. Make sure the ProFile window is active (title should be white-on-black; if not, click once anywhere on the window.) Then open the View menu and select "Straighten up Icons". Now the Lisa will straighten up the icons in the ProFile window.
15. Set aside ProFile (double-click on small icon at upper left corner of ProFile window).
16. Make sure the icons on the desktop are in the order shown in Figure 6. Open the View menu and select "Straighten up Icons".

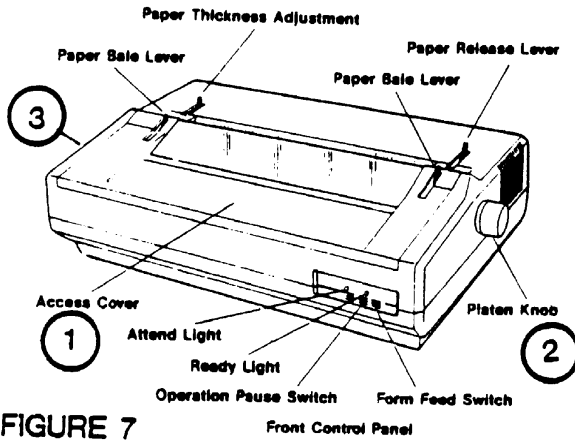


FIGURE 7

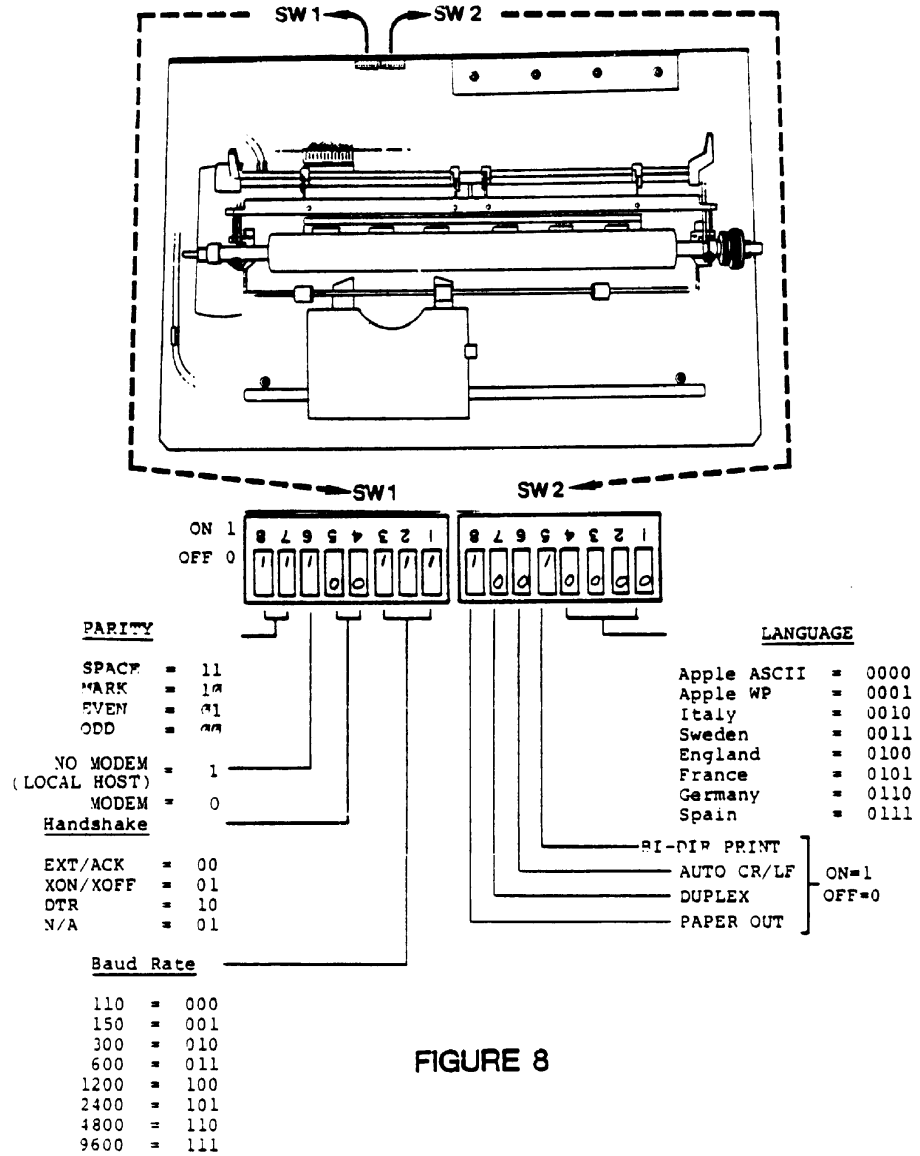


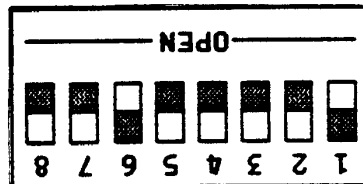
FIGURE 8



H. CONFIGURING AND INSTALLING AN APPLE DAISY WHEEL PRINTER

Before you attach a DWP to a Lisa, you must set the configuration switches inside the DWP to be compatible with the Lisa. If you are not installing a DWP, skip this section.

1. Open the printer as follows:
 - a) With power off, remove the access panel (Figure 7, #1) by pulling it forward.
 - b) Remove the two screws inside the front panel of the printer (one on each side).
 - c) Remove the two screws at the rear of the printer.
 - d) Pull off the platen knob (Figure 7, #2).
 - e) Lift off the cover (Figure 7, #3).
2. Locate the two sets of configuration switches at the back of the DWP (see Figure 8). Set them as pictured in Figure 8.
3. Locate the user-accessible DIP switch just inside the front of the printer. Make sure it is set as follows.



- this side of switch up
- this side of switch pushed down

4. Return cover, screws, platen knob and access cover. Insert paper.
5. Connect the DWP to either serial port at the back of the Lisa, using an RS 232 cable and a modem eliminator cable.
6. Make sure DWP power switch is set to OFF. Then connect power cord to DWP and to wall current.
7. Install paper. **IMPORTANT:** Do not turn on the DWP yet. When you turn the Lisa on, its internal I/O test sends signals to the serial ports. If the printer is on at that time, it will print garbage and seem to have gone crazy. This does not indicate a printer problem.

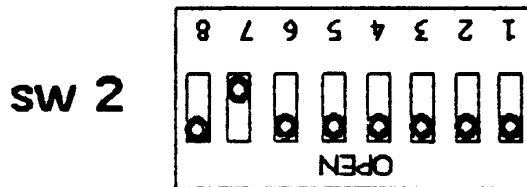
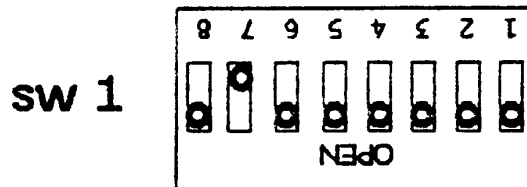


I. INSTALLING AN APPLE DOT MATRIX PRINTER

If you are not installing a DMP, skip this section.

1. With power OFF, remove the front access panel from the DMP by lifting up on the front edge.
2. Inside the printer, under a plastic strip at the right, are two green DIP switches. On each switch, switch #7 should be closed and all the rest open. The switches should look like this:

○ indicates switch position



3. Connect DMP cable connector to back of DMP and to upper connector of Parallel Interface Card in Lisa.
4. Make sure DMP power switch is set to OFF. Then connect power cord to DMP and wall current.
5. Install paper and turn printer on.



J. SETTING PREFERENCES

"Preferences" gives you control over Lisa's input-output devices. Whenever you connect or disconnect a device from the Lisa, you must inform the Lisa of that fact by means of the "Device Connections" menu in Preferences.

1. Open Preferences icon (by double-clicking with the mouse). Note the three choices at the top of the Preferences window: "Convenience Settings," "Startup," and "Device Connections".
2. Move pointer to "Device Connections". When the pointer becomes a check mark, click once on the mouse button.
3. On the next screen, choose "Parallel" (click once).
4. When asked what device you intend to connect, click on "ProFile".
5. When Note screen appears, click "OK".
6. If you have installed a Dot Matrix Printer, choose "Expansion 2 upper" (click once).
7. When asked what device you intend to connect, click on "Dot Matrix Printer".
8. When Note screen appears, click "OK".
9. When "Setup of Apple Dot Matrix Printer" appears, select appropriate settings.
10. If you have installed a Daisy Wheel Printer, choose the box for the Serial Port (A or B) to which you connected it. When asked what device you intend to connect, check "Apple Daisy Wheel Printer".
11. When Note screen appears, click "OK".
12. When "Setup of Apple Daisy Wheel Printer" appears, select appropriate settings.
13. Choose "Startup" from top of Preferences window.
14. On the Startup screen, choose "Start Up From Disk Attached to Parallel Connector" (i.e., the ProFile). Then choose "Brief Memory Test".
15. Set aside Preferences by double-clicking at the upper left-hand corner of the window.

CONTINUED ON NEXT PAGE



16. To cause the Lisa to use the Preferences you have just selected, use the following procedure:
 - a) Press the ON-OFF button. Wait for the light in the ON-OFF button to go out.
 - b) Press the ON-OFF button again. Now Lisa will come on again, with your Preferences operating.

K. SETTING THE CLOCK

1. Open the clock icon (select with mouse and double-click).
2. Move the mouse over desired time or date item and click once. When item is highlighted, type correct value. Continue until all items on clock are up to date.
3. Set aside the clock (double-click in upper left corner).

L. TESTING THE SYSTEM: PRINTING A DOCUMENT

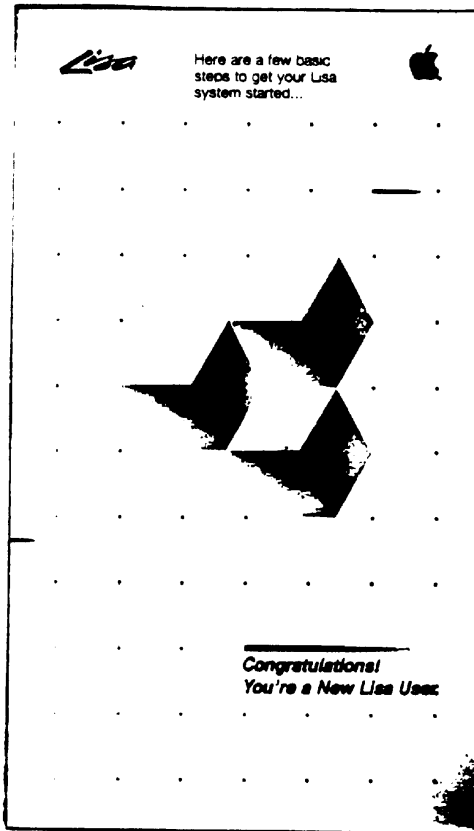
1. Make sure printer(s) are on.
2. Open ProFile icon with mouse (double-click).
3. Open examples folder for any application (LisaDraw is good for graphics demonstration).
4. Double-click on one of the examples, to create a new document ("Untitled"). Then double-click on "Untitled," to open it.
5. Pull down the File/Print menu and select "Format for Printer". Make the appropriate settings for the system at hand. Then click in the "OK" box.
6. Pull down the File/Print menu and select "Print". Make the appropriate settings. Then click in the "OK" box.

If the document prints, the Lisa is functional. If not, check the printer cables. If they are properly seated and the document still will not print, check the Troubleshooting section of Lisa Owner's Guide or Level 1 Technical Procedures.



M. GETTING THE USER STARTED

After setting a system up for a customer, give the new owners the Lisa Customer Orientation Card (see illustration below) and go over it with them, to help them get started with their Lisa. You should make sure that they can turn the system on and off properly and that they can start up LisaGuide before you leave.





APPENDIX 1

Replacing a Single Tool on the ProFile

If you accidentally discard a tool icon or pad-of-paper icon and want to replace it, you should use the method described here rather than the method given in section D (using the Office System 1 and 2 diskettes).

1. Turn the Lisa on and start up from the ProFile.
2. Insert the tool master diskette in either drive.
3. When the diskette icon appears on the screen, open it (double-click with mouse). Select and **duplicate** the desired icon (use the File/Print menu).
4. Move the highlighted duplicate icon into the ProFile. (If it is a tool icon (spiral notebook), open the ProFile icon and the Tools folder, and move the tool icon into the Tools folder.)



APPENDIX 2

Set-up Checklist

- 1- Serial number and support information written on pull-out cards?
- 2- Pull-out cards installed?
- 3- I/O board batteries on?
- 4- Parallel Interface Card installed in expansion slot 2 (for DMP)?
- 5- Software loaded onto ProFile from this Lisa's tool master diskettes?
- 6- Icons put in correct order?
- 7- Daisy Wheel Printer:
 - a) All three internal switches set correctly?
 - b) Correct cable and modem eliminator cable?
- 8- Dot Matrix Printer
 - a) Both internal switches set correctly?
 - b) Correct cable?
 - c) Connected to upper connector of Parallel Interface Card?
- 9- Preferences set correctly?
- 10- Clock set?
- 11- Document prints properly?
- 12- Customer knows how to begin working with Lisa?

Lisa 2/Macintosh XL Technical Procedures

Section 3

Video Take-Apart

Contents

Safety Precautions.....3.2
Discharging the CRT.....3.5
Removing the CRT.....3.9
Installing the CRT.....3.11
Removing the Video Board3.12
Replacing the Video Board.....3.12
Removing the Flyback Transformer.....3.14
Replacing the Flyback Transformer.....3.14
Removing the Disk Drive Cable Assembly.....3.15
Replacing the Disk Drive Cable Assembly.....3.15
Locating the Power-Supply-to-Card-Cage Assembly.....3.16
Removing the Macintosh XL Screen Kit Transformer.....3.17
Replacing the Macintosh XL Screen Kit Transformer.....3.18
Disposing of the Cathode-Ray Tube (CRT).....3.19

A videotape of these procedures is available.
Refer to the Prices section of your Service
Programs binder for part number and price.

NOTE: The letters in the margin refer to sections of the videotape. The circled step numbers following those letters mark steps that are demonstrated in corresponding sections of the videotape.

SAFETY PRECAUTIONS

The Lisa, with its built-in video monitor, is harmless as long as you're just watching the display. Removing the cover, however, exposes you to the high-voltage Cathode-Ray Tube (CRT)--the picture tube. The following precautions must be taken to ensure your safety, especially when you are making adjustments on a live monitor.

Safe Electrical Setup

1. **Be sure your outlet is correctly wired and properly grounded.**

Polarity and ground testers are available from most electronics stores. Test all outlets in your service area before working on **any** electrical equipment. If you have any doubts about your building's wiring, consult a qualified electrician.

2. **Never use an adaptor plug to connect a monitor's three-prong power plug to a two-prong wall outlet.**

Adaptors defeat the ground pin, which is a safety feature.

3. **Use an isolation transformer between the monitor and the outlet when performing live adjustments.**

Order an isolation transformer from your electronics distributor, and make it a practice to use it whenever you are working with **any** monitor or other powered system under test. An isolation transformer isolates the circuitry of the system under test from the power company's circuitry, reducing the likelihood of a fatal shock should you simultaneously contact high voltage and anything else that is earth-grounded.

Do not connect more equipment to the transformer than the wattage capacity of the transformer will bear. (It is usually best to connect only one piece of equipment at a time.) We recommend an isolation transformer with a minimum wattage capacity of 500 VA, with a grounded three-prong cord and receptacle. Two such transformers, available from many electronics stores and distributors, are listed below:

|| Triad N-57MG

Stancor GIS 500

CRT Safety Rules

- 1. Do not work on a monitor alone.**

In case of accident, it could save your life to have someone else nearby. Apple recommends that your staff be trained in Cardio-Pulmonary Resuscitation (CPR).

- 2. Remove rings, watches, bracelets, hanging necklaces, and other jewelry before performing repairs on a monitor.**

Metal jewelry is an excellent conductor of electricity. Removing jewelry will reduce the possibility of electric shock.

- 3. Never use a grounding wriststrap or heelstrap or work on a grounded workbench mat when discharging a monitor or when performing live adjustments.**

Grounding wriststraps, heelstraps, and mats are used to protect sensitive components from the damaging effects of electrostatic discharge from your own body or clothing. Even though they contain a one-megohm resistor and are designed to conduct only small electrical charges, we recommend that they be used **only** when working on "dead" (uncharged) equipment.

- 4. Wear safety goggles when working with a CRT.**

The CRT contains a high vacuum. If cracked or broken, it can implode (collapse into itself, then explode). To protect your eyes from serious injury, always wear safety goggles when working on or near a CRT, and be careful of other people in the area.

- 5. Before working inside a monitor, turn off the power and disconnect the AC power cord.**

Certain parts of a monitor chassis are hot (electrified) when the monitor is under power. Except when you must have the power on (for example, when making live adjustments), never work on a plugged-in monitor--even if you have the power turned off.

- 6. Keep one hand in your pocket or behind your back when working on a live monitor.**

This practice reduces the risk of current passing through your heart, should you accidentally contact high voltage.

7. Always discharge the anode before touching anything inside the monitor.

The anode of the CRT maintains a charge of about 15,000 volts DC (even when the power is off). Before touching any internal components you must discharge this voltage. The anode can regain some charge, even after it has been discharged. If the service procedure takes more than 30 minutes, the anode should be discharged again.

8. Never touch the anode connector or the anode aperture.

Normally the anode aperture has a connector plugged into it (Figure 1, #2). When a CRT is replaced, the anode connector is removed, exposing the anode. The anode can maintain a charge of several thousand volts (even after the power is off).

9. Do not pick up or handle a CRT by its neck.

To prevent an implosion, take every precaution against breaking the tube. Be especially careful with the neck, the area where the tube is the thinnest.

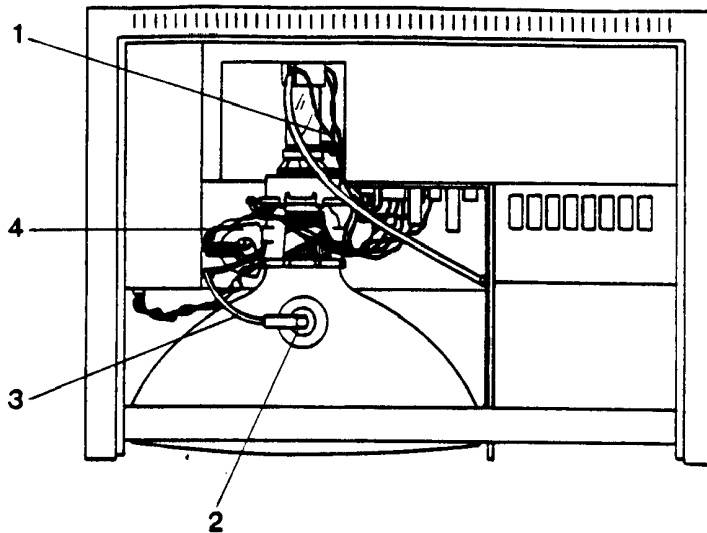


FIGURE 1

Live Adjustment Rules

In addition to the precautions listed on the previous pages, never touch the following components when adjusting a live CRT:

1. The yoke wires (Figure 1, #1)
2. The anode connector (Figure 1, #2)
3. The anode wire (Figure 1, #3)
4. The flyback transformer (Figure 1, #4)

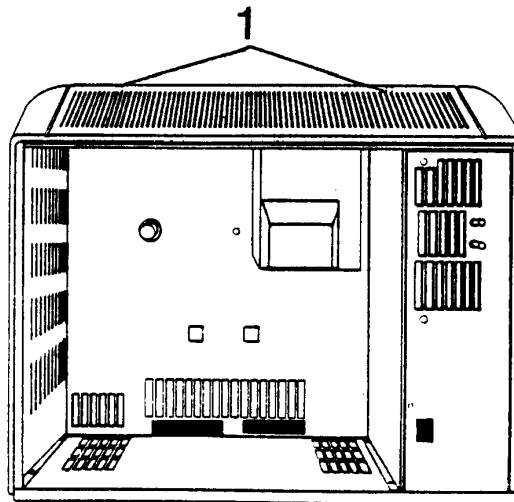


DISCHARGING THE CRT

WARNING! WHEN WORKING ON A LISA THE FOLLOWING STEPS CAN BE DANGEROUS IF NOT EXECUTED PROPERLY.

1. If the Lisa is on, press the ON-OFF switch. When it is finished powering down, unplug the Lisa.
2. Remove the back panel, card cage, and front panel.
3. Remove the top of the Lisa. It is joined to the chassis by screws which are permanently attached to the chassis. These two screws are found 'hidden' on the underside of the roof of the card cage chamber toward the back of the machine. To access them you have to poke your phillips screw driver up through the round holes in the flap which is part of the roof of the card cage chamber. See Figure 2, #1.

FIGURE 2



4. Lift off the top panel from the back of the Lisa.
5. Put on the safety goggles.
6. Remove any rings, wristwatches, and bracelets.
7. Attach the alligator lead to the large screw driver three inches from the handle on one end, and to the metal chassis on the other end.



FIGURE 3

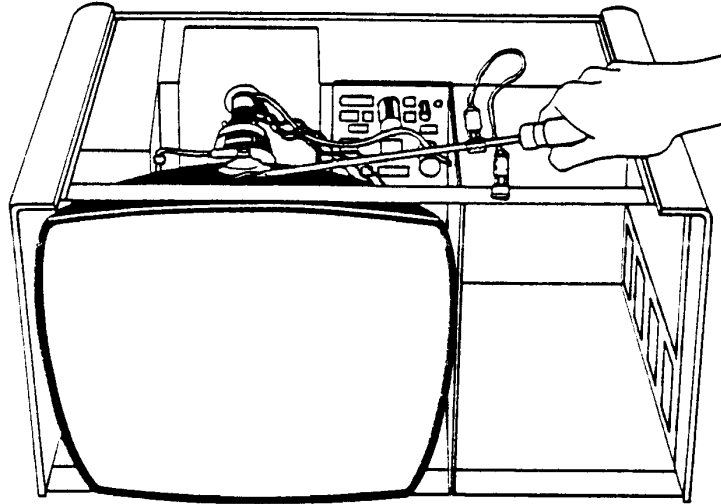
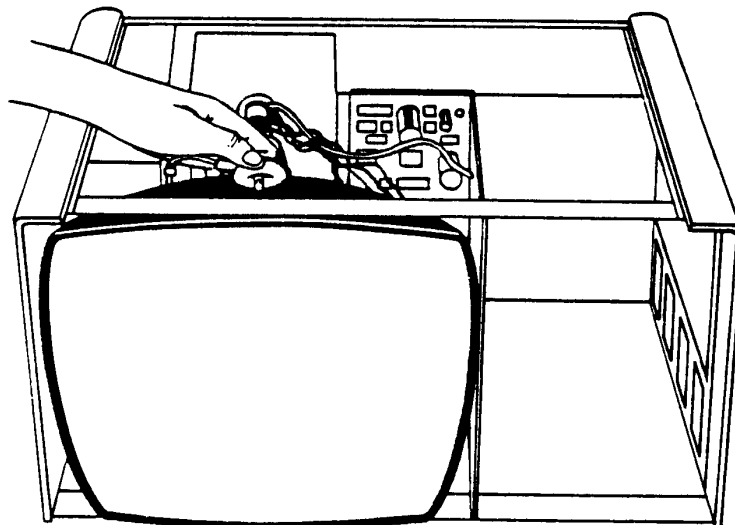


FIGURE 4





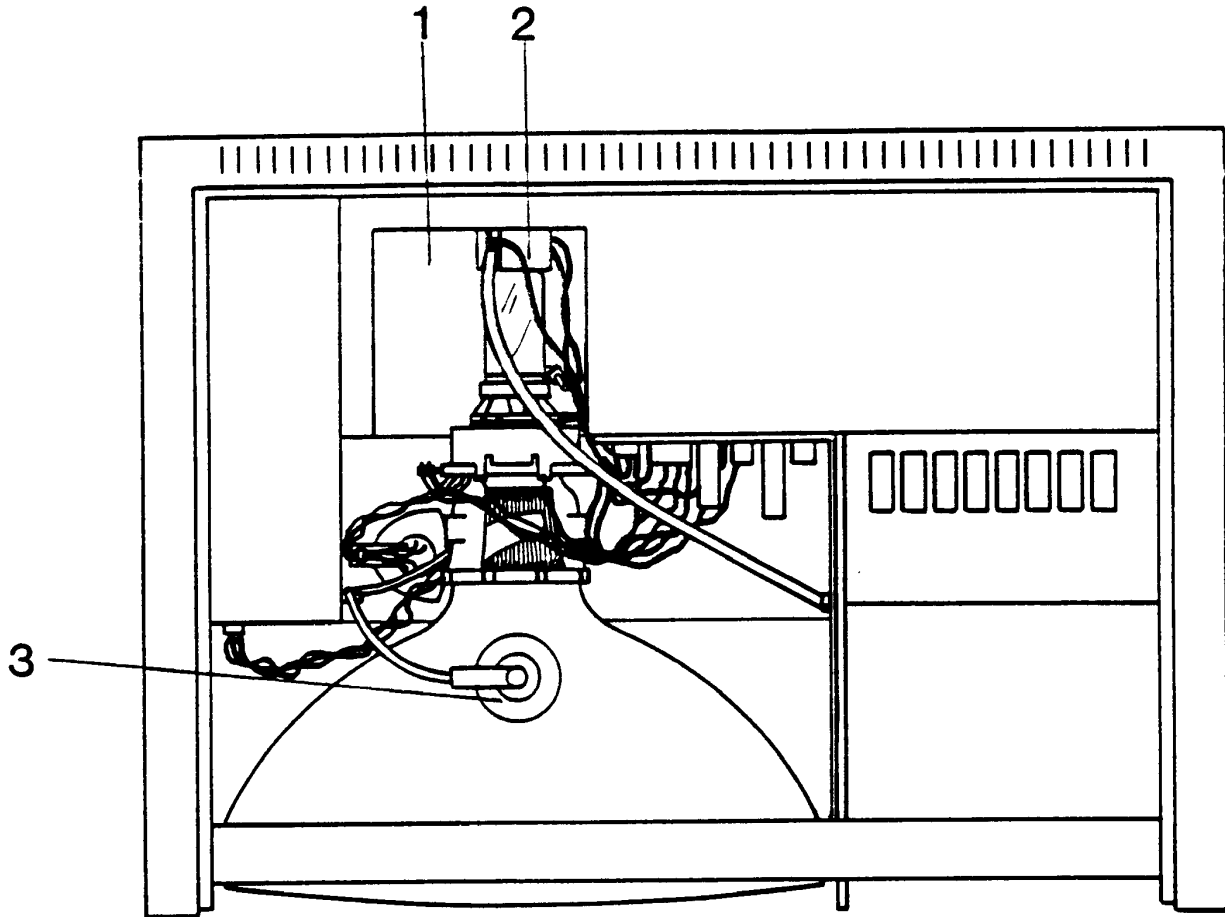
8. Put one hand in your pocket or behind your back. With your other hand grasping **ONLY** the insulated handle of the screwdriver, insert the screwdriver under the CRT anode cap. See Figure 3. Be sure the blade comes into contact with the anode ring.

CAUTION: DO NOT USE FORCE. If it is difficult to get the screwdriver under the anode cap, put down the large screwdriver and use a smaller screwdriver to loosen the suction of the anode cap on the tube. Remember, keep one hand behind your back while loosening the suction. Once the suction is relieved, proceed to discharge the anode with the large screwdriver as described above.

9. Remove the screwdriver.
10. Remove the alligator clips.
11. With one hand behind your back remove the anode cap. (Pull back on the rubber of the anode cap. First push one way then the other to loosen and remove it.) See Figure 4.



FIGURE 5



REMOVING THE CRT

1. Put on safety goggles.
2. Remove the cover.
3. **Discharge the CRT.**

WARNING: When working in the video chamber, avoid touching the anode and the anode cap--even after the CRT has been discharged. The anode can regain some charge over time.

4. Place the Lisa on a grounded workbench mat and put on your grounding wriststrap.

The CRT cup is the part of the chassis that surrounds the CRT neck (Figure 5, # 1). In the following steps, you will remove the cables, screws, and ground wire that are attached to the CRT cup. The ground wire (the single white wire that runs from the yoke to the contact on the chassis) is difficult to remove safely. You will do that last so that you can orient the CRT cup away from the CRT neck.

5. Remove the wires from the clamps on the side of the CRT cup. Turn the computer so that the back is facing you.
6. Supporting the cup, remove the four screws that secure the cup to the chassis. Access three screws through the video chamber, the fourth through the card cage chamber.
7. Remove the round plug from the socket at the end of the CRT neck (Figure 5, #2). (If the black plastic guide comes off the tube with the plug, replace it.)
8. Move the CRT cup so you can grasp the ground terminal and remove it safely from the contact on the floor of the CRT cup.
9. Remove the two upper yoke connectors from the video board. Be careful of the 25-volt capacitor directly above the second plug.

WARNING: In the following steps, avoid touching the red-painted anode area of the CRT (Figure 5, #3).

10. Use the magnetic nutdriver to remove the screws from the four front corners of the CRT, removing the top screws last. Use one hand to steady the CRT while removing the top two screws.

11. Carefully remove the CRT by pulling it toward you.

WARNING: Do not hit the tube against the chassis frame. Do not break the seal of the yoke to the neck.

12. Set the CRT aside on a flat, soft surface.

WARNING: If you are going to dispose of the CRT, read and follow the instructions for safe devacuuming in "Disposing of the Cathode-Ray Tube (CRT)" at the end of this section.

INSTALLING THE CRT

1. Put the flyback cable (anode wire) and ground wire through the CRT cup hole.
2. Carefully place the CRT where it is to be mounted, with the anode facing up.
3. Hold the CRT in place with one hand and install the bolts. Partially install all four bolts, then tighten all of them.
4. Attach the round socket to the end of the CRT neck. It fits only one way. Make sure the pins are aligned correctly with the connector before pushing it on.
5. Connect the yoke wires to the connectors on the video board. The yellow and green wires go on the left side of the board (as you face the screen), and the red and blue wires go on the right side of the board.

CAUTION: The CRT may be damaged if these connections are reversed.

6. Route the anode wire through the clamps on the video chamber side of the power supply chamber.
7. Clip in the anode cap.
8. Replace the ground.
9. Replace the CRT cup.
10. Replace the top.
11. Replace the card cage.



REMOVING THE VIDEO BOARD

1. Discharge the CRT.
2. Remove the two yoke plugs (upper connectors) from the video board. Be careful not to injure the 25V capacitor directly above the second plug. These connectors can be difficult to remove.
3. Remove the flyback transformer connector from the video board. Squeeze the release catches on the top and bottom of the connector and use a rocking motion to pull the connector free.
4. Remove the two phillips head screws that attach the video board to the CRT.

NOTE: If the screws drop and remain on the bottom, the flyback may short when the computer is turned on.

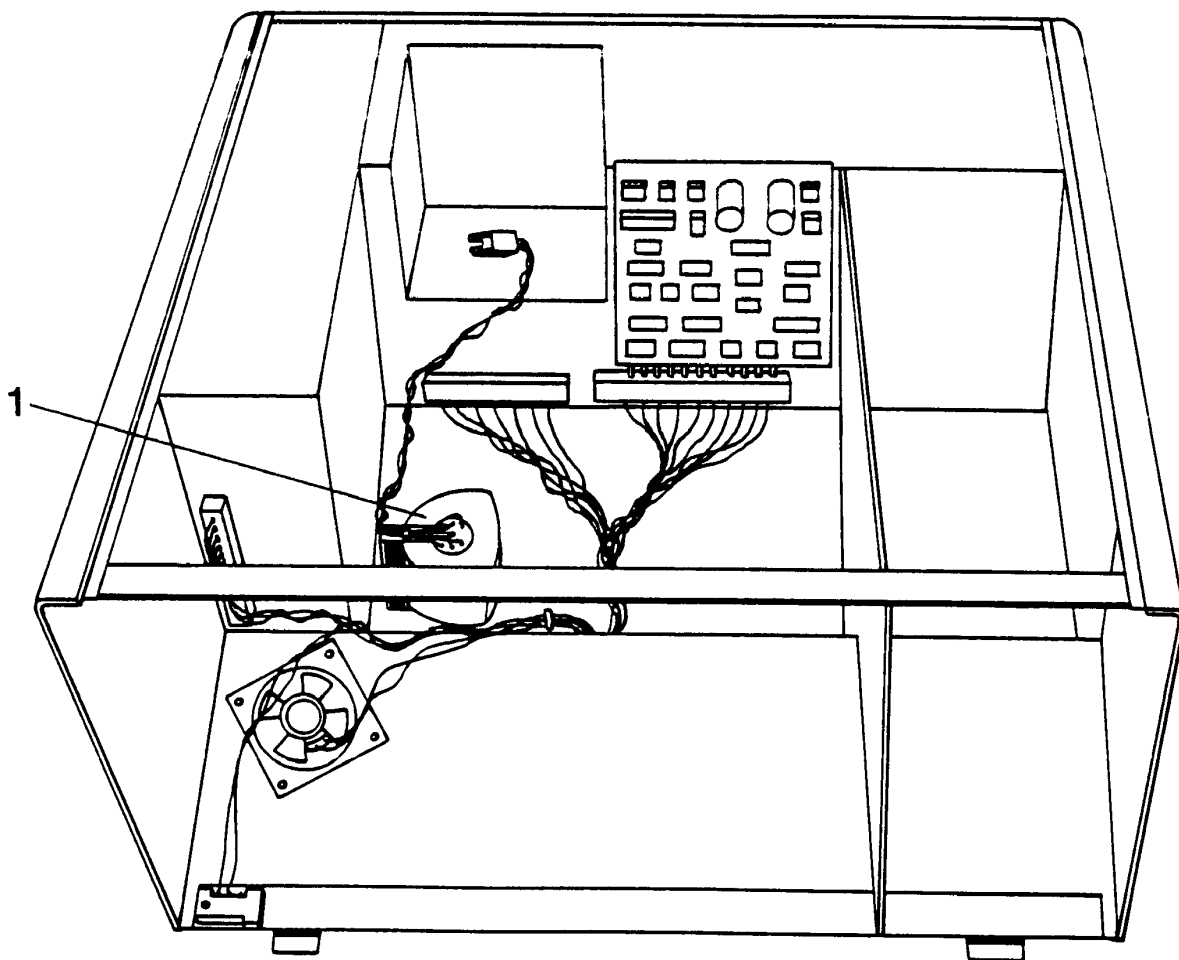
5. Pull out the video board.

REPLACING THE VIDEO BOARD

1. Slide in the video board into its connector.
2. Screw in the two screws which hold the video board in place.
3. Connect the wires from the yoke to the connectors on the video board. When facing the front of the Lisa, the yellow and green wires go on the left side of the board and the red and blue wires go on the right side of the board.
4. Attach the flyback transformer connector.
5. Replace the top.



FIGURE 6





REMOVING THE FLYBACK TRANSFORMER

1. Discharge the CRT.
2. Remove the CRT.
3. Remove the power supply
4. Face the back of the Lisa. Remove bottom pan by removing 6 flathead phillips screws; four from the card cage chamber floor, and two from the power supply chamber floor.
5. Tilt the back of the Lisa forward and the bottom pan will fall free.
6. Pull the high voltage wire loose from the clamps on the side of the chassis.
7. Turn the chassis upside down.
8. Orient yourself to the front of the Lisa.
9. While holding the flyback (See Figure 6, #1) from underneath with one hand, remove the two nuts which attach the flyback to the chassis from the bottom of the machine (which is now facing up) using a number 6 nutdriver.
10. Turn the chassis right side up.

REPLACING THE FLYBACK TRANSFORMER

1. With the chassis lying on its back, orient the flyback so that the screws are sticking through the bottom of the chassis. Gently tighten down the bolts.

Caution: These bolts are delicate. If you tighten down the nuts too much the bolts may break off.
2. Replace the bottom plate. Slide the little feet of the bottom plate up into the bottom of the chassis. Carefully set the Lisa right side up. Replace the 6 screws, starting all of them first before tightening each one down.
3. Replace CRT.



REMOVING THE DISK DRIVE CABLE ASSEMBLY

1. Remove the disk drive cables from the two clamps on the bottom of the disk drive chamber. Apply downward pressure to the tab on the right side of the clamp (perhaps with the handle of a screwdriver) and simultaneously pull up on the body of the clamp.
2. Remove the cable from the board of the ON-OFF switch. (Push the tabs apart to release the cable.)
3. Remove the disk-drive-to-card-cage connector from the bottom back panel of the disk drive chamber. It is attached with two screw/starwasher/bolt assemblies. Access the bolt on the left side of this connector through the video chamber. The screws are accessible through the card cage chamber. Hold the bolt steady with a 1/4" crescent wrench or needlenose pliers from inside the video chamber and loosen the screw from inside the card cage chamber. The bolt on the right hand side of the connector is accessible through the disk drive chamber.

REPLACING THE DISK DRIVE CABLE ASSEMBLY

1. Replace the disk-drive-to-card-cage connector. Push the screw in from the card cage side, hold the nut and starwasher in place, and tighten down the screw.
2. Plug ON-OFF switch cable into ON-OFF switch/keyboard assembly board.
3. Place the left disk drive cable on top of the right disk drive cable and insert both into the clamps on the bottom of the disk drive chamber. Lock the clamps.

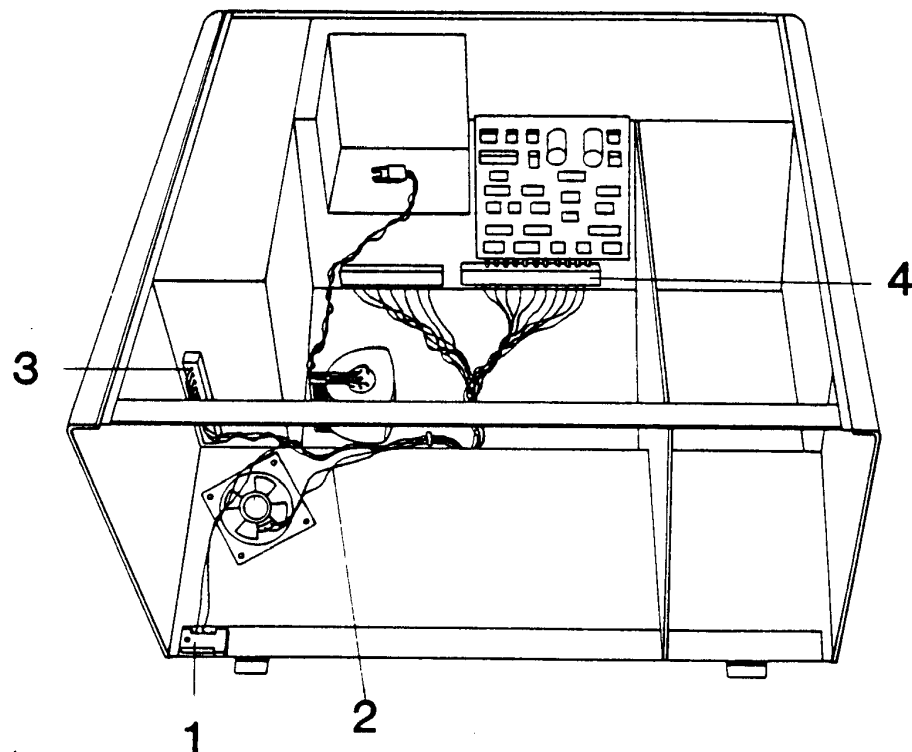


LOCATING THE POWER-SUPPLY-TO-CARD-CAGE-ASSEMBLY

The power-supply-to-card-cage-assembly winds its way through the video chamber from the power supply chassis frame to where it splits and supplies power to both the card cage and the video board.

1. The safety interlock switch which is attached by one screw to the front, bottom, left of the video chamber is located at Figure 7, #1.
2. The speaker-to-assembly connector is located at Figure 7, #2.
3. The connector to the power supply chassis frame is located at Figure 7, #3. When you are replacing the connector be sure to replace the ground under the star washer when replacing the screw.
4. The video board connector is located at Figure 7, #4. When you are replacing the connector be sure to replace the ground under the star washer when replacing the screw.
5. The assembly is attached to the card cage at Figure 7, #5.

FIGURE 7



DISPOSING OF THE CATHODE-RAY TUBE (CRT)

WARNING: Remember that a CRT can implode unless it is devacuumed. Putting a defunct CRT into a trash receptacle without devacuuming it can endanger other people.

Materials Required

Thick cardboard box large enough to conceal the CRT
Large, sharp diagonal cutters
Large pliers
Duct tape
Safety goggles
Gardening gloves
12-inch square of cloth or heavy paper

Devacuuming the CRT

1. Put on the safety goggles.
2. In the side of the box about six inches from the bottom, cut or drill a hole just large enough to accommodate the very tip of the CRT.
3. Place the CRT inside the box with the tip of the neck protruding through the hole, and tape the box flaps down with duct tape (Figure 8).

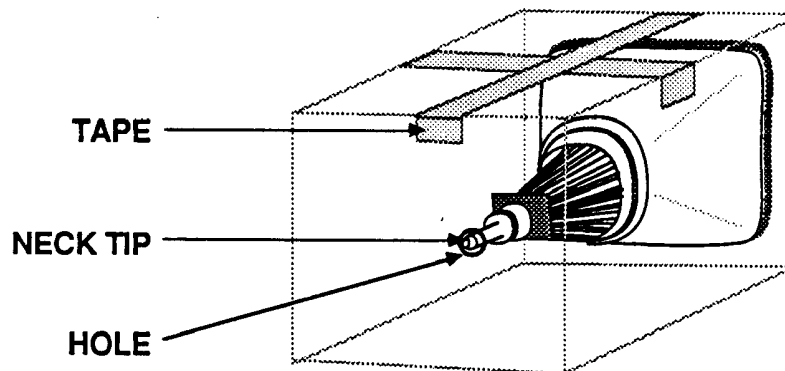


FIGURE 8

WARNING: Only the very tip of the CRT neck should be protruding through the hole in the box. The box must not have any other openings.

4. Put on the gloves.
5. If there is a plastic guide on the end of the CRT neck, pull it off. Using the diagonal cutters, carefully clip off the connector pins on the end of the CRT neck.
6. Tape the piece of cloth or paper onto the box (Figure 9, #1) so that it forms a veil over the opening (Figure 9, #2) but allows your hand access to the tip of the CRT. The veil's purpose is to catch the bits of glass that may fly during the following step.

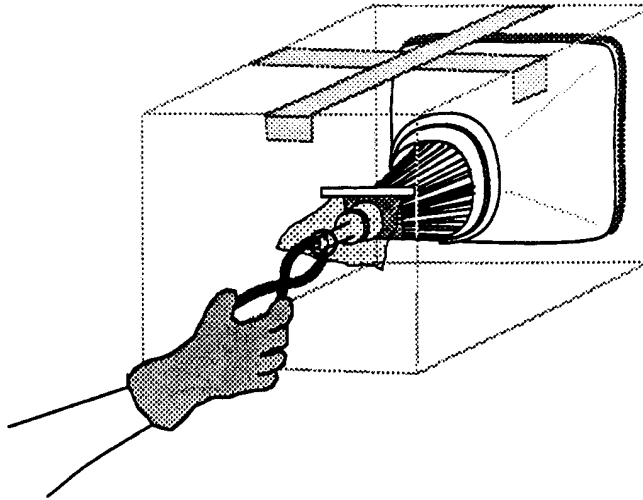


FIGURE 9

7. Make sure no one is standing nearby. Place the pliers under the veil, stand to one side, and look away while you use the pliers to snip off the exposed tip of the CRT.

WARNING: Do not look directly at the box when cutting off the tip!

You will probably hear a rush of air entering the CRT when the CRT vacuum breaks--but even if you don't, the procedure is complete if the inner space of the CRT is clearly visible through the opening created by the removed tip.



Lisa 2 Technical Procedures

Section 4

Video Adjustments

Contents:

Introduction.....4.3
Tools and Equipment Needed.....4.3
Accessing the Video Assembly and the Test Patterns.....4.4
Summary of Video Adjustments: Problems and Corrections..4.5
Horizontal Phase Adjustment.....4.7
Brightness and Contrast Adjustments.....4.8
Calling up the Video Crosshatch Pattern.....4.9
Yoke Adjustment.....4.11
Height, Width, Vertical Linearity, and Centering.....4.12
Magnet Adjustments.....4.13
Finishing up.....4.14

CAUTION: BEFORE PERFORMING THESE ADJUSTMENTS, REVIEW THE SAFETY PROCEDURES IN THE LISA VIDEO TAKE-APART TECHNICAL PROCEDURE.

A videotape of these procedures is available. Refer to the Prices section of your Service Programs binder for part number and price.

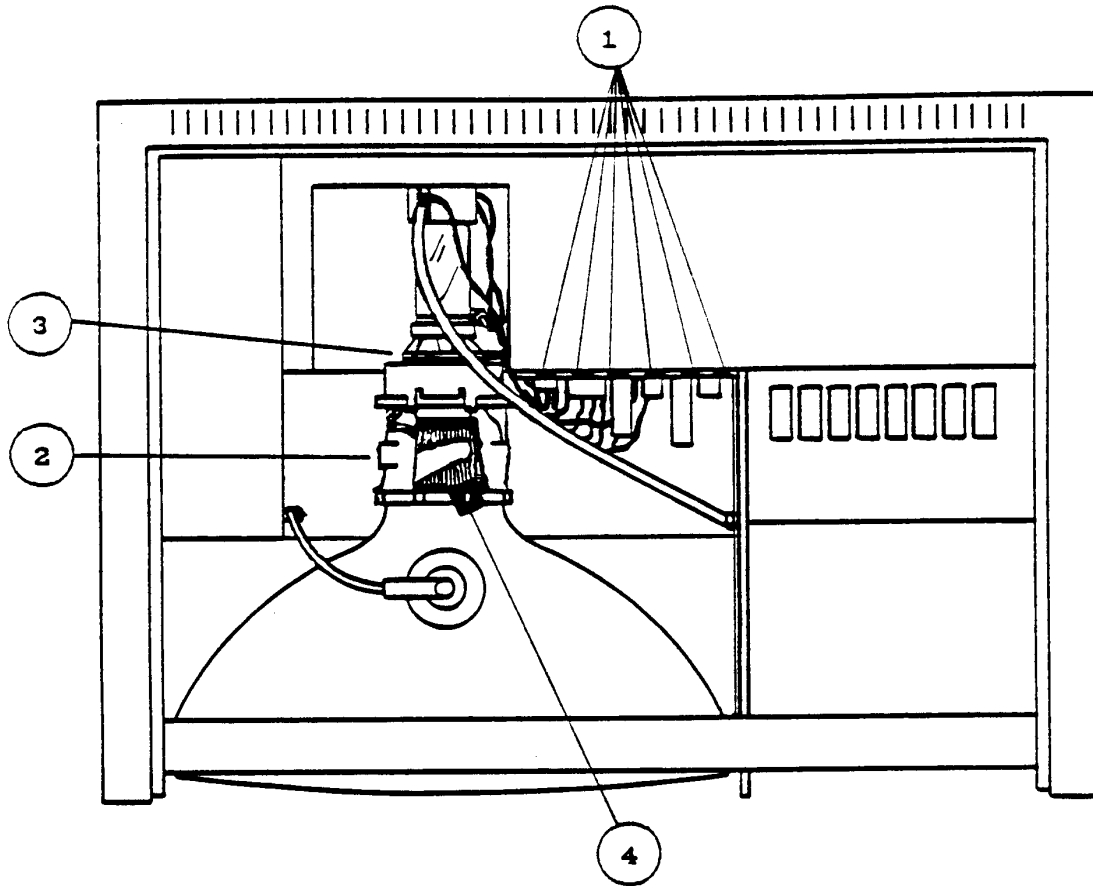


Figure 1



INTRODUCTION

You will need to perform video adjustments if you replace the CRT assembly, the flyback transformer, or the video board.

There are four major types of adjustment: the video board potentiometers (Figure 1, #1), and the CRT yoke, centering rings, and magnets (Figure 1, #2, 3, and 4). Using an alignment graticule etched with centering marks, which you can lay over the screen, you will make all four adjustments by matching a video crosshatch pattern to the graticule.

Some very old Lisa CRTs will not have spoke collars for magnet adjustments, and to add magnets to them you will have to use Funtak (available at Gemco, Woolworth's, etc.) or an equivalent adhesive.

TOOLS AND EQUIPMENT NEEDED

- LisaTest 2.0 Diskette (P/N 077-8140-A)
- Alignment graticule (P/N 077-8043-A)
- Diagonal cutters ("dikes")
- Medium Phillips screwdriver with insulated handle **and shaft**
- Medium or small flatblade screwdriver with insulated handle **and shaft**
- Safety goggles with closed side panels
- Adjustment magnets (P/N 652-4520)
- Glue: Torque Seal, Glyptol, or equivalent

WARNING: All screwdrivers used in video work should have insulated **shafts** as well as insulated handles. If you cannot find screwdrivers with insulated shafts, you can make them by putting a double layer of shrink tubing on the shaft of a normal screwdriver with insulated handle. Make sure the shrink tubing extends up to the insulated handle and covers all parts of the shaft that you might touch.

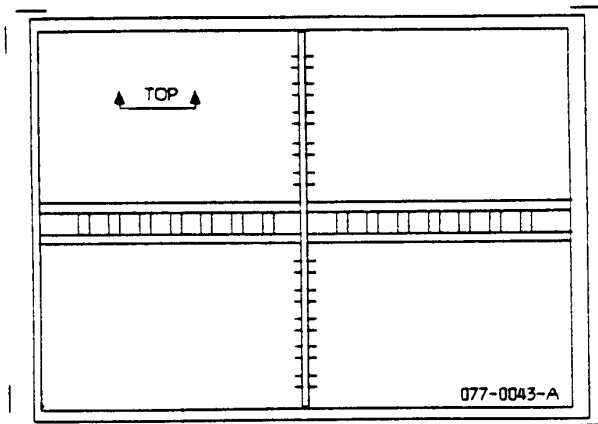


A. ACCESSING THE VIDEO ASSEMBLY AND THE TEST PATTERNS

IMPORTANT: Since the picture may expand and change position slightly as the Lisa warms up, you should let it warm up for 10 - 15 minutes before you adjust it.

1. Make sure the power is off. Remove the front and rear panels from the Lisa.
2. Remove the card cage and unscrew and remove the top panel.
3. Install the alignment graticule (pictured below) on the front panel, just as you would install a glare filter (see *Take-Apart* procedures).
4. Replace the card cage and the front and rear panels.
5. Insert the LisaTest diskette into the disk drive.
6. Turn on the Lisa by pushing the ON-OFF button, and, when you hear the first click, hold down the <APPLE> key while typing 2. (This interrupts the automatic startup sequence and tells the Lisa to start up from the disk drive.)
7. If the Lisa was cold, allow it to warm up for 10-15 minutes.
8. Examine the Lisa picture for the problems listed in the Summary of Video Adjustments (next page).

If there are no problems, do not continue with these procedures.





SUMMARY OF VIDEO ADJUSTMENTS

<u>Problem</u>	<u>Correction</u>
Screen is dark.	Brightness, contrast.
Letters on screen look smudged, appear to have "shadows".	Turn down contrast trimpot.
Bent or distorted lines on crosshatch pattern or edges of picture.	Adjust magnets on yoke.
Entire picture tilted (rotated around center).	Adjust yoke.
"Shadow band" visible at left side of screen.	Horizontal Phase Adjustment.
Picture is too far to one side of the screen.	Horizontal Phase Adjustment.
Vertical distortions or distortions of scale from one part of the screen to another.	Adjust Width, Height, Vertical Linearity trimpots and centering rings.
Vertical and horizontal lines not perpendicular.	Make sure yoke is pushed fully forward on CRT neck.

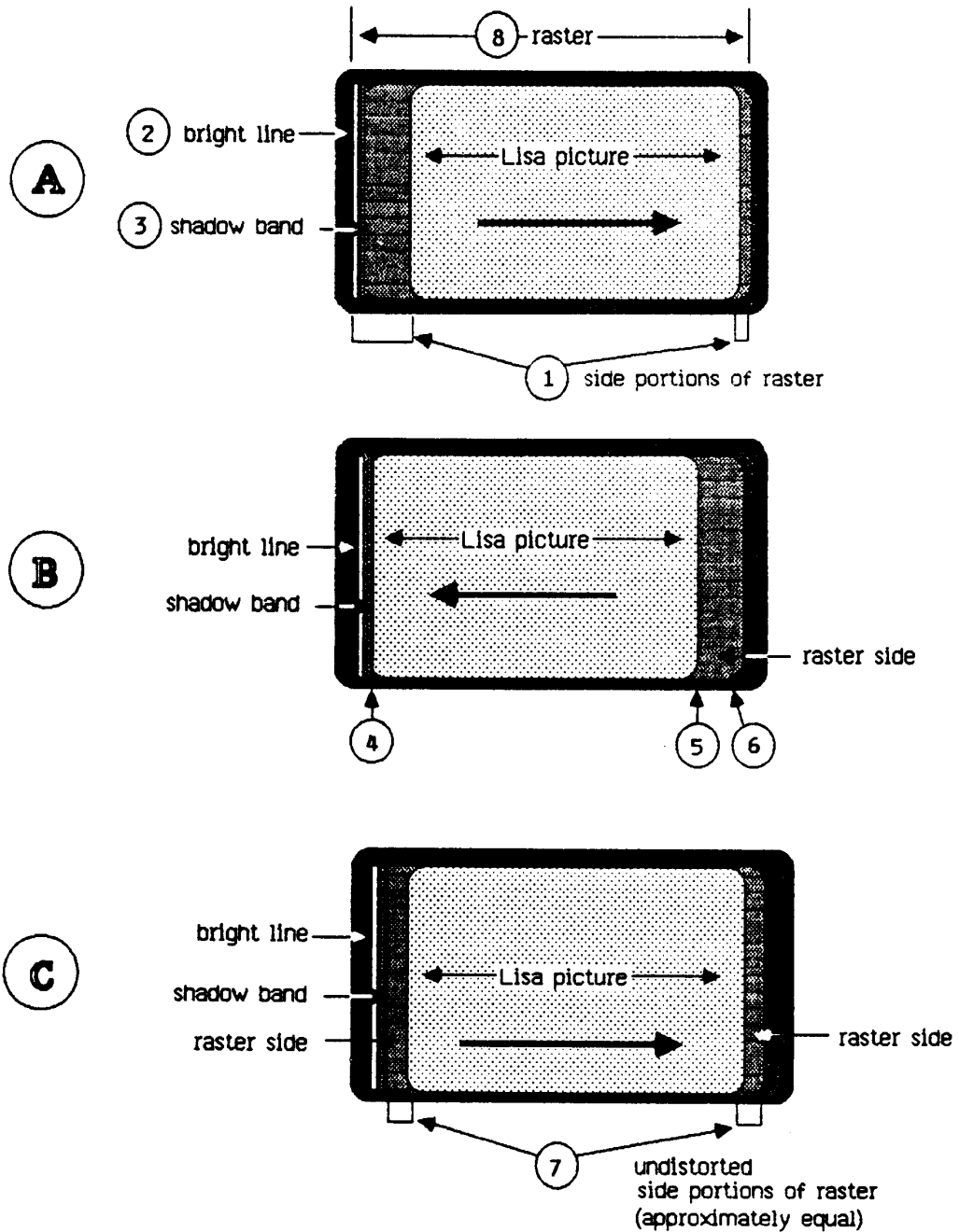


Figure 2



B. HORIZONTAL PHASE ADJUSTMENT

When you turn up the Lisa's brightness, you can see entire raster (that is, the area of illumination) on the screen (see Figure 2A, #8). At the left edge of the raster is a narrow band that is slightly darker than the rest of the screen (Figure 2A, #3); you will have to try hard to notice it. You will use the Horizontal Phase trimpot to move the picture outside this area of darkness ("shadow band") and center it in the undistorted part of the raster.

1. Remove all metallic objects (including your wedding ring, your watch, and any jewelry) from your hands and arms. Put on the safety goggles to protect your eyes. Keep one hand in your pocket or behind your back during these adjustments.
2. Turn up the brightness control on the back of the Lisa until the side portions of the raster appear around the Lisa picture (see Figure 2A, #1). If the picture or the raster become enlarged or distorted, turn down the brightness until normal size and shape are restored.
3. Find the Horizontal Phase trimpot on the top of the video board and use it to move the picture all the way to the right (Figure 2A).
4. At the extreme left side of the raster you will see a bright line (Figure 2A, #2). To the right of the bright line is a vertical band of shadow about 1/16 inch wide (see Figure 2A, #3: the shadow band is very slightly darker than the rest of the raster edge. If you cannot see the shadow band, use the Horizontal Phase trimpot to move the picture all the way to the left. If you still cannot see the shadow band, adjust the Brightness until you can see it.)
5. Using the trimpot, move the left edge of the picture flush with the right edge of the shadow band (see Figure 2B, #4).
6. Now observe the space between the right edge of the picture (Figure 2B, #5) and the right edge of the raster (Figure 2B, #6). Move the picture halfway through that space, so that the undistorted portions of the raster on either side of the picture are equal (see Figure 2C, #7).
7. Put a small drop of the specified glue on the trimpot, to hold it in place. Be careful not to cover up the name of the trimpot or the resistor number (e.g., R34, R22).



C. BRIGHTNESS AND CONTRAST ADJUSTMENTS

1. Turn down the brightness control on the back of the Lisa until the side portions of the raster just disappear and only the Lisa picture is visible.
2. Find the contrast trimpot (CONT) on the top of the video board. Turn it to the maximum setting that does not enlarge or distort the picture. If this causes the side portions of the raster to become visible again, turn down the brightness control on the back of the Lisa until only the Lisa picture is visible.
3. Turn down the contrast until the screen looks right. Then turn it down just a little more, so that the screen looks slightly darker than you would want it for actual use.
4. Put a small drop of the specified glue on the contrast trimpot, to hold it in place. Be careful not to cover up the name of the trimpot.

These are the proper hardware settings for brightness and contrast. From this point on, the contrast of the screen should be changed only by using the Preferences menu.



D. CALLING UP THE VIDEO CROSSHATCH PATTERN

The rest of the video adjustments require that you match a crosshatch pattern on the CRT screen to the alignment graticule. To call up the video crosshatch pattern from LisaTest, use the following procedure.

1. Access the Options menu by holding down <APPLE> and <SHIFT> and typing S.
2. Pull down the Options menu and choose "Check". From the "Check" window choose the crosshatch icon and click "OK". The crosshatch pattern will then appear on the screen. (To return to the desktop, press any key.)
3. Note that for each crosshatch line on the video display there are two marks on the graticule (Figure 3, #1) to define the limits of tolerance. Always try to center the video line between the two tolerance marks, as the adjustments will probably shift somewhat after you make them.

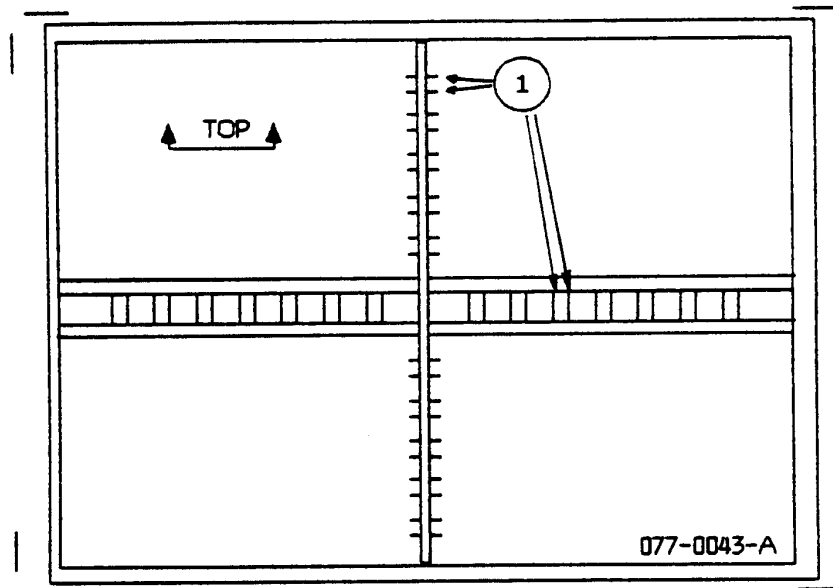


Figure 3

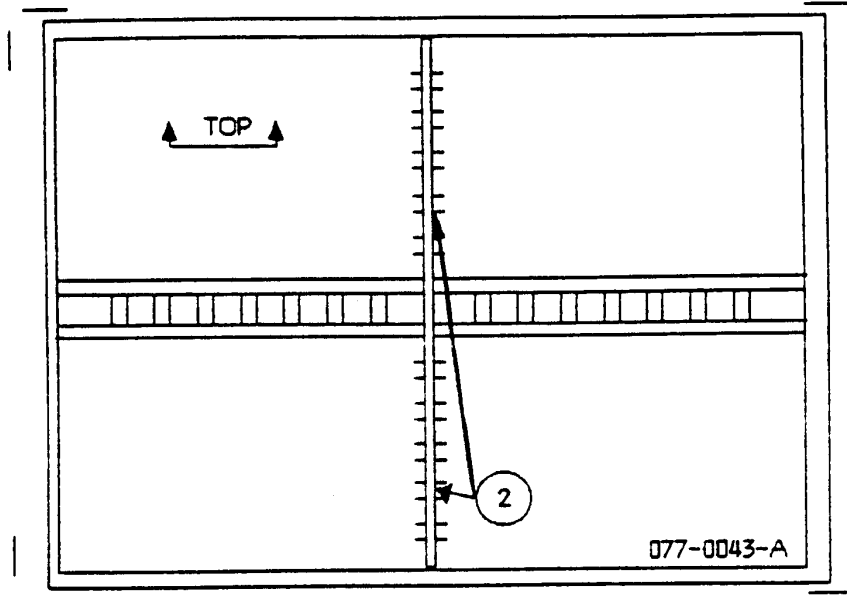


Figure 3

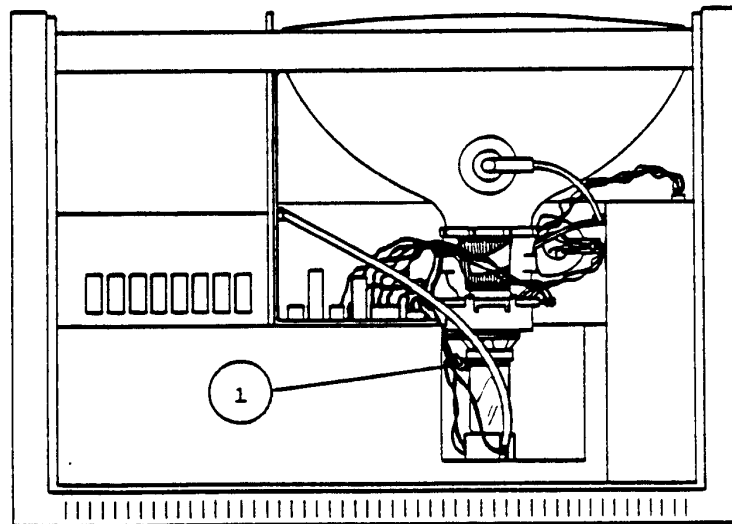


Figure 4



E. YOKE ADJUSTMENT

The yoke controls the orientation of the picture on the screen: if you rotate the yoke, the entire picture rotates around its center. (Turning the yoke does not affect the shape or focus of the picture, only its orientation.) If the central vertical line of the crosshatch pattern is not parallel to the central vertical line of the graticule (see Figure 3, #2), adjust the yoke as follows.

1. Remove all metallic objects (including your wedding ring, your watch, and any jewelry) from your hands and arms. Put on the safety goggles to protect your eyes. Keep one hand in your pocket or behind your back during these adjustments.
2. With a medium or small flatblade screwdriver, carefully loosen the yoke clamp screw (Figure 4, #1). Rotate the yoke by gripping it **only on the plastic section near the centering rings**, until the center vertical of the crosshatch is parallel to the center vertical on the graticule.
3. Make sure the yoke is pushed fully forward on the CRT neck; then carefully tighten the screw on the yoke clamp: it should be tight enough to prevent the yoke from turning, but not so tight as to crack the tube.

IMPORTANT: If the yoke is not pushed fully forward, the vertical and horizontal lines of the crosshatch pattern will not be perpendicular to each other.



F. HEIGHT, WIDTH, VERTICAL LINEARITY, AND CENTERING

NOTE: Height and width specifications are different for a Modified Lisa 2/Macintosh XL. Refer to **Upgrade and Retrofit, Section 4** to perform height and width adjustments on a Modified Lisa 2/Macintosh XL.

By adjusting the video board Height, Width, and Vertical Linearity trimpots, along with the centering rings, you should be able to make the crosshatch pattern fit within the graticule's tolerance markings. You may notice curves or bends in the lines of the pattern; don't worry about them at this point. You can correct them later by adding small magnets to the yoke collar (see next section).

1. Adjust the yoke and centering rings until the central vertical line on the video crosshatch is parallel to the central vertical line on the graticule, and within the tolerance markings.
2. Adjust the Width trimpot until the left and right borders are within graticule tolerance.
3. Recenter the picture using the rings and yoke, if necessary; use the central vertical line as your guide.
4. Adjust the Height trimpot until the upper and lower borders of the picture are within graticule tolerance. Readjust the width and recenter the picture if necessary.

NOTE: You will probably see some slight distortion at the upper and lower right corners. Don't worry about this; you will correct for it later.

5. Check the height, width, centering and orientation of the picture against the graticule again. Repeat steps 1-4 if necessary.
6. Adjust the Vertical Linearity trimpot until the horizontal lines of the crosshatch pattern are evenly spaced and within graticule tolerance.
7. Readjust the height and recenter the picture if necessary. Then recheck the vertical linearity and readjust that trimpot if necessary. Then recheck height and centering.... et cetera. These controls affect each other, so they must be adjusted and readjusted in this way.
8. Rest your eyes for a moment. Then inspect the picture again. Readjust if necessary.



9. If you see bent or distorted lines in the crosshatch pattern, adjust the magnets on the yoke (see next section). If not, put a small drop of the specified glue on the rings and one on each trimpot, to hold them in place. Be careful not to cover up the name of the trimpot or the resistor number (e.g., R34, R22).

G. MAGNET ADJUSTMENTS

After adjusting the picture as well as you can with the trimpots and rings, examine the crosshatch pattern for any distortions: curves or bends in the lines can be corrected by placing magnets around the yoke.

The magnets come in four strengths, according to the following color code:

yellow	=	5 gauss
red	=	7 gauss
blue	=	11 gauss
green	=	15 gauss

1. On yokes with spokes, simply place the magnet on the appropriate spoke and turn the magnet until the distortion is corrected. If your weakest magnet is too strong for the correction you need, cut pieces off it with the dikes until it is the proper strength.

To apply magnets on spokeless yokes, put a small piece of magnet in a wad of Funtak. Find the spot on the yoke corresponding to the distorted area of the crosshatch, and stick the magnet on.

NOTE: To apply magnets to the bottom of the yoke, you may need to rotate the yoke so that the area is accessible. To do this, loosen the yoke collar screw and rotate the yoke as far as necessary. When finished, rotate the yoke back to normal position and retighten the screw.

2. Once you have adjusted the magnets, use a drop of the specified glue to hold each in place. Then recheck the trimpot adjustments. When you are satisfied with the adjustments, put a small drop of the specified glue on the rings and one on each trimpot. Be careful not to cover up the name of the trimpot or the resistor number (e.g. R34, R22).



H. FINISHING UP

Turn off the Lisa. Let it sit in your shop overnight, to give the glue time to dry. In the morning, turn it on, let it warm up for 10 to 15 minutes, and check it against the alignment graticule to make sure that the adjustments have held. If there are no problems, turn off the Lisa, remove the alignment graticule, replace the customer's glare filter (if there was one), and return the Lisa to the customer.



Lisa/Macintosh XL Technical Procedures

Section 5

Diagnostics

Contents:

Vital Information.....5.2
Interpreting the Boot ROM and I/O ROM.....5.2.1
Using the Diagnostic Diskettes.....5.3
Booting the Diagnostic Diskette.....5.3
Customer Level.....5.4
Service Level.....5.5
 Running Individual Tests.....5.6
 Brief Test Descriptions.....5.7
 Run System Check.....5.8
 Set Diagnostic Controls.....5.8



VITAL INFORMATION

The Lisa/Macintosh XL has two diagnostic test series available for Level I service: the **boot ROM** and the **diagnostic test diskette**. The boot ROM on the CPU board acts as the first test of the Lisa 2/Macintosh XL system. It contains diagnostics that are executed each time the system is turned on.

The Lisa/Macintosh XL Test diagnostic diskette is used for testing Lisa 2, Lisa 2/5, and those Macintosh XL's (Lisa 2/10's) that have not been upgraded with the Macintosh XL Screen Modification Kit. It will not work on a system that has been upgraded with the Screen Modification Kit.

The Macintosh XL Screen Modification Kit diagnostic diskette is an identical test for use in testing Modified Lisa/Macintosh XL's (Lisa 2/10's) that have been upgraded with the Screen Modification Kit. It will not work on a system without that modification.

Both diagnostic diskettes contain tests for the CPU, memory boards, I/O board, diskette drive, built-in hard disk, ProFile, and expansion cards, as well as tools for video adjustments (the video grid and gray screen).

Both the modified and unmodified Lisa/Macintosh XL require two memory boards in order to use the diagnostic diskette.



INTERPRETING THE BOOT ROM AND I/O ROM

Upon power up, the Lisa/Macintosh XL will automatically perform a self-test using the program in its boot ROM. As the CRT warms up (approximately 30 seconds after power-up), the monitor will display four icons representing the CPU, I/O, memory, and expansion cards as they are being tested. Each icon will be highlighted in sequence as the boot ROM checks it.

The Boot ROM and I/O ROM code numbers are displayed at the upper right corner of the screen once the board icons have been tested. These ROM code numbers are displayed for only a few seconds, so it is important that you watch the upper right corner of the screen until you can record the code numbers for the Boot ROM and I/O ROM. The correct ROM code numbers for unmodified Lisa/Macintosh XL and Modified Lisa/Macintosh XL are listed on the table below. **If the numbers you record do not match the numbers given on the table, install the correct ROM immediately.**

	Unmodified		Modified	
	Boot ROM	I/O ROM	Boot ROM	I/O ROM
Lisa 2 and 2/5	H	A8	3A	A8
Macintosh XL	H	88	3A	88

The boot ROM diagnostics are an overview of the system. If one of the cards is faulty, its icon will be presented on the screen with an "X" through it. The testing will stop. Upon failure you should reseal the board, power-up, and if you get that error message again, swap out the board. If the system passes, and the ROM code numbers are correct, you can use the Lisa/Macintosh XL Test diagnostic (for unmodified system) or Macintosh XL Screen Modification Kit diagnostic (for modified system) for further testing.

THE FOLLOWING PROCEDURES ARE WRITTEN FOR THE LISA/MACINTOSH XL TEST DIAGNOSTIC (P/N 077-0140), AND FOR THE MACINTOSH XL SCREEN MODIFICATION KIT DIAGNOSTIC (P/N 077-0206).



USING THE DIAGNOSTIC DISKETTES

The Lisa/Macintosh XL Test and Macintosh XL Screen Modification Kit diagnostic can be used in two ways, in the "Customer Level" or the "Service Level." Customer Level allows you to set up and run a continuous sequence of tests. In Service Level you can choose to test individual modules. When you boot up either diagnostic diskette you are in the Customer Level. To enter the Service Level, hold down the **<APPLE>** and **<SHIFT>** keys and press **S**. You can enter Service Level before running the first Customer Level test.

Here are some important things to remember about using the diagnostic diskettes.

1. First determine whether the system to be tested is a modified Macintosh XL (with Screen Kit installed) or not. (See "Interpreting the Boot ROM and I/O ROM.") Be sure to use the appropriate diagnostic diskette.
2. In order to use the diagnostic diskette, the computer must have two memory boards.
3. If you attempt to use the diagnostic while any application is running, the computer will display a "damaged diskette" error message.
4. The diagnostic diskette will report an I/O error if the CPU board boot ROM are prior to rev. F. It is recommended that such boards be upgrade to the latest rev.

BOOTING THE DIAGNOSTIC DISKETTE

1. Make sure the diagnostic diskette is not write protected.
2. If the computer is turned on, turn it off by pressing the on-off button once.
3. Insert the proper diagnostic diskette.
4. Power up the computer. When you hear the first click (when the four boot ROM icons are on the screen but have not yet all been checked off) hold down the **<APPLE>** key and press **2** on the alphanumeric keyboard.

After completing its self-test, the computer will read the diskette. You are then presented with a series of menu screens offering several options for the configuration of the test sequence.



Double-clicking on a Service Level icon produces a list of specific tests for the selected test (eg diskette test shows "Scissor Read" and "Surface Test").

SERVICE LEVEL

Use the "Service Level" to run tests of individual modules. This is useful when you have some idea where in the system the problem may be located. From the Service Level you can also set diagnostic controls and run a system check.

To enter the Service Level from the first screen after startup, hold down the "APPLE" and "SHIFT" keys and press "S". Then, to see the Options menu, pull it down with the mouse or press any key on the keyboard. The choices listed in the Options menu are defined below:

- a) **Check** - to run individual tests.
- b) **Run System Check** - to enter the first menu of the Customer Level.
- c) **Eject Diskette** - to eject Lisa/Macintosh Test.
- d) **Set Diagnostic Controls** - to set testing modes and error controls.
- e) **Set Customer Level** - to get out of the Service Level.
- f) **Turn Off** - to turn off the computer.

Service Level lets you use either mouse or keyboard input. To use the keyboard, hold down the "APPLE" key while pressing the letter or number indicated at the right of the option you want to select.

NOTE: AFTER THE LISA/MACINTOSH XL TEST DISKETTES VERIFY THAT THE SYSTEM IS GOOD, RUN A FUNCTIONAL TEST BY:

a. **BOOTING THE LISA OFFICE SYSTEM AND RUNNING ANY OFFICE SYSTEM APPLICATION (FOR A LISA)**

OR

b. **BOOTING UP A MACWORKS DISKETTE AND RUNNING A MACINTOSH APPLICATION (FOR A MACINTOSH XL).**



Running Individual Tests

1. Select "Check" from the Options menu.

Lisa or Macintosh XL now displays the icons for the diagnostics.

2. Selecting the test. (See **Brief Test Descriptions** for specific tests and additional instructions on how to run them.)
 - a) Select the icon for the test you are interested in by moving the pointer over the icon, and pressing the mouse button **once**.
 - b) Select "OK." (Selecting "Cancel" would return you to Options.)
3. Test results are displayed either as an icon with a check by it, indicating the module passed, or as an error message suggesting which modules may be at fault and the order in which to swap them.

The "Gray" and "Crosshatch" tests are use for video adjustments. When either of these icons is selected, the Lisa displays the corresponding pattern. You must push the mouse button to return to the Options menu.

4. To return to the "Check" menu to continue testing, select "OK" from the results screen and then select "OK" from the subsequent Note. To see the Options menu use the mouse to pull it down or press any key on the keyboard.

NOTE: Results from previous tests may be displayed on the screen while you are returning to the Options menu. Don't be confused. Ignore this and follow the above instructions to return to the "Check" menu.



Brief Test Descriptions

Below are brief explanations of what each diagnostic examines and instructions that help clarify its use.

CPU verifies the logic on the CPU: the operation of the boot ROM, the memory management unit of the CPU board, the video timing circuitry, and the error logic.

MEMORY tests all the RAM chips in both memory boards. The memory board test takes about sixteen minutes, so have patience. This test does not destroy any memory data.

IO BOARD test verifies the operation of the Clock/Calendar, versatile interface adaptor, and diskette controller logic. While this test is running, do not move the mouse or press any keys on the keyboard.

DISKETTE DRIVE test verifies the operation of the disk drive, testing that certain parameters are within specifications (e.g., the motor speed). It also verifies the diskette drive operation with a complete nondestructive diskette surface test. This test takes a while, so have patience.

GRAY can be used for video adjustments.

CROSSHATCH is used for video adjustments. (See Section 4, "Lisa Video Adjustments," in the Lisa Technical Procedures.)

BUILT-IN HARD DISK test scans the entire data surface, checking for bad blocks. This test lasts about five minutes and is nondestructive.

PARALLEL INTERFACE CARD tests the first parallel interface card that is installed in an expansion slot (scanning for a card from innermost to outermost slot).

PROFILE test verifies the Lisa/Macintosh XL - Profile communication and the RAM buffer; it also checks the status block and does a block scan.



Run System Check

You would use this selection if you had no idea what was causing an error and therefore wanted to run a test sequence.

-- To run this test, select "Run Complete System Check" from the Options menu.

You are then presented with the same series of menu screens offered in the Customer Level. These include several options about how you want the test sequence to run. You can choose either a short or long (overnight) test sequence. The long test is preferable for intermittent problems. You are also given the choice of testing or not testing the disk drives. To make these choices, select the appropriate decision box using the mouse.

If you abort a test early (hold down the "APPLE" key and press "."), you are given the options "Continue" or "Turn Off". "Continue" allows you to make further selections from the Options menu.

Set Diagnostic Controls

Here you can change how a test is run, that is, once or continuously. You would select "continuously" to find intermittent errors.

1. Select Set Diagnostic Controls from the Options menu.
The defaults are numbers 1, 3, 5, 8, and 9.
2. To change a default setting select the box to the left of your choice.
3. To cancel changes select "Cancel". To accept changes select "OK".



Lisa 2/Macintosh XL Technical Procedures

Section 6

Troubleshooting

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HOW TO USE THIS SECTION

To use this section most efficiently:

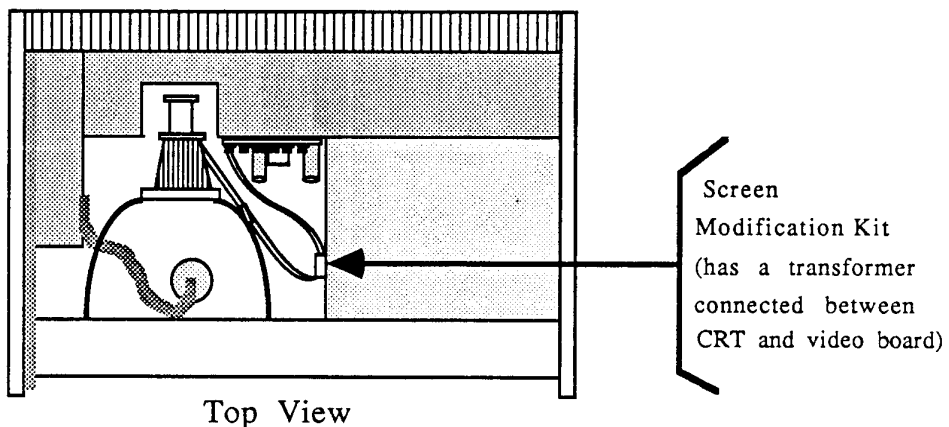
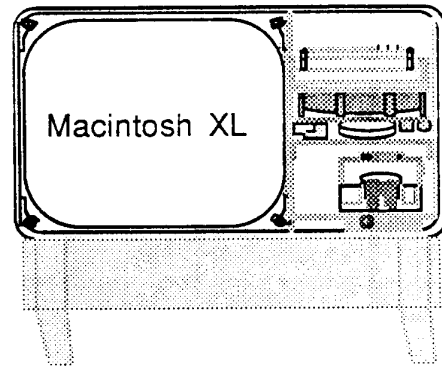
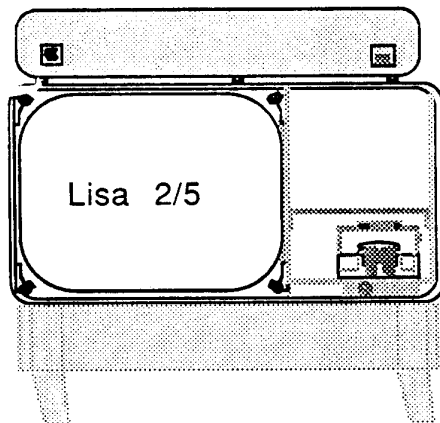
1. Review the **Basic Lisa 2/Macintosh XL Configuration Table** to determine which configuration of Lisa 2/Macintosh XL you are working with. This table provides the names of systems and lists basic hardware components required. It also contains information about the programs and devices each system is capable of running.
2. If you have an idea where the problem lies, use the appropriate symptom/cure procedure or table to solve the problem. If you have no idea what the problem is, or if using the symptom/cure table did not provide a fix, start by following the **Primary Troubleshooting Flowchart**.
3. When checking or replacing system boards or ROM, use the **System Boards Compatibility Table** to make sure that system boards and firmware match the particular Lisa 2/Macintosh XL configuration you are working on.



Basic Lisa 2/Macintosh XL Configuration Table

The top row of the table (across) lists the system names for the three basic configurations of the Lisa 2/Macintosh XL. The first column (down) lists the names of basic hardware components. The "YES" or "NO" listed under each system indicates whether the hardware component is or is not a required part of that system. The "Notes" provide important information about software compatibility and hardware configuration for each system.

The pictures below show each basic system as it is listed in the top row of the table.



Top View
Modified Macintosh XL or Modified Lisa 2



BASIC LISA 2/MACINTOSH XL CONFIGURATION TABLE

SYSTEMS:	LISA 2 (Lisa 2/5 if connected to ProFile)	MACINTOSH XL (LISA 2/10)	MODIFIED MACINTOSH XL (Screen Modification Kit Installed)
BASIC FEATURES			
Internal Hard Disk			
Present:	NO	YES	YES
Notes:	Runs Lisa 7/7 Office and/or MacWorks if ProFile is connected	Runs Lisa 7/7 Office and/or MacWorks.	Runs MacWorks only.
MicroDisk Drive			
Present:	YES	YES	
Notes:	Requires Lisa Drive Adapter board (inside disk drive chamber).		
Built-in Parallel Port			
Present:	YES	NO	NO
Notes:	Can connect ProFile or other parallel device to motherboard. MacWorks and/or Lisa 7/7 Office System can be installed on a connected ProFile. The parallel port is a horizontal DB-25 connector located next to the mouse port.	Must install parallel interface card in expansion chamber to access parallel device. When using Lisa 7/7 Office System, internal hard disk can access ProFile and other parallel devices. When using MacWorks, internal hard disk cannot access ProFile but can access parallel printer if driver is installed.	Must install parallel interface card in expansion chamber to access parallel device. Internal hard disk runs MacWorks only: cannot access ProFile while using MacWorks, but can access parallel printer if driver is installed.
Two Built-in Serial Ports			
Present:	YES	YES	
Notes:	Has Three DB-25 connectors in back.	Only two DB-25 connectors in back	
8 Amp Power Supply rated at 1.2 amps AC			
Present:	YES	NO	
10 Amp Power Supply rated at 1.8 amps AC			
Present:	NO	YES	



System Boards Compatibility Table

The top row of the table (across) lists the system names for three basic configurations of Lisa 2/Macintosh XL. The first column (down) lists the boards contained in the card cage and video chamber. The boxes under each system list the engineering number (printed near the edges on each board) and the Apple part number for each system board. The part numbers and revision levels for ROM on the CPU and I/O boards are included. The ROM identification codes listed are the code numbers that will be displayed on the screen during the startup self-test (see **Section 5, Diagnostics**, "Interpreting the Boot ROM and I/O ROM").

When inspecting or replacing system boards, use the **System Boards Compatibility Table** to make sure boards and ROM (part numbers and rev. level) match the system you are working on.

NOTE: Any number can be in place of the "X" in the engineering numbers listed on the table.

NOTE: Refer to the **Module Identification Manual** for pictures and Apple part numbers of the system boards.

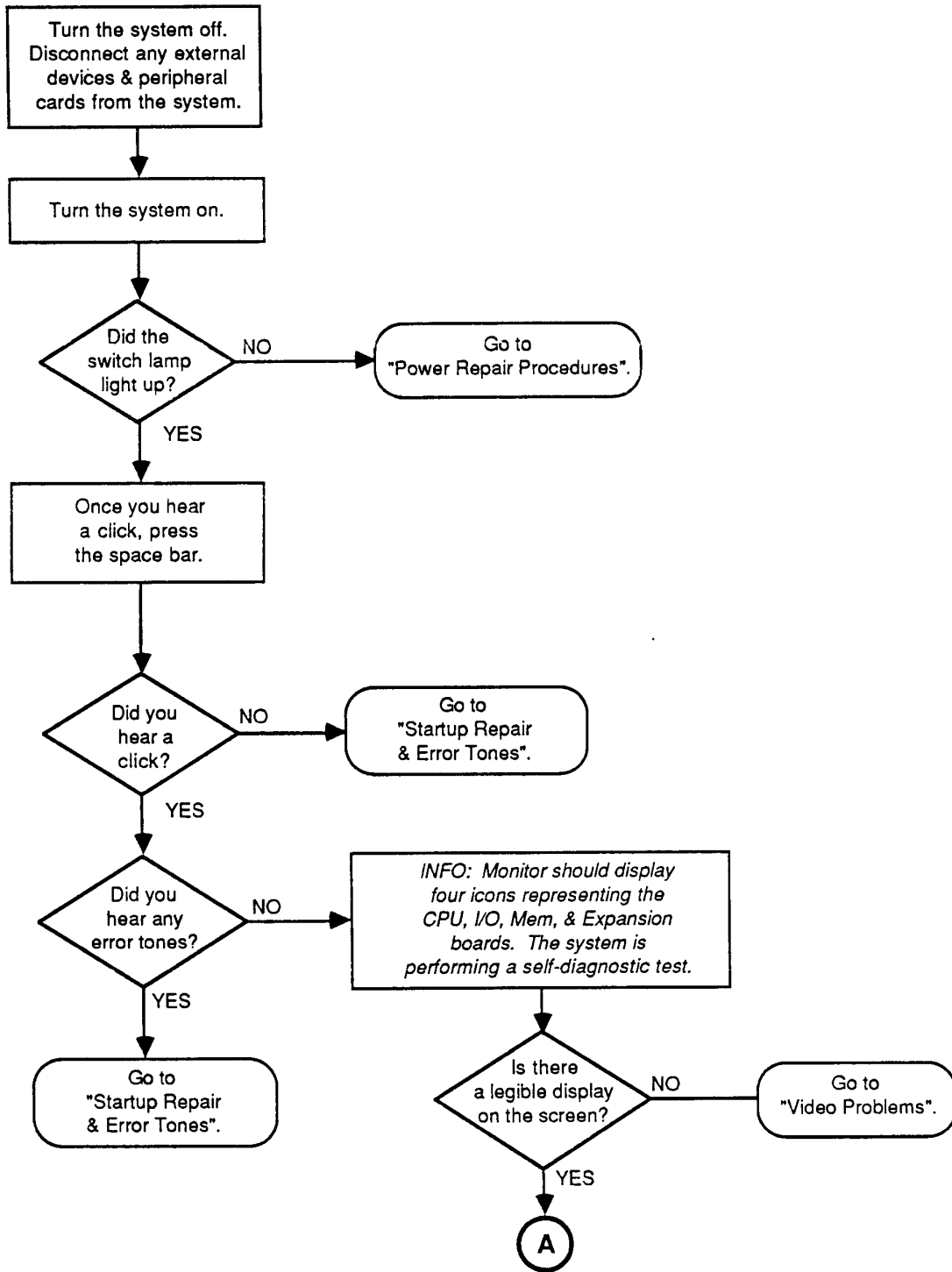


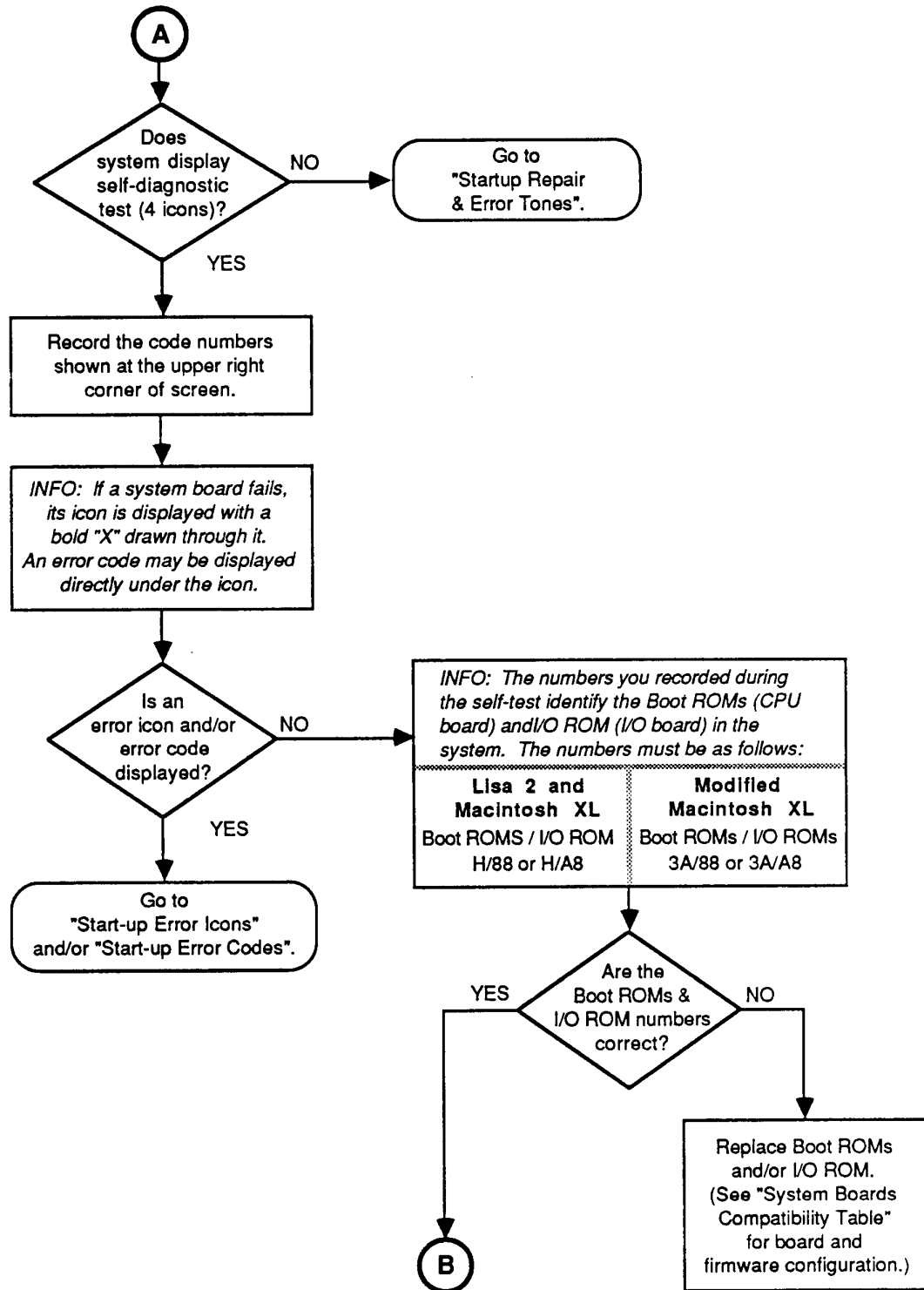
SYSTEM BOARDS COMPATIBILITY TABLE

SYSTEMS: SYSTEM BOARDS	LISA 2 (Lisa 2/5 if connected to ProFile)	MACINTOSH XL (LISA 2/10)	MODIFIED MACINTOSH XL (Screen Modification Kit Installed)	MODIFIED LISA 2 (Screen Modification Installed and an External 5 or 10 megabyte ProFile)
Motherboard BOARD ENGINEERING #: APPLE P/N: NOTES:	620-0108-X 661-93106 Has three DB-25 connectors: two serial, one parallel	Same for Macintosh XL and Modified Macintosh XL 620-X141 661-93170 1. No parallel connector 2. Has total of 2 DB-25 connectors, both serial	620-0108-X 661-93106 Has three DB-25 connectors, two serial, one parallel	
I/O Board BOARD ENGINEERING #: APPLE P/N: DISK CONTROLLER ROM: LOCATION: REV: ROM ID CODE: NOTES:	620-0117-X 661-93198 P/N 341-0290 1-A B A8 1. Resistor at R-47 IS NOT present 2. Has batteries	Same for Macintosh XL and Modified Macintosh XL 620-X142-X 661-93171 P/N 341-0281 2-A D 88 1. Resistor at R-47 IS present 2. No batteries	620-0117-X 661-93198 P/N 341-0290 1-A B A8 1. Resistor at R-47 IS NOT present 2. Has batteries	
CPU Board BOARD ENGINEERING #: APPLE P/N: BOOT ROMS: REV & ID CODE: LOCATION: SERIALIZED ROM (VIDEO STATE ROM): NOTES:	Same for Lisa 2 and Macintosh XL 620-0119-X 661-93103 P/N 341-0175 and 341-0176 H 13-D 14-D P/N 620-0003 1. Serialized ROM must be transferred to the customer's replacement CPU board. 2. Macintosh XL (Lisa 2/10) CPU board can be used in Modified Macintosh XL provided the correct Boot ROMs and Serialized ROM are installed.	Same for Modified Macintosh XL and Modified Lisa 2 620-0119-X 661-0298 or 661-93103 P/N 341-0347 and 341-0346 3A 13-D 14-D P/N 341-0348		
Memory Boards (two identical) BOARD ENGINEERING #: APPLE P/N:	Same for Lisa 2, Macintosh XL, Modified Macintosh XL, and Modified Lisa 2 620-01XX-X 661-93105			
Video Board BOARD ENGINEERING #: APPLE P/N:	Same for Lisa 2, Macintosh XL, Modified Macintosh XL, and Modified Lisa 2 620-0121-X 661-93107			



PRIMARY TROUBLESHOOTING FLOWCHART



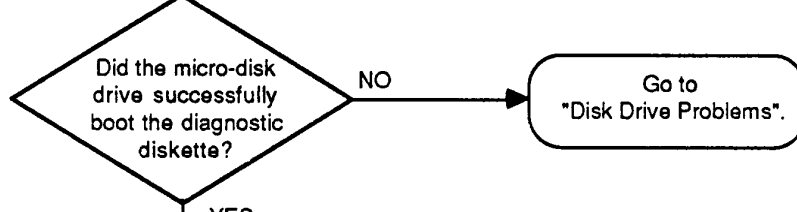
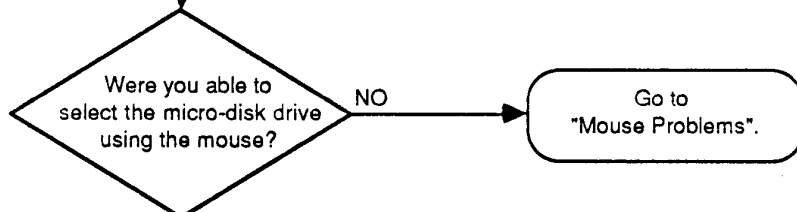




B

If you are working on a Lisa2 or unmodified Macintosh XL, insert Lisa/Macintosh XL diagnostic diskette into the micro-disk drive.
If you are working on a modified Macintosh XL, insert the Macintosh XL Screen Modification Kit diagnostic diskette.

Use the mouse to select the micro-disk drive from the "STARTUP FROM" menu.



Turn to the **Diagnostics** section of this manual and follow the procedures to run a complete system check.

*IMPORTANT: When you are sure that the system is functioning properly, reconnect any external devices and peripheral cards & follow the procedures in the **Diagnostics** section to test peripherals.*



SYMPTOM/CURE PROCEDURES AND TABLES

Power Repair Procedures

If the system does not come on when you press the on-off button, follow the steps listed below to repair it. Try turning the system on after each step.

1. Make sure that the AC cord is secure at the back of the system and in the wall outlet.
2. Swap the AC cord.
3. Make sure that the front and back panels are installed securely so that the interlock switches are active.
4. Make sure that the softswitch/keyboard assembly is connected to the motherboard.
 - a. Remove the front and rear panels.
 - b. Remove the top.
 - c. Slide the disk drive assembly out far enough to let you see the softswitch assembly card located in the well behind the disk drive assembly. If it is not connected, connect it.
5. Swap out modules in the following order:
 - a. power supply
 - b. I/O board
 - c. softswitch/keyboard assembly
 - d. front interlock switch
 - e. disk-drive-to-card-cage connector
 - f. motherboard
 - g. video board



Startup Repair and Error Tones

NOTE: Prior to using the charts in this section, you must remove all external devices and peripheral cards attached to the system. Then turn the system back on and see if it works. If not, try pushing the reset button in back. If the problem remains, proceed to the Symptom/Cure table below.

Identify the "Symptom," and then follow the steps in the order in which they are listed under "Cure". Turn on the system after each step. Once the system works, reconnect the external devices, one at a time, turning on the system after each replacement.

SYMPTOM	CURE
Incorrect or no video, no "clicks", no error tones	<ul style="list-style-type: none"> - Check System Boards Compatibility Table to make sure correct CPU board and ROM are installed - Replace boot ROM - Replace CPU board - Go to Video Problems - Replace motherboard
No "clicks", but no problems found during self diagnostic test (no error codes or icons)	<ul style="list-style-type: none"> - Check speaker connection - Replace I/O board - Replace speaker
"Clicks" are heard, but incorrect or no video, no error tones	<ul style="list-style-type: none"> - Check System Boards Compatibility Table to make sure correct CPU board and ROM are installed - Replace CPU board - Go to Video Problems



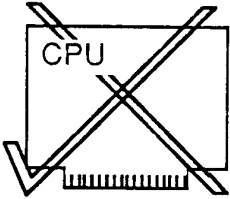
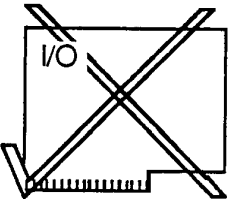
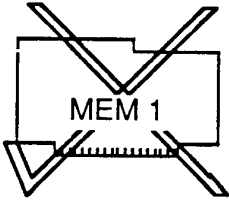
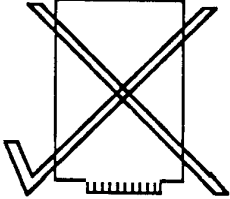
SYMPTOM	CURE
Error tones with incorrect or no video	- Use System Boards Compatibility Table to make sure the system has correct boards and firmware before replacing the following modules:
Lo	- CPU board - Memory board 1 - Memory board 2
Lo, Lo	- Memory board 2 - CPU board
Lo, Hi	- System Boards (Swap out one at a time)
Lo, Lo, Hi	- CPU board
Lo, Hi, Lo	- I/O board
Hi, Hi, Hi	- Expansion cards
Lo, Hi, Hi	- Memory board 1 - Memory board 2
Hi, Lo, Lo	- Expansion cards - Motherboard
Hi, Lo, Hi	- Keyboard
Hi, Hi, Lo	- Keyboard or Mouse not connected



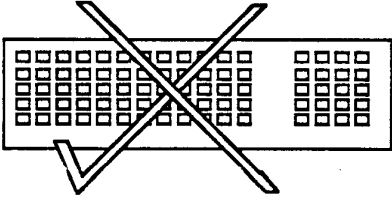
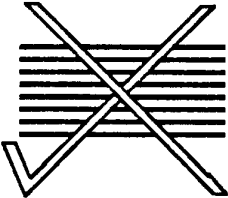
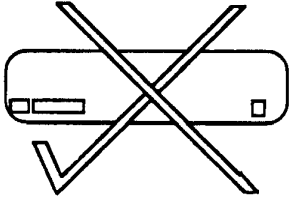
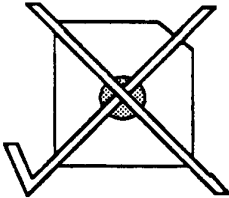
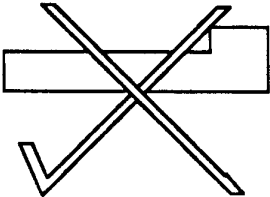
STARTUP ERROR ICONS

Identify the Icon indicated on the display, then follow the steps in the order in which they are listed in the "Cure" column.

Use the **System Boards Compatibility Table** to make sure that system (card cage) boards and firmware match the particular Lisa 2/Macintosh XL configuration you are working on.

ICON	MODULE AND OTHER POSSIBLE REPLACEMENTS
	<ol style="list-style-type: none"> 1. Check for obsolete ROM on CPU board (See "System Boards Compatibility Table") 2. Reseat CPU board 3. Replace Boot Roms (CPU board) 4. Replace CPU board 5. Replace motherboard
	<ol style="list-style-type: none"> 1. Check for obsolete ROM on I/O board (see "System Boards Compatibility Table") 2. Reseat I/O board 3. Replace I/O board 4. Replace Motherboard
	<ol style="list-style-type: none"> 1. Reseat memory board indicated 2. Replace Memory board 1 3. Replace Memory board 2 4. Replace Motherboard
	<ol style="list-style-type: none"> 1. Reseat expansion card 2. Try card in another slot 3. Replace expansion card



ICON	MODULE AND OTHER POSSIBLE REPLACEMENTS
	<ol style="list-style-type: none"> 1. Replace Keyboard
	<ol style="list-style-type: none"> 1. See "Hard Disk Problems" Problems" to repair the hard disk 2. Replace internal hard disk
	<ol style="list-style-type: none"> 1. See "ProFile Problems" 2. Replace ProFile cable 3. Replace Profile 4. Replace I/O board 5. Replace motherboard
	<ol style="list-style-type: none"> 1. Try another diskette 2. Replace microdisk drive
	<ol style="list-style-type: none"> 1. Replace Lisa Lite Adaptor if using Lisa 2/5 2. Replace I/O board 3. Replace micro-disk drive



STARTUP ERROR CODES

Locate the number that matches the error number on the display. Then follow the steps and/or replace the modules in the order in which they are listed in the "Cure" column to repair the system.

Use the **System Boards Compatibility Table** to make sure that system (card cage) boards and firmware match the particular Lisa 2/Macintosh XL configuration you are working on.

NUMBER	PROBLEM	CURE
22	Unable to clamp diskette	- Refer to Appendix A
23	Unable to read diskette	"
25	Unable to unclamp diskette	"
38	No boot file on diskette	"
39	Disk controller timeout	- I/O board - CPU board - Motherboard
40	MMU	- CPU board
41	CPU selection logic	- CPU board
42	Video circuitry	- CPU board
43	Parity circuitry	- CPU board - Memory board 1 - Memory board 2 - Motherboard



NUMBER	PROBLEM	CURE
44	NMI error	- CPU board - I/O board - Motherboard
45	BUS error	- I/O board - CPU board - Motherboard
46	Address error	- CPU board - Memory board 1 - Memory board 2
47	Exception	- CPU board - Motherboard
48	Illegal instruction	- CPU board - Memory board 1 - Memory board 2
49	1010 or 1111 trap	- CPU board - Memory board 1 - Memory board 2
50	COPs VIA	- I/O board - CPU board - Motherboard
51	Parallel Ports VIA	- I/O board - CPU board - Motherboard
52	I/O board COPs	- I/O board



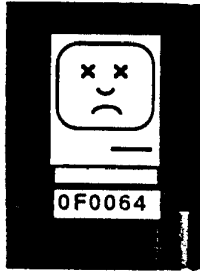
NUMBER	PROBLEM	CURE
53	Keyboard COPS	<ul style="list-style-type: none"> - Keyboard - I/O board - Keyboard cable - Motherboard
54	Clock error	<ul style="list-style-type: none"> - I/O board
55	RS232 Port A	<ul style="list-style-type: none"> - I/O board - Motherboard
56	RS232 Port B	<ul style="list-style-type: none"> - I/O board - Motherboard
57	Disk controller	<ul style="list-style-type: none"> - I/O board - Lisa Drive Adaptor (Lisa 2 only) - MicroDisk Drive - Disk Drive cables - CPU board - Motherboard
58	I/O board access	<ul style="list-style-type: none"> - I/O board - CPU board - Motherboard
59	I/O board COPS code	<ul style="list-style-type: none"> - I/O board
60 - 69	I/O or Keyboard error	<ul style="list-style-type: none"> - Keyboard - I/O board - Motherboard
70 71	Memory data or Memory parity	<ul style="list-style-type: none"> - Replace memory board specified by error icon displayed



NUMBER	PROBLEM	CURE
75	Boot failure	- Refer to Appendix A
80 - 85	Hard disk errors	- Refer to Appendix A
90 - 93	Expansion card errors	- Expansion card - Motherboard



"SAD MACINTOSH" ERROR CODES



This icon appears on the Lisa 2/Macintosh XL when it is turned on and is not working (it can't read the disk, and won't start up). Sometimes a "Happy Macintosh" screen will appear, but before the "Welcome to Macintosh" screen can appear, a "Sad Macintosh" comes up.

A list of "Sad Macintosh" error codes and what they mean for the Lisa 2/Macintosh XL is not available at this time. If the system displays a "Sad Macintosh" error code, go to **Hard Disk Problems** and follow the procedures under "How To Repair a Crashed Disk."



Macintosh: "Sad Mac" Error Code Meaning

Source

Apple Tech Info Library (TIL)

<http://til.info.apple.com/techinfo.nsf/artnum/n7748>

30 September 1998

Article ID: 7748

Created: 7/2/91

Modified: 9/10/98

TOPIC

When I turn on my Macintosh, I get a black screen with a "sad Macintosh" face and the numbers 020016. There is no listing for this error code in any of my manuals. What does it mean?

DISCUSSION

The particular error code that appears with the "sad Macintosh" is not as important as WHEN it occurs. If the Macintosh can start up from a different system diskette, then the problem is probably with the system software on the other disk. System problems are usually identified when you get a "happy Macintosh" face and the "Welcome to Macintosh" screen before the "sad Macintosh."

If the "sad Macintosh" face appears immediately at power up, that usually suggests an issue with the logic board or memory. Try starting up from a floppy disk before assuming it's a hardware problem.

Sad Mac Error Codes Description

On the Original ROMs (Macintosh 128k, 512k, 512ke, Plus):

When you press the interrupt button on the side of your Macintosh when starting up, you should get a sad Mac icon with '0F000D' and some bits cycling under the icon

Macintosh: "Sad Mac" Error Code Meaning

Source: Apple Tech Info Library (TIL) • 30 Sep 1998 • 1 / 11

Macintosh

indicating it is performing a memory test.

This numeric code is in two parts:

- o The first two characters are the class code. The class code tells what part of the diagnostic program found the error.
- o The second four are the sub code. The sub class code tells what the error was. In the case of a bad RAM chip, the sub class identifies the bad chip (this was very helpful to homegrown upgraders).

Class Code	Sub Code
1 = ROM test failed	Meaningless
2 = Memory test - bus subtest	identifies bad chips
3 = Memory test - byte write	identifies bad chips
4 = Memory test - Mod3 test	identifies bad chips
5 = Memory test - address uniqueness	identifies bad chips

Single Chip Identification

Data Bit	Location	Sub Code Bits
0	F5	0001
1	F6	0002
2	F7	0004
3	F8	0008
4	F9	0010
5	F10	0020
6	F11	0040
7	F12	0080
8	G5	0100
9	G6	0200
10	G7	0400
11	G8	0800
12	G9	1000
13	G10	2000
14	G11	4000
15	G12	8000

Class Code	Sub Code
F = Exception	0001 Bus error

Macintosh: "Sad Mac" Error Code Meaning
 Source: Apple Tech Info Library (TIL) • 30 Sep 1998 • 2 / 11

Macintosh

0002 Address error
0003 Illegal instruction
0004 Zero divide
0005 Check instruction
0006 Traps instruction
0007 Privilege violation
0008 Trace
0009 Line 1010
000A Line 1111
000B Other exception
000C Nothing
000D NMI (normal indication)
0064 Couldnt Read System File into Memory

Macintosh SE & Macintosh II ROMs:

The Sad Mac error codes have been changed to incorporate additional power for testing and to support the 32-bit world. Generally, the same codes are used for 68000 exceptions as the Macintosh, however they are displayed differently.

Traditional

The traditional Macintosh error codes are displayed like this: 0F0003

Where F indicates an exception occurred, and 3 indicates an illegal instruction occurred. On the Macintosh SE and II, the display would appear:

0000000F

00000003

Note: 0000003 is a hex number.

Power On

The new power-on error codes have the following format:

XXXXYYYY

ZZZZZZZZ

Where XXXX is internal test manager state information (ignore this), YYYY contains codes that indicate either an

Macintosh: "Sad Mac" Error Code Meaning
Source: Apple Tech Info Library (TIL) • 30 Sep 1998 • 3 / 11

Macintosh

exception code, or the test number for a power on test failure. The ZZZZZZZZ code contains additional failure information to help track down the problem.

YYYY Error Codes:

\$0001 The ROM checksum test failed. Ignore the Z field.

\$0002 The first small chunk of RAM to be tested failed. The Z field indicates which RAM Bit(s) failed. This small chunk of RAM is always in Bank B.

Example: \$AABBCCDD

AA=8 bit mask for bits 31-24

BB=8 bit mask for bits 23-16

CC=8 bit mask for bits 15-8

DD=8 bit mask for bits 7-0

\$0003 The RAM test failed while testing bank B, after passing the chunk tested for code \$0002. The Z field indicates which bits failed as in code \$0002.

\$0004 The RAM test failed while testing bank A. The Z field indicates which bits failed as in code \$0002.

\$0005 The RAM External addressing test failed. The Z field indicates a failed address line.

\$0006 Unable to properly address the VIA1 chip. The Z field is not applicable.

\$0007 Unable to properly address the VIA2 chip (Macintosh II only). The Z field is not applicable.

\$0008 Unable to properly access the Front Desk Bus. The Z field is not applicable.

\$0009 Unable to properly access the MMU. The Z field is not applicable.

\$000A Unable to properly access NuBus. The Z field is not applicable.

\$000B Unable to properly access the SCSI Chip. The Z

Macintosh: "Sad Mac" Error Code Meaning

Source: Apple Tech Info Library (TIL) • 30 Sep 1998 • 4 / 11

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field is not applicable.

- \$000C Unable to properly access the IWM chip. The Z field is not applicable.
- \$000D Unable to properly access the SCC Chip. The Z field is not applicable.
- \$000E Failed Data Bus test. The Z field indicated the bad bit(s) as a 32-bit mask for bits 0-31. This may indicate either a bad SIMM or data bus failure.
- \$000F Reserved for Macintosh compatibility.
- \$FFxx A 680xx exception occurred during power on testing.

The xx indicates the exception:

- \$01 Bus Error
- \$02 Address Error
- \$03 Illegal Instruction Error
- \$04 Zero Divide
- \$05 Check Instruction
- \$06 cpTrapCC, Trap CC, Trap V
- \$07 Privilege violation
- \$08 Trace
- \$09 Line A
- \$0A Line F
- \$0B unassigned
- \$0C CP protocol violation
- \$0D Format exception
- \$0E Spurious interrupt
- \$0F Trap 015 exception
- \$10 Interrupt Level 1
- \$11 Interrupt Level 2
- \$12 Interrupt Level 3
- \$13 Interrupt Level 4
- \$14 Interrupt Level 5
- \$15 Interrupt Level 6
- \$16 Interrupt Level 7
- \$17 FPCP bra or set on unordered condition
- \$18 FPCP inexact result
- \$19 FPCP divide by zero
- \$1A FPCP underflow
- \$1B FPCP operand error

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```

$1C  FPCP overflow
$1D  FPCP signalling NAN
$1E  PMMU configuration
$1F  PMMU illegal operation
$20  PMMU access level violation
    
```

Macintosh Portable ROMs:

The bootup code in the Macintosh Portable contains a series of startup tests that are run to ensure that the fundamental operations of the machine are working properly. If any of those tests fail, a Sad Mac icon appears on the screen with a code below that describes what failure occurred. Here is a typical example of a Sad Mac display with an error code below it:

SAD MAC CODE

```

05460203  =  (D7.L)
0000B6DB  =  (D6.L)
    
```

The two codes are actually the contents of the two CPU data registers D6 and D7. The upper word (upper 4 hex digits, in this case 0546) of D7 contains miscellaneous flags that are used by the start-up test routines and are unimportant to just about everybody except a few test engineers within Apple. The lower word of D7 is the major error code. The major error code identifies the general area the test routines were in when a failure occurred. D6 is the minor error and usually contains additional information about the failure, something like a failed bit mask.

SAD MAC CODE BROKEN DOWN

```

Test Flags      Major Error

0546            0203

Minor Error     Minor Error

0000            B6DB
    
```

The major error is further broken into the upper byte that contains the number of any 68000 exception that occurred (\$00 meaning that no exception occurred), and the lower

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byte that usually contains the test that was being run at the time of failure. If an unexpected exception occurred during a particular test, then the exception number is logically ORed into the major error code. This way both the exception that occurred as well as the test that was running can be decoded from the major error code:

SAD MAC CODE FURTHER BROKEN DOWN

68000 Exception Test Code

02 03

In this example, the code says that an address error exception (\$0200) occurred during the RAM test for Bank A (\$03); \$0200 ORed with \$03 = \$0203.

Major Error Codes

Below is a brief description of the various test codes that might appear in the major error code:

****Warning****: Some of these codes may mean slightly different things in Macintosh models other than the Macintosh Portable. These descriptions describe specifically how they are used in the Macintosh Portable.

- \$01 - ROM test failed. Minor error code is \$FFFF, means nothing.
- \$02 - RAM test failed. Minor error code indicates which RAM bits failed.
- \$05 - RAM external addressing test failed. Minor error code indicates a failed address line.
- \$06 - Unable to properly access the VIA 1 chip during VIA initialization. Minor error code not applicable.
- \$08 - Data bus test at location eight bytes off of top of memory failed. Minor error code indicates the bad bits as a 16 bit mask for bits 1500. This may indicate either a bad RAM chip or data bus failure.
- \$0B - Unable to properly access the SCSI chip. Minor error code not applicable.

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- \$0C - Unable to properly access the IWM (or SWIM) chip. Minor error code not applicable.
- \$0D - Not applicable to Macintosh Portable. Unable to properly access the SCC chip. Minor error code not applicable.
- \$0E - Data bus test at location \$0 failed. Minor error code indicates the bad bits as a 16bit mask for bits 1500. This may indicate either a bad RAM chip or data bus failure.
- \$10 - Video RAM test failed. Minor error code indicates which RAM bits failed.
- \$11 - Video RAM addressing test failed. Minor error code contains the following:
 - upper word = failed address (16-bit)
 - msb of lower word = data written
 - lsb of lower word = data readData value written also indicates which address line is being actively tested.
- \$12 - Deleted
- \$13 - Deleted
- \$14 - Power Manager processor was unable to turn on all the power to the board. This may have been due to a communication problem with the Power Manager. If so, the minor error code contains a Power Manager error code, explained in the next section.
- \$15 - Power Manager failed its self-test. Minor error code contains the following:
 - msw = error status of transmission to power manager.
 - lsw = Power Manager self-test results (0 means it passed, non-zero means it failed)
- \$16 - A failure occurred while trying to size and configure the RAM. Minor error code not applicable.

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Minor error codes

Power Manager Processor Failures

If a communication problem occurs during communication with the Power Manager, the following error codes will appear somewhere in the minor error code (usually in the lower half of the code, but not always):

- \$CD38 Power Manager was never ready to start handshake.
- \$CD37 Timed out waiting for reply to initial handshake.
- \$CD36 During a send, Power Manager did not start a handshake.
- \$CD35 During a send, Power Manager did not finish a handshake.
- \$CD34 During a receive, Power Manager did not start a handshake.
- \$CD33 During a receive, Power Manager did not finish a handshake.

Diagnostic Code Summary

Below is a summarized version of the Sad Mac error codes:

Test Codes

- \$01 ROM checksum test.
- \$02 RAM test.
- \$05 RAM addressing test.
- \$06 VIA 1 chip access.
- \$08 Data bus test at top of memory.
- \$0B SCSI chip access.
- \$0C IWM (or SWIM) chip access.

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- \$0D Not applicable to Macintosh Portable. SCC chip access.
- \$0E Data bus test at location \$0.
- \$10 Video RAM test.
- \$11 Video RAM addressing test.
- \$14 Power Manager board power on.
- \$15 Power Manager self-test.
- \$16 RAM sizing.

Power Manager Communication Error Codes

- \$CD38 Initial handshake.
- \$CD37 No reply to initial handshake.
- \$CD36 During send, no start of a handshake.
- \$CD35 During a send, no finish of a handshake
- \$CD34 During a receive, no start of a handshake.
- \$CD33 During a receive, no finish of a handshake

CPU Exception Codes (as used by the startup tests)

- \$0100 Bus error exception code
- \$0200 Address error exception code
- \$0300 Illegal error exception code
- \$0400 Zero divide error exception code
- \$0500 Check inst error exception code
- \$0600 cpTrapcc, Trapcc, TrapV exception code
- \$0700 Privilege violation exception code

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\$0800	Trace exception code
\$0900	Line A exception code
\$0A00	Line F exception code
\$0B00	Unassigned exception code
\$0C00	CP protocol violation
\$0D00	Format exception
\$0E00	Spurious interrupt exception code
\$0F00	Trap inst exception code
\$1000	Interrupt level 1
\$1100	Interrupt level 2
\$1200	Interrupt level 3
\$1300	Interrupt level 4
\$1400	Interrupt level 5
\$1500	Interrupt level 6
\$1600	Interrupt level 7

Document Information

Product **Apple Software**
Area:
Category: **Mac OS Error Codes & Messages**
Sub **General Topics**
Category:

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SYSTEM HANG PROCEDURES

The system is said to "hang" when it ignores all input from the user. This condition is usually caused by software failures. When the system hangs, follow the steps below to try to save any open documents. **IT IS IMPORTANT TO FOLLOW THESE STEPS BEFORE SHUTTING THE SYSTEM DOWN.**

1. If the mouse is not working try installing another mouse.
2. Try alternative keyboard commands for saving documents. (See the manual for the software you are using.)
3. Try turning the system off by pressing the ON/OFF button once. This will usually trigger a series of verification and storage (save) functions.

NOTE: If the above procedures do not work, you will not be able to recover whatever you were working on when the system failed.

4. Press the reset button located at the back of the system.

If the system starts up normally, then you probably do not have a hardware problem. Check to make sure that the software you were using is compatible with (works with particular version of) the Startup environment (Lisa 7/7 or MacWorks). Use the **System Boards Compatibility Table** to make sure that system (card cage) boards and firmware match the particular Lisa 2/Macintosh XL configuration you are working on.

If the system displays error tones, an error code, icon, or message, refer to the appropriate Symptom/Cure table to determine the problem.

If the system still "hangs," unplug the system from the wall outlet, then plug it back in. Use the **Primary Troubleshooting Flowchart** procedure to get the system running. (See **Contents.**)



VIDEO PROBLEMS

WARNING: IF HAVE NOT BEEN TAUGHT HOW TO ADJUST AND REPLACE LISA 2/MACINTOSH XL VIDEO MODULES DO NOT ATTEMPT VIDEO REPAIRS.

Refer to **Section 3, Video Adjustments**, for instructions on the following adjustments.

When replacing boards or ROM, refer to the **System Boards Compatibility Table** to make sure that system (card cage) boards and firmware match the particular Lisa 2/Macintosh XL configuration you are working on.

NOTE: Whenever you replace the CPU board, be sure to transfer the customer's serialized ROM (Video State ROM) to the new board. If the customer's Video State ROM is bad, record the serial number of the system and call your TAC to order a new Video State ROM.

SYMPTOM	CURE
No display (no raster), power is on, no error tones or codes	<ul style="list-style-type: none"> - Adjust brightness pot in back - Check connections ** - Replace video board - Replace CPU board - Replace I/O board - Replace power supply - Replace CRT - Replace flyback - Replace screen modification kit * - Replace motherboard
Display not legible, no error tones	<ul style="list-style-type: none"> - Check System Boards Compatibility Table to make sure correct boards and ROM are installed - Replace boot ROM - Replace CPU board - Replace memory board 1 - Replace memory board 2 - Replace video board

* Applies to Modified Macintosh XL only.
 ** See notes at the end of this table.



SYMPTOM	CURE
Screen is blinking on and off, hear a continuous clicking sound	<ul style="list-style-type: none"> - Adjust brightness pot in back - Adjust contrast - Replace power supply - Replace video board - Replace flyback
CRT too bright or too dim	<ul style="list-style-type: none"> - Turn system off, then on, and adjust brightness and contrast pots
Unable to adjust brightness	<ul style="list-style-type: none"> - Replace power supply - Replace video board - Replace CRT - Replace CPU board
Unable to adjust contrast on video board	<ul style="list-style-type: none"> - Replace video board - Check connections ** - Replace CRT - Replace flyback - Replace CPU board - Replace power supply
Unable to adjust contrast via software	<ul style="list-style-type: none"> - Replace I/O board - Replace CPU board - Replace video board - Use diagnostic to check keyboard
Blurred screen	<ul style="list-style-type: none"> - Adjust focus pot in back
Unable to adjust focus	<ul style="list-style-type: none"> - Replace power supply - Replace video board - Check connections ** - Replace CRT - Replace flyback

* Applies to Modified Macintosh XL only.
 ** See notes at the end of this table.



SYMPTOM	CURE
Rolling screen	- Adjust vertical hold
Unable to adjust vertical hold (picture keeps rolling)	- Replace video board - Replace CPU board - Replace I/O board - Replace motherboard
Picture locked in wrong vertical position (picture begins or end in middle of screen)	- Replace CPU board - Replace video board - Adjust yoke - Check connections **
Picture too small (horizontally or vertically)	- Adjust height and width - Adjust brightness and contrast - Replace video board - Replace flyback
Unable to adjust height and/or width using video board pots	- Replace video board - Replace I/O board - Replace CPU board - Replace CRT
Dark or bright lines along side edges of screen	- Adjust horizontal phase
Unable to adjust horizontal phase	- Replace video board - Replace CPU board - Replace I/O board - Replace flyback - Replace CRT - Replace motherboard

* Applies to Modified Macintosh XL only.
 ** See notes at the end of this table.



SYMPTOM	CURE
Only a horizontal line appears on screen	<ul style="list-style-type: none"> - lower brightness and contrast - Replace video board - Replace CRT
Picture appears stretched or compressed vertically	<ul style="list-style-type: none"> - Adjust vertical linearity pot
Unable to adjust vertical linearity	<ul style="list-style-type: none"> - Replace video board - Replace CPU board - Replace I/O board - Replace flyback - Replace motherboard - Replace CRT
Scalloped picture (vertically compressed)	<ul style="list-style-type: none"> - Adjust video controls - Replace video board - Replace power supply - Adjust yoke - Replace flyback
Screen not centered or not straight	<ul style="list-style-type: none"> - Adjust yoke
Bad deflection	<ul style="list-style-type: none"> - Replace video board - Replace CRT
No horizontal stability (out of phase)	<ul style="list-style-type: none"> - Replace video board - Replace CPU board - Replace I/O board - Replace CRT

* Applies to Modified Macintosh XL only.
 ** See notes at the end of this table.



SYMPTOM	CURE
Double images	<ul style="list-style-type: none"> - Replace CPU board - Check connections **
Inverse video	<ul style="list-style-type: none"> - Replace CPU board
No video content, raster displays	<ul style="list-style-type: none"> - Replace CPU board - Replace I/O board - Replace video board - Check connections **
Burn spots on screen	<ul style="list-style-type: none"> - Replace CRT

* Applies to Modified Macintosh XL only.
 ** See notes at the end of this table.



NOTES

** To "check connections" follow the procedures below.

1. Turn off the system.
2. Unplug the power cord from the wall outlet.
3. Discharge the CRT.
4. Remove and reseal the video board.
5. Disconnect and reconnect the video board connectors.
6. Make sure that the ground strap that goes from the round yoke connector to the floor of the CRT cup is secure.
7. Make sure that the round yoke connector is securely connected to the CRT neck.
8. Remove and reseal the power supply.
9. Remove the card cage and reseal the card cage boards.
10. Replace the card cage.
11. Plug the AC cord back into the Lisa 2/Macintosh XL and into the wall outlet.



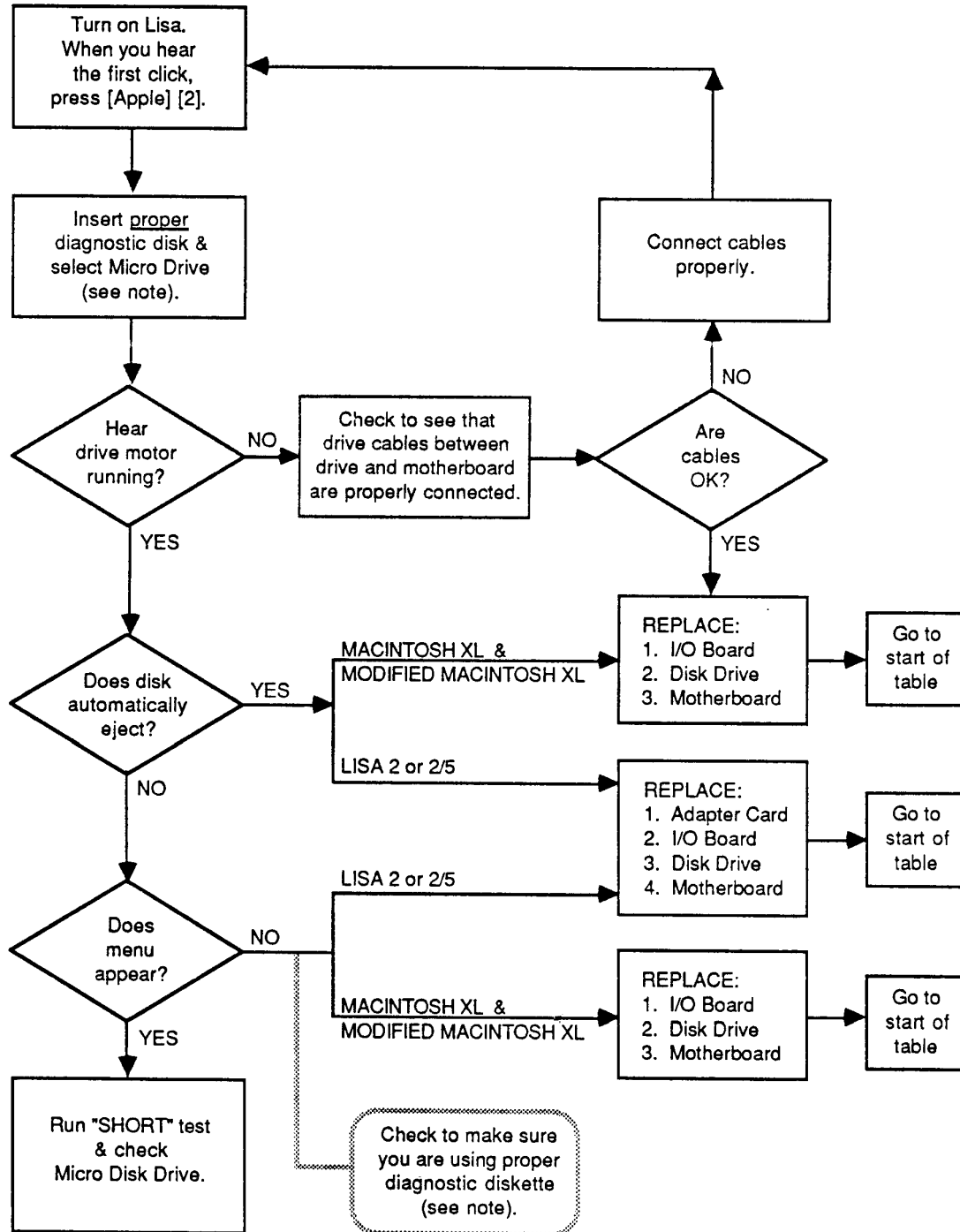
MICRODISK DRIVE PROBLEMS

NOTE: If the current disk drive problem is not described in the table below, use the troubleshooting flowchart at the end of this section to determine the problem.

SYMPTOM	CURE
Diskette is difficult or impossible to insert	<ul style="list-style-type: none"> - Make sure the arrow on the diskette is pointed toward the drive. - Try another disk - Replace disk drive
Disk drive will not eject diskette, mouse and keyboard work	<ul style="list-style-type: none"> - Check cable connections between the drive and motherboard - Replace I/O board - Remove the front cover and manually eject the the diskette, then follow the flowchart at the end of this section
System displays a bad disk icon and an error code	<ul style="list-style-type: none"> - Go to Start-Up Error Icons
System displays error message concerning disk drive.	<ul style="list-style-type: none"> - Go to Appendix A



Disk Drive Problems Flowchart



NOTE 1: For Modified Macintosh XL use Macintosh XL Screen Modification Kit Diagnostic.
 For Lisa2 and Macintosh XL; use the Lisa/Macintosh XL Test 3.0 Diagnostic diskette.
 NOTE 2: Lisa must have two memory boards to use the Lisa Diagnostic diskette.



HARD DISK OPERATING SYSTEMS (ENVIRONMENTS)

In order to use any hard disk, some type of operating system (environment) must be installed on it. These environments allow you to use applications such as LisaDraw or MacDraw, depending upon which environment is installed. There are two environments that can be installed on the Macintosh XL (Lisa 2/10) internal hard disk: the Lisa Office System and MacWorks. You can install one or both of these environments on one internal hard disk. When a hard disk has two environments installed on it, it is called a "shared" hard disk. You can only access one environment at a time.

There is a different procedure for booting each portion (environment) of a shared hard disk. To boot the Macintosh environment on a shared hard disk, you must insert the MacWorks diskette into the microdisk drive and start up from the microdisk. To boot the Lisa Office System portion of a shared hard disk, simply turn the system on. If the hard disk is not sharing two different environments, then just turn the system on to boot whichever environment has been installed.

For the Lisa environment, the version of any application you are using should match the Office System version installed on the hard disk. Applications that have different version numbers will usually work, but may cause problems in the hard disk during certain routines. So, if the hard disk environment has been upgraded, the applications must be upgraded to the same version.

For the Macintosh environment, the Finder on an application diskette must match the version of the MacWorks environment installed on the hard drive.

The existing versions of both environments are listed below.

Lisa Office System -- Versions 1.0 and 2.0

Lisa 7/7 Office System -- Versions 3.0 and 3.1

MacWorks -- Versions 1.0, 2.0, and 3.0

CONTINUED ON NEXT PAGE



To find out which version of the Lisa Office System you are using, or to find the version number of any Lisa application, follow the steps below.

1. Turn on the system.
2. If you want information about a diskette, insert the diskette you are concerned about.
3. When the desktop appears, select the hard disk or diskette you are concerned about.
4. Pull down the **File/Print** menu and select **Attributes of** whichever device you selected in step 3.

To find out which version of the MacWorks environment you are using, follow the steps below.

NOTE: If you want information about the Finder on an application diskette, you will have to boot the diskette on a Macintosh and follow the instructions below.

1. Turn the system on.
2. When the desktop appears, select the hard disk or diskette you are concerned about.
3. Pull down the **Apple** menu and select **About the Finder**. The version number will appear at the bottom of the finder window.



HARD DISK PROBLEMS

How to Repair a Crashed Disk (with MacWorks installed on it)

If a problem occurs while the operating system is being loaded, such as an address error, a bad system file, or no system file, the startup disk is said to have "crashed." In this case, the Lisa 2/Macintosh XL is unable to continue. A "Sad Macintosh" error icon with the address 0F0064 or 0F0028 may be displayed.

Attempt to repair the hard disk following the steps below.

1. Turn the system off.
2. Turn the system back on. After you hear the first "click," press the <SPACE BAR> two or three times.
3. After the system performs its self diagnostic test, a **STARTUP FROM** menu will appear at the upper left corner of the screen.
4. Insert the MacWorks boot diskette.
5. Hold down the <OPTION> and <COMMAND>/<APPLE> keys and select the microdisk drive from the **STARTUP FROM** menu. Keep holding the keys down until the diskette icon appears with a question mark inside.
6. Remove the MacWorks boot diskette and insert the MacWorks System Diskette.

If both the hard disk and MacWorks System Diskette icons appear, select both icons. Pull down the **File/Print** menu and open both icons. Copy the system folder from the system disk onto the hard disk.

If the hard disk does not appear, pull down the **File/Print** menu to open the MacWorks System disk. Open the "Hard Disk Install" icon on the MacWorks System Disk and reinitialize the hard disk. If you do not know how to do this, turn to the "Upgrades and Retrofits" tab in this binder. Find **Section 4, Macintosh XL Screen Modification Kit**, and look up "Hard Disk Install."

7. Turn the system off.
8. Use the proper diagnostic diskette to make sure that the system is functioning properly. (See **Section 5, Diagnostics**).



How to Repair a Crashed Disk (with Lisa Office System installed on it)

The startup disk crashes whenever it begins to load the operating system and a problem occurs, such as an address error, a bad system file, or no system file, and the Macintosh XL is unable to continue. A "Sad Macintosh" error icon with the address **0F0064** or **0F0028** may be displayed if you are using MacWorks.

Attempt to repair the hard disk following the steps below.

1. Turn the system off.
2. Turn the system on, after you hear the first "click," press the **<SPACE BAR>**.
3. Insert the Office System 1 diskette into the microdisk drive.
4. Select the microdisk drive from the **STARTUP FROM** menu.
5. When the Office System installation menu comes up, select **REPAIR**.

NOTE: Do not reinstall the Office System.

6. Turn off the system, and try booting from the hard disk.

If the hard disk crashes again, go to the appropriate hard disk Symptom/Cure Table following this section.



ProFile Symptom/Cure Table

SYMPTOM	CURE
System crashes while booting or while in use	<ul style="list-style-type: none">- Try doing a hard disk repair (See Hard Disk Problems)- Reseat card cage boards- Replace card cage boards, one at a time- Replace hard disk
Bad ProFile icon is displayed or ProFile does not appear on the desktop	<ul style="list-style-type: none">- Verify that the ProFile is properly connected. If it is not, do the following:<ul style="list-style-type: none">a) turn off ProFileb) turn off systemc) reseat parallel card if the ProFile is connected via the cardd) reconnect the ProFilee) turn on the ProFile and wait until the ready light stays on steadilyf) turn on the system- If using Lisa Office System, check Preferences- If the ProFile is attached, try doing a hard disk repair (See Hard Disk Problems)- See Startup Error Icons /Codes



Internal Hard Disk Symptom/Cure Table

SYMPTOM	CURE
System crashes while booting or while in use	<ul style="list-style-type: none">- Try doing a hard disk repair (See Hard Disk Problems)- Reseat card cage boards- Replace card cage boards, one at a time- Replace hard disk
Internal hard disk error icon is displayed or hard disk icon does not appear on the desktop	<ul style="list-style-type: none">- Make sure there are two memory boards installed- Do the following to verify that the disk is properly connected:<ul style="list-style-type: none">a) remove the front coverb) remove the back coverc) remove the topd) reseat the two cable connections at the top of the hard disk drivee) reinstall top and covers and turn the system on- If using Lisa Office System, check Preferences- Try doing a "hard disk repair" via software (see owner's manual)- See Startup Error Icons /Codes



MOUSE PROBLEMS

SYMPTOM	CURE
Cursor is not displayed	<ul style="list-style-type: none">- Remove and reinsert mouse plug- Replace mouse
Cursor does not move when you push the mouse	<ul style="list-style-type: none">- Remove and reinsert mouse plug- Replace mouse- Replace I/O board- Replace CPU board- Replace motherboard
Arrow moves vertically or horizontally only	<ul style="list-style-type: none">- Remove and reinsert mouse plug- Replace mouse- Replace I/O board



KEYBOARD PROBLEMS

SYMPTOM	CURE
System does not respond to any keyboard input	<ul style="list-style-type: none">- Remove and reinsert the keyboard plug- Replace the keyboard- Turn off the system; if the system does not turn off, go to System Hang Procedures- Replace the I/O board- Replace the CPU board- Replace the motherboard
One or more keys on the keyboard don't work	<ul style="list-style-type: none">- Replace the keyboard



NOISE PROBLEMS

SYMPTOM	CURE
A sizzling noise coming from the system	<ul style="list-style-type: none">- Replace the power supply- Adjust brightness in back- Adjust the contrast on video board- Replace video board- Replace flyback
A clicking sound coming from the system (power supply trips)	<ul style="list-style-type: none">- Adjust brightness in back- Adjust the contrast on video board- Replace power supply- Replace video board- Replace flyback
Scratching sound coming from the hard disk	<ul style="list-style-type: none">- Replace the hard disk



TRANSMITTING/RECEIVING REPAIR PROCEDURE (For Lisa 2 only)

Some Lisa 2 systems that are connected to AppleTalk networks suffer from noise problems on their receiving lines. This noise prevents the Lisa 2 from hearing other devices transmit, and consequently the Lisa 2 may transmit at the same time as another device. When two devices on the same line transmit signals to each other simultaneously, the signals collide and neither device receives a message.

The noise problem is in the Lisa 2 I/O board circuitry near the battery pack. Follow the steps below to resolve this problem.

1. Remove the I/O board.
2. Carefully cut the trace shown in Figure 1, #1.
3. Clip both leads of the resistor R38 (Figure 1, #2) to completely remove it from the board.

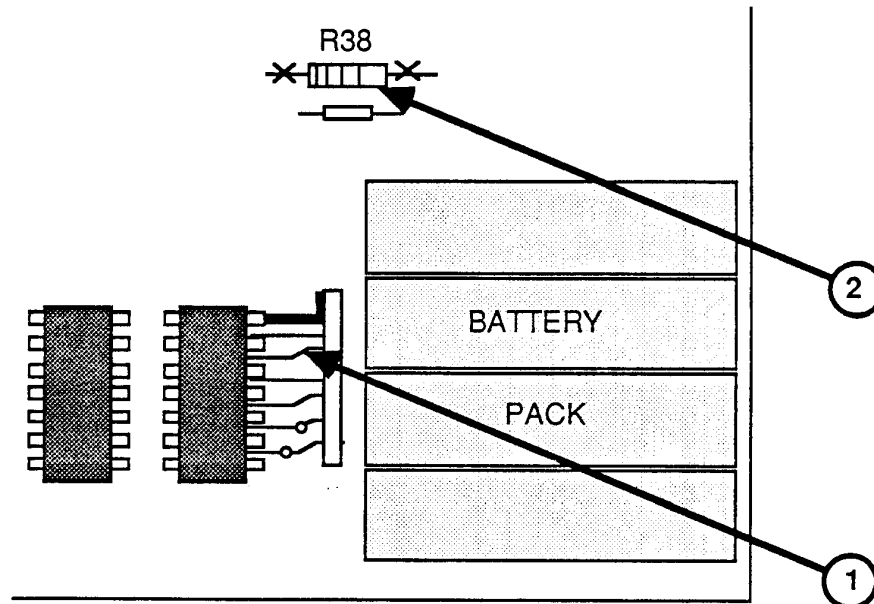


FIGURE 1



APPENDIX A

MACWORKS/LISA 2 OFFICE SYSTEM ERROR MESSAGES

This appendix contains a series of discussions covering the software error messages generated by the Lisa Office System and MacWorks environments. The discussions are grouped into four general categories, with specific entries under each major heading. If you have encountered a software error message, go to the specific entry that corresponds to that message. If you think you may have a hardware problem with your system, refer to the flowcharts and symptom/cure tables in this section.

Disk Problems

- Disk Full or Insufficient Room on Disk
- Damaged Disk
- Difficulty Accessing Disk
- Disk Drive Problems

Document Problems

- Damaged Document
- Difficulty Saving Document

Tool Problems

- Tool Failure
- Difficulty Starting Tool
- Incompatible Version

System Problems

- Insufficient Memory
- System Restart
- Desktop State
- Difficulty Printing
- Difficulty Displaying Preferences



DISK PROBLEMS

Disk Full or Insufficient Room on Disk

Many common desktop operations -- opening or saving documents, for example -- require a certain amount of free disk space. When your disks become crowded, you can make more room in several ways:

Discarding Obsolete Documents - Discard obsolete documents by moving their icons to the "Trash" can. The last thing you discard from a disk stays in the Trash -- and on the storage disk -- until something else from the same disk is also discarded or until you choose the **Empty Trash** item in the **Special** menu. Sometimes the Lisa 2/Macintosh XL destroys objects in the Trash if it needs the disk space. Usually, however, the space occupied by an object is not actually reclaimed until you have thrown away another object from the same disk or chosen **Empty Trash** in the **Housekeeping** menu. Therefore, if you are discarding a group of documents in order to make more room on the disk, choose **Empty Trash** from the **Special** menu afterward.

Moving Objects - You can move some objects to a different storage disk. If you are in the Lisa Office System environment, do not duplicate the object, because that will not remove the copy from the original disk.

In the Macintosh environment, drag the icon you wish to copy onto a different storage disk. You now have two copies of the document, the one you just made and the original. Drag the original document to the trash can to eliminate it.

Repairing the Disk - You can repair the disk, following the procedures in "Hard Disk Problems" in this section.

If, after you have made more space on the disk that holds the document, the Lisa 2/Macintosh XL still indicates that there is not enough room on the disk, check the Status panel of the startup disk window to verify that there is also space available on the startup disk.



Damaged Disk

The Lisa 2/Macintosh XL may tell you that one of your disks is "damaged." This could mean either that some of the information stored on the disk has been altered or that the disk itself is physically damaged.

First, repair the disk following the procedures under **Hard Disk Problems** in this section. Unreadable information may be altered or removed; the names of some documents may change.

If the Lisa 2/Macintosh XL is unable to repair the disk, either the disk or the disk drive probably has a physical problem. If the disk in question is a microdisk, try inserting it in another Lisa 2/Macintosh drive. If the other drive has no trouble with the diskette, then there may be something wrong with the first disk drive. If the other drive cannot read the diskette either, then the disk may have suffered physical damage. Use a backup copy of the diskette.

Difficulty Accessing Disk

First, try restarting the system: put away all open documents, and then turn the Lisa 2/Macintosh XL off and back on again. When the desktop returns, try again to access the disk.

If this procedure works, your system was probably in a temporary error condition caused by the interaction of different tools and documents.

If restarting the system doesn't solve the problem, the most likely cause is a damaged document, disk, or tool. If you are trying to access a document, see **Damaged Document**. If that discussion does not address your problem, see **Damaged Disk**, and then, as a last resort, **Tool Failure and Disk Drive Problems**.



Disk Drive Problems

Sometimes a mechanical failure in a disk drive results in errors that appear to come from your documents or disks. You can verify that the drive in question is working properly by trying the disk in the another Lisa 2/Macintosh XL.

If you find that the disk drive and not the diskette is at fault, replace the drive and repair any disks that were used in the damaged drive. A faulty disk drive could have permanently damaged a disk. If this is the case, you'll need to use the backup copy of the disk.

DOCUMENT PROBLEMS

Damaged Document

A document can be damaged in a number of ways. The disk on which the document is stored could be wearing out, for example, or the document may have been damaged during a power failure. Sometimes a software failure leaves a document unreadable.

First, restart the system if you have not already done so. Put away all documents, and then turn the Lisa 2/Macintosh XL off and on again. Try again to open the document.

If the document still won't open, try to duplicate the document and put the duplicate on a different disk. If this works, the original disk is probably not damaged. Try to open the copy. If the Lisa 2/Macintosh XL reports that the copy is also damaged, the document itself probably contains some inconsistent or unreadable information. The Tool could also be damaged.

If you cannot make a duplicate of the document, try to make a copy of the entire disk. Whether or not the copy procedure works, repair the original disk following the instructions in troubleshooting section under **Hard Disk Problems**.

If the document is still damaged after the disk is repaired, discard the document and replace it with a backup copy.



Difficulty Saving Document

Check the status panel of the document's storage disk to see how much free space is left on the disk. If you have saved an earlier version of the document, change the disk display to an alphabetical view, and see how many blocks the document required in its earlier version. Estimate how much space the document now needs, on the basis of whether you have added or removed information. If there is inadequate space available, see **Insufficient Room on Disk**.

If disk space is not the problem, or if you do not want to remove anything to make room on the storage disk, you may be able to save the document by setting it aside on the desktop and then moving it to another disk. (Because some tools will not let you move a document that has not been saved, you may not be able to use this technique.)

TOOL PROBLEMS

Tool Failure

Before you conclude that a tool is actually damaged, restart the system and try to repeat the failure. To restart the system, put away all documents, and then turn the Lisa 2/Macintosh XL off and on again. If the procedure works after a restart, the system was probably in a temporary error condition caused by the interaction of various tools and documents.

If the tool still fails, discard the working copy from your internal hard disk (or ProFile) and replace it with a duplicate of the master tool.

The calculator, the clock, the Preferences, and some of the printing routines (in MacWorks, the **Apple** menu items) are all part of the system software. If replacing the tool doesn't work, or if the problem was with this software in the first place, reinstall the system software (Lisa Office System or MacWorks Hard Disk Install) on your startup disk.



Difficulty Starting Tool

Check the status panel in the window of the disk that holds the tool and, if you started up from a different device, in the window of your startup device. If the number of free blocks is approaching 200 or fewer, see **Insufficient Room on Disk**.

If disk space is not the problem, see **Tool Failure**.

Incompatible Version

From time to time, Apple releases updated versions of the Lisa 2/Macintosh XL software. If you buy an additional Lisa 2/Macintosh XL system more than six months after you bought your first Lisa 2/Macintosh XL system, the computers may come with different versions of the software. (If you have a support agreement, you will always have the most recent updates of all software.)

Old documents are usually compatible with new revisions of the tools. New documents, however, may not be compatible with old versions of the tools; and once you have worked on an old document with a more recent version of the tool, you may no longer be able to work on that document with the old tool. If the Lisa 2/Macintosh XL cannot work on a document because the tool and the document are incompatible, take the document to a Lisa 2/Macintosh XL that has a more recent revision of the tool. To find out the release date of a tool, display an alphabetical or chronological view of the folder in which the tool is stored.



SYSTEM PROBLEMS

Insufficient Memory

Insufficient room in memory usually means either that too many documents are open on the desktop or that the document you are actually working on has gotten too big.

First, put away all documents with which you currently are not working, especially if the documents were created with a different tool from the one you are using.

If the Lisa 2/Macintosh XL still cannot perform the task, restart the system: put away all documents, and turn the Lisa 2/Macintosh XL off and on again. Then open only the document you want to work on, and try the operation again.

If none of these techniques works, then your document is probably too big. Split it into two smaller documents if possible.

System Restart

Sometimes the Lisa 2/Macintosh XL encounters an error condition that it cannot handle. In this case, the Lisa 2/Macintosh XL shuts down the desktop and starts over. If possible, any open documents are suspended in their current states so that you can continue where you left off after the system started again.

If the problem recurs, either your software or your hardware may be damaged.

Try repairing the hard disk by following the procedures in **Hard Disk Problems**. If you can repair the disk, copy all files onto diskette and reinitialize the hard disk. Then reinstall the system software.

If the problem recurs after reinstalling your system software, your system hardware may need repair.



Difficulty Printing

The Lisa 2/Macintosh XL can have difficulty printing a document for a number of reasons, from simple mechanical problems to software failures.

First, verify that the printer is turned on and that all connections are secure. If the printer is properly connected and is on, then turn it off and back on again. If the printer still does not print, see the **Owner's Manual** to set preferences for the printer you are using.

If your system setup checks out, the Lisa 2/Macintosh XL may have insufficient room in memory or insufficient free space on the startup disk. See **Insufficient Memory** and **Insufficient Room on Disk**.

If none of these strategies solves the problem, either the tool you were using or your system software may have failed. See **Tool Failure**.

Difficulty Displaying Preferences

This problem can be caused by an incorrect or bad Video State ROM on the CPU board.

The Video State ROM is a multipurpose chip installed at location 6-C on the CPU board. It contains the serial number and AppleNet number of the system in which it was originally installed.

Whenever you replace the CPU board, you must transfer the customer's Video State ROM to the replacement CPU board.

If the customer's Video State ROM is bad, record the serial number of the system. Call your TAC and order a replacement ROM.



APPENDIX B

OPERATING SYSTEM ERROR MESSAGES

Operating system error messages may help you find the problem, but always double-check using the usual troubleshooting procedures.

- 6081 End of exec file input
- 6004 Attempt to reset text file with typed-file type
- 6003 Attempt to reset nontext file with text type
- 1885 ProFile not present during driver initialization
- 1882 ProFile not present during driver initialization
- 1176 Data in the object have been altered by Scavenger
- 1175 File or volume was scavenged
- 1174 File was left open or volume was left mounted, and system crashed
- 1173 File was last closed by the OS
- 1146 Only a portion of the space requested was allocated
- 1063 Attempt to mount boot volume from another Lisa or not most recent boot volume
- 1060 Attempt to mount a foreign boot disk following a temporary unmount
- 1059 The bad block directory of the diskette is almost full or difficult to read
- 876 (from CLOSE_OBJECT) The file just closed. May be damaged or contain corrupted data because an I/O error occurred when writing a part of the file that was buffered by the file system
- 696 Printer out of paper during initialization
- 660 Cable disconnected during ProFile initialization
- 626 Scavenger indicated data are questionable, but may be OK
- 622 Parameter memory and the disk copy were both invalid
- 621 Parameter memory was invalid but the disk copy was valid
- 620 Parameter memory was valid but the disk copy was invalid
- 413 Event channel was scavenged
- 412 Event channel was left open and system crashed
- 321 Data segment open when the system crashed. Data possibly invalid.
- 320 Could not determine size of data segment
- 150 Process was created, but a library used by program has been scavenged and altered
- 149 Process was created, but the specified program file has been scavenged and altered
- 125 Specified process is already terminating
- 120 Specified process is already active
- 115 Specified process is already suspended



- 115 Specified process is already suspended
- 100 Specified process does not exist
- 101 Specified process is a system process
- 110 Invalid priority specified (must be 1..225)
- 130 Could not open program file
- 131 File System error while trying to read program file
- 132 Invalid program file (incorrect format)
- 133 Could not get a stack segment for new process
- 134 Could not get a syslocal segment for new process
- 135 Could not get sysglobal space for new process
- 136 Could not set up communication channel for new process
- 138 Error accessing program file while loading
- 141 Error accessing a library file while loading program
- 142 Cannot run protected file on this machine
- 143 Program uses an intrinsic unit not found in the
Intrinsic Library
- 144 Program uses an intrinsic unit whose name/type does
not agree with the Intrinsic Library
- 145 Program uses a shared segment not found in the
Intrinsic Library
- 146 Program uses a shared segment whose name does not
agree with the Intrinsic Library
- 147 No space in syslocal for program file descriptor
during process creation
- 148 No space in the shared IU data segment for the
program's shared IU globals
- 190 No space in syslocal for program file description
during List_LibFiles operation
- 191 Could not open program file
- 192 Error trying to read program file
- 193 Cannot read protected program file
- 194 Invalid program file (incorrect format)
- 195 Program uses a shared segment not found in the
Intrinsic Library
- 196 Program uses a shared segment whose name does not
agree with the Intrinsic Library
- 198 Disk I/O error trying to read the intrinsic unit
directory
- 199 Specified library file number does not exist in the
Intrinsic Library
- 201 No such exception name declared
- 202 No space left in the system data area for
Declare_Excep_Hdl or Signal_Excep
- 203 Null name specified as exception name
- 302 Invalid LDSN
- 303 No data segment bound to the LDSN
- 304 Data segment already bound to the LDSN
- 306 Data segment too large
- 307 Input data segment path name is invalid
- 308 Data segment already exists
- 309 Insufficient disk space for data segment



310 An invalid size has been specified
311 Insufficient system resources
312 Unexpected File System error
313 Data segment not found
314 Invalid address passed to Info_Address
315 Insufficient memory for operation
317 Disk error while trying to swap in data segment
401 Invalid event channel name passed to Make_Event_Chn
402 No space left in system global data area for
Open_Event_Chn
403 No space left in system local data area for
Open_Event_Chn
404 Non-block-structured device specified in pathname
405 Catalog is full in Make_Event_Chn or Open_Event_Chn
406 No such event channel exists in Kill_Event_Chn
410 Attempt to open a local event channel to send
411 Attempt to open event channel to receive when event
channel has a receiver
413 Unexpected File System error in Open_Event_Chn
416 Cannot get enough disk space for event channel in
Open_Event_Chn
417 Unexpected File System error in Close_Event_Chn
420 Attempt to wait on a channel that the calling process
did not open
421 Wait_Event_Chn returns empty because sender process
could not complete
422 Attempt to call Wait_Event_Chn on an empty event-call
channel
423 Cannot find corresponding event channel after being
blocked
424 Amount of data returned while reading from event
channel not of expected size
425 Event channel empty after being unblocked,
Wait_Event_Chn
426 Bad_request pointer error returned in Wait_Event_Chn
427 Wait_List has illegal length specified
428 Receiver unblocked because last sender closed
429 Unexpected File System error in Wait_Event_Chn
430 Attempt to send to a channel which the calling process
does not have open
431 Amount of data transferred while writing to event
channel not of expected size
432 Sender unblocked because receiver closed in
Send_Event_Chn
433 Unexpected File System error in Send_Event_Chn
440 Unexpected File System error in Make_Event_Chn
441 Event channel already exists in Make_Event_Chn
445 Unexpected File System error in Kill_Event_Chn
450 Unexpected File System error in Flush_Event_Chn
530 Size of stack expansion request exceeds limit
specified for program



- 531 Cannot perform explicit stack expansion due to lack of memory
- 532 Insufficient disk space for explicit stack expansion
- 600 Attempt to perform I/O operation on non I/O request
- 602 No more alarms available during driver initialization
- 605 Call to nonconfigured device driver
- 606 Cannot find sector on floppy diskette (disk unformatted)
- 608 Illegal length or disk address for transfer
- 609 Call to nonconfigured device driver
- 610 No more room in sysglobal for I/O request
- 613 Unpermitted direct access to spare track with sparing enabled on floppy drive
- 614 No disk present in drive
- 615 Wrong call version to floppy drive
- 616 Unpermitted floppy drive function
- 617 Checksum error on floppy diskette
- 618 Cannot format, or write protected, or error unclamping floppy diskette
- 619 No more room in sysglobal for I/O request
- 623 Illegal device control parameters to floppy drive
- 625 Scavenger indicated data are bad
- 630 The time passed to Delay_Time, Convert_Time, or Send_Event_Chn has invalid year
- 631 Illegal timeout request parameter
- 632 No memory available to initialize clock
- 634 Illegal timed event id of -1
- 635 Process got unblocked prematurely due to process termination
- 636 Timer request did not complete successfully
- 638 Time passed to Delay_Time or Send_Event_Chn more than 23 days from current time
- 639 Illegal date passed to Set_Time, or illegal date from system clock in Get_Time
- 640 RS-232 driver called with wrong version number
- 641 RS-232 read or write initiated with illegal parameter
- 642 Unimplemented or unsupported RS-232 driver function
- 646 No memory available to initialize RS-232
- 647 Unexpected RS-232 timer interrupt
- 648 Unpermitted RS-232 initialization, or disconnect detected
- 649 Illegal device control parameters to RS-232
- 652 N-port driver not initialized prior to ProFile
- 653 No room in sysglobal to initialize ProFile
- 654 Hard error status returned from drive
- 655 Wrong call version to ProFile
- 656 Unpermitted ProFile function
- 657 Illegal device control parameter to ProFile
- 658 Premature end of file when reading from driver
- 659 Corrupt File System header chain found in driver
- 660 Cable disconnected



- 662 Parity error while sending command or writing data to ProFile
- 663 Checksum error or CRC error or parity error in data read
- 666 Timeout
- 670 Bad command response from drive
- 671 Illegal length specified (must = 1 on input)
- 672 Unimplemented console driver function
- 673 No memory available to initialize console
- 674 Console driver called with wrong version number
- 675 Illegal device control
- 680 Wrong call version to serial driver
- 682 Unpermitted serial driver function
- 683 No room in sysglobal to initialize serial driver
- 685 Eject not allowed this device
- 686 No room in sysglobal to initialize n-port card driver
- 687 Unpermitted n-port card driver function
- 688 Wrong call version to n-port card driver
- 690 Wrong call version to parallel printer
- 691 Illegal parallel printer parameters
- 692 N-port card not initialized prior to parallel printer
- 693 No room in sysglobal to initialize parallel printer
- 694 Unimplemented parallel printer function
- 695 Illegal device control parameters (parallel printer)
- 696 Printer out of paper
- 698 Printer offline
- 699 No response from printer
- 700 Mismatch between loader version number and Operating System version number
- 701 OS exhausted its internal space during startup
- 702 Cannot make system process
- 703 Cannot kill pseudo-outer process
- 704 Cannot create driver
- 706 Cannot initialize floppy disk driver
- 707 Cannot initialize the File System volume
- 708 Hard disk mount table unreadable
- 709 Cannot map screen data
- 710 Too many slot-based devices
- 724 The boot tracks do not know the right File System version
- 725 Either damaged File System or damaged contents
- 726 Boot device read failed
- 727 The OS will not fit into the available memory
- 728 SYSTEM.OS is missing
- 729 SYSTEM.CONFIG is corrupt
- 730 SYSTEM.OS is corrupt
- 731 SYSTEM.DEBUG or SYSTEM.DEBUG2 is corrupt
- 732 SYSTEM.LLD is corrupt
- 733 Loader range error
- 734 Wrong driver is found. For instance, storing a diskette loader on a ProFile



735 SYSTEM.LLD is missing
736 SYSTEM.UNPACK is missing
737 Unpack of SYSTEM.OS with SYSTEM.UNPACK failed
791 Configurable driver (CD) code file not executable
792 Could not get code space for the CD
793 IO error reading CD code file
794 CD code file not found
795 CD has more than 1 segment
796 Could not get temporary space while loading CD
801 IO Result <> 0 on I/O using the Monitor
802 Asynchronous I/O request not completed successfully
803 Bad combination of mode parameters
806 Page specified is out of range
809 Invalid arguments (page, address, offset, or count)
810 The requested page could not be read in
816 Not enough sysglobal space for File System buffers
819 Bad device number
820 No space in sysglobal for asynchronous request list
821 Already initialized I/O for this device
822 Bad device number
825 Error in parameter values (Allocate)
826 No more room to allocate pages on device
828 Error in parameter values (Deallocate)
829 Partial deallocation only (ran into unallocated region)
835 Invalid s-file number
837 Unallocated s-file or I/O error
838 Map overflow: s-file too large
839 Attempt to compact file past PEOF
840 The allocation map of this file is truncated
841 Unallocated s-file or I/O error
843 Requested exact fit, but one could not be provided
847 Requested transfer count is <= 0
848 End of file encountered
849 Invalid page or offset value in parameter list
852 Bad unit number
854 No free slots in s-list directory (too many s-files)
855 No available disk space for file hints
856 Device not mounted
857 Empty, locked, or invalid s-file
861 Relative page is beyond PEOF (bad parameter value)
864 No sysglobal space for volume bitmap
866 Wrong FS version or not a valid Lisa FS volume
867 Bad unit number
868 Bad unit number
869 Unit already mounted (mount)/no unit mounted
870 No sysglobal space for DCB or MDDF
871 Parameter not a valid s-file ID
872 No sysglobal space for s-file control block
873 Specified file is already open for private access
874 Device not mounted



875 Invalid s-file ID or s-file control block
879 Attempt to position past EOF
881 Attempt to read empty file
882 No space on volume for new data page of file
883 Attempt to read past EOF
884 Not first auto-allocation, but file was empty
885 Could not update filesize hints after a write
886 No syslocal space for I/O request list
887 Catalog pointer does not indicate a catalog (bad parameter)
888 Entry not found in catalog
890 Entry by that name already exists
891 Catalog is full or is damaged
892 Illegal name for an entry
894 Entry not found, or catalog is damaged
895 Invalid entry name
896 Safety switch is on--cannot kill entry
897 Invalid bootdev value
899 Attempt to allocate a pipe
900 Invalid page count or FCB pointer argument
901 Could not satisfy allocation request
921 Pathname invalid or no such device
922 Invalid label size
926 Pathname invalid or no such device
927 Invalid label size
941 Pathname invalid or no such device
944 Object is not a file
945 File is not in the killed state
946 Pathname invalid or no such device
947 Not enough space in syslocal for File System reldb
948 Entry not found in specified catalog
949 Private access not allowed if file already open shared
950 Pipe already in use, requested access not possible or dwrite not allowed
951 File is already opened in private mode
952 Bad refnum
954 Bad refnum
955 Read access not allowed to specified object
956 Attempt to position FMARK past EOF not allowed
957 Negative request count is illegal
958 Nonsequential access is not allowed
959 System resources exhausted
960 Error writing to pipe while an unsatisfied read was pending
961 Bad refnum
962 No WRITE or APPEND access allowed
963 Attempt to position FMARK too far past EOF
964 Append access not allowed in absolute mode
965 Append access not allowed in relative mode
966 Internal inconsistency of FMARK and EOF (warning)
967 Nonsequential access is not allowed



968 Bad refnum
971 Pathname invalid or no such device
972 Entry not found in specified catalog
974 Bad refnum
977 Bad refnum
978 Page count is nonpositive
979 Not a block-structured device
981 Bad refnum
982 No space has been allocated for specified file
983 Not a block-structured device
985 Bad refnum
986 No space has been allocated for specified file
987 Not a block-structured device
988 Bad refnum
989 Caller is not a reader of the pipe
990 Not a block-structured device
994 Invalid refnum
995 Not a block-structured device
999 Asynchronous read was unblocked before it was satisfied
1021 Pathname invalid or no such entry
1022 No such entry found
1023 Invalid newname, check for '-' in string
1024 New name already exists in catalog
1031 Pathname invalid or no such entry
1032 Invalid transfer count
1033 No such entry found
1041 Pathname invalid or no such entry
1042 Invalid transfer count
1043 No such entry found
1051 No device or volume by that name
1052 A volume is already mounted on device
1053 Attempt to mount temporarily unmounted boot volume just unmounted from this Lisa
1054 The bad block directory of the diskette is invalid
1061 No device or volume by that name
1062 No volume is mounted on device
1071 Not a valid or mounted volume for working directory
1091 Pathname invalid or no such entry
1092 No such entry found
1101 Invalid device name
1121 Invalid device, not mounted, or catalog is damaged (from RESET_CATALOG) There is no space available in the process' local data area to allocate the catalog scan buffer
1124 (from GET_NEXT-ENTRY) There is no space available in the process' local data area to allocate the catalog scan buffer
1128 Invalid pathname, device, or volume not mounted
1130 File is protected; cannot open due to protection violation



- 1131 No device or volume by that name
- 1132 No volume is mounted on that device
- 1133 No more open files in the file list of that device
- 1134 Cannot find space in sysglobal for open file list
- 1135 Cannot find the open file entry to modify
- 1136 Boot volume not mounted
- 1137 Boot volume already unmounted
- 1138 Caller cannot have higher priority than system processes when calling ubd
- 1141 Boot volume was not unmounted when calling rbd
- 1142 Some other volume still mounted on the boot device when calling rbd
- 1143 No sysglobal space for MDDF to do rbd
- 1144 Attempt to remount volume which is not the temporarily unmounted boot volume
- 1145 No sysglobal space for bit map to do rbd
- 1158 Track-by-track copy buffer is too small
- 1159 Shutdown requested while boot volume was unmounted
- 1160 Destination device too small for track-by-track copy
- 1161 Invalid final shutdown mode
- 1162 Power is already off
- 1163 Illegal command
- 1164 Device is not a diskette device
- 1165 No volume is mounted on the device
- 1166 A valid volume is already mounted on the device
- 1167 Not a block-structured device
- 1168 Device name is invalid
- 1169 Could not access device before initialization using default device parameters
- 1170 Could not mount volume after initialization
- 1171 '-' is not allowed in a volume name
- 1172 No space available to initialize a bitmap for the volume
- 1176 Cannot read from a pipe more than half of its allocated physical size
- 1177 Cannot cancel a read request for a pipe
- 1178 Process waiting for pipe data got unblocked because last pipe writer closed it
- 1180 Cannot write to a pipe more than half of its allocated physical size
- 1181 No system space left for request block for pipe
- 1182 Writer process to a pipe got unblocked before the request was satisfied
- 1183 Cannot cancel a write request for a pipe
- 1184 Process waiting for pipe space got unblocked because the reader closed the pipe
- 1186 Cannot allocate space to a pipe while it has data wrapped around
- 1188 Cannot compact a pipe while it has data wrapped around
- 1190 Attempt to access a page that is not allocated to the pipe



1191 Bad parameter
1193 Premature end of file encountered
1196 Something is still open on device--cannot unmount
1197 Volume is not formatted or cannot be read
1198 Negative request count is illegal
1199 Function or procedure is not yet implemented
1200 Illegal volume parameter
1201 Blank file parameter
1202 Error writing destination file
1203 Invalid UCSD directory
1204 File not found
1210 Boot track program not executable
1211 Boot track program too big
1212 Error reading boot track program
1213 Error writing boot track program
1214 Boot track program file not found
1215 Cannot write boot tracks on that device
1216 Could not create/close internal buffer
1217 Boot track program has too many code segments
1218 Could not find configuration information entry
1219 Could not get enough working space
1220 Premature EOF in boot track program
1221 Position out of range
1222 No device at that position
1225 Scavenger has detected an internal inconsistency
symptomatic of a software bug
1226 Invalid device name
1227 Device is not block structured
1228 Illegal attempt to scavenge the boot volume
1229 Cannot read consistently from the volume
1230 Cannot write consistently to the volume
1231 Cannot allocate space (Heap segment)
1232 Cannot allocate space (Map segment)
1233 Cannot allocate space (SFDB segment)
1237 Error rebuilding the volume root directory
1240 Illegal attempt to scavenge a non-OS-formatted volume
1295 The allocation map of this file is damaged and cannot
be read
1296 Bad string argument has been passed
1297 Entry name for the object is invalid (on the volume)
1298 S-list entry for the object is invalid (on the volume)
1807 No disk in floppy drive
1820 Write-protect error on floppy drive
1822 Unable to clamp floppy drive
1824 Floppy drive write error
1882 Bad response from ProFile
1885 ProFile timeout error
1998 Invalid parameter address
1999 Bad refnum
6001 Attempt to access unopened file



6002 Attempt to reopen a file which is not closed using an open FIB (file info block)
6003 Operation incompatible with access mode
6004 Printer offline
6005 File record type incompatible with character device (must be byte sized)
6006 Bad integer (read)
6010 Operation incompatible with file type or access mode
6081 Premature end of exec file
6082 Invalid exec (temporary) file name
6083 Attempt to set prefix with null name
6090 Attempt to move console with exec or output file open
6101 Bad real (read)
6151 Attempt to reinitialize heap already in use
6152 Bad argument to NEW (negative size)
6153 Insufficient memory for NEW request
6154 Attempt to RELEASE outside of heap

Operating System Error Codes

The error codes listed below are generated only when a nonrecoverable error occurs while in Operating System code.

10050 Request block is not chained to a PCB (Unblk_Req)
10051 Bld_Req is called with interrupts off
10100 An error was returned from SetUp_Directory or a Data Segment Routine (Setup_IUInfo)
10102 Error > 0 trying to create shell (Root)
10103 Sem_Count > 1 (Init_Sem)
10104 Could not open event channel for shell (Root)
10197 Automatic stack expansion fault occurred in system code (Check_Stack)
10198 Need_Mem set for current process while scheduling is disabled (SimpleScheduler)
10199 Attempt to block for reason other than I/O while scheduling is disabled (SimpleScheduler)
10201 Hardware exception occurred while in system code
10202 No space left from Sigl_Except call in Hard_Except
10203 No space left from Sigl_Except call in Nmi_Except
10205 Error from Wait_Event_Chn called in Except_Prolog
10207 No system data space in Except_Setup
10208 No space left from Sigl_Except call in range error
10212 Error in Term_Def_Hdl from Enable_Except
10213 Error in Force_Term_Except, no space in Enq_Ex_Data
10401 Error from Close_Event_Chn in Ec_Cleanup
10582 Unable to get space in Freeze_Seg
10590 Fatal memory parity error
10593 Unable to move memory manager segment during startup
10594 Unable to swap in a segment during startup
10595 Unable to get space in Extend_MMlist



- 10596 Trying to alter size of segment that is not data or stack (Alt_DS_Size)
- 10597 Trying to allocate space to an allocated segment (Alloc_Mem)
- 10598 Attempting to allocate a nonfree memory region (Take_Free)
- 10599 Fatal Disk error trying to read system code into memory
- 10600 Error attempting to make timer pipe
- 10601 Error from Kill_Object of an existing timer pipe
- 10602 Error from second Make_Pipe to make timer pipe
- 10603 Error from Open to open timer pipe
- 10604 No syslocal space for head of timer list
- 10605 Error during allocate space for timer pipe, or interrupt from nonconfigured device
- 10609 Interrupt from nonconfigured device
- 10610 Error from info about timer pipe
- 10611 Spurious interrupt from floppy drive #2
- 10612 Spurious interrupt from floppy drive #1, or no syslocal space for timer list element
- 10613 Error from Read_Data of timer pipe
- 10614 Actual returned from Read_Data is not the same as requested from timer pipe
- 10615 Error from open of the receiver's event channel
- 10616 Error from Write_Event to the receiver's event channel
- 10617 Error from Close_Event_Chnl on the receiver's pipe
- 10619 No sysglobal space for timer request block
- 10624 Attempt to shut down floppy disk controller while drive is still busy
- 10637 Not enough memory to initialize system timeout drives
- 10675 Spurious timeout on console driver
- 10699 Spurious timeout on parallel printer driver
- 10700 Mismatch between loader version number and Operating System version number
- 10701 OS exhausted its internal space during startup
- 10702 Cannot make system process
- 10703 Cannot kill pseudo-outer process
- 10704 Cannot create driver
- 10706 Cannot initialize floppy disk driver
- 10707 Cannot initialize the File System volume
- 10708 Hard disk mount table unreadable
- 10709 Cannot map screen data
- 10710 Too many slot-based devices
- 10724 The boot tracks do not know the right File System version
- 10725 Either damaged File System or damaged contents
- 10726 Boot device read failed
- 10727 The OS will not fit into the available memory
- 10728 SYSTEM.OS is missing
- 10729 SYSTEM.CONFIG is corrupt
- 10730 SYSTEM.OS is corrupt



10731 SYSTEM.DEBUG or SYSTEM.DEBUG2 is corrupt
10732 SYSTEM.LLD is corrupt
10733 Loader range error
10734 Wrong driver is found. For instance, storing a
diskette loader on a ProFile
10735 SYSTEM.LLD is missing
10736 SYSTEM.UNPACK is missing
10737 Unpack of SYSTEM.OS with SYSTEM.UNPACK failed
11176 Found a pending write request for a pipe while in
Close_Object when it is called by the last writer of
the pipe
11177 Found a pending read request for a pipe while in
Close_Object when it is called by the (only possible)
reader of the pipe
11178 Found a pending read request for a pipe while in
Read_Data from the pipe
11180 Found a pending write request for a pipe while in
Write_Data to the pipe
118xx Error_xx from diskette ROM (See OS errors 18xx)
11901 Call to Getspace or Relspace with a bad parameter, or
free pool is bad



LISA/MACINTOSH XL UPGRADE AND RETROFIT

TABLE OF CONTENTS

Section 1: Lisa 2/5 Inventory Upgrade Instructions

Section 2: Lisa to Lisa 2 Upgrade

Section 3: Lisa to Lisa 2/10 Upgrade

Section 4: Macintosh XL Screen Modification Kit



Lisa 2/5 Inventory Upgrade Instructions

CPU

- 1) Order and receive A6P1001 Lisa 2/5 upgrade kit.
- 2) Open mainframe package and upgrade the hardware, using the directions in the service procedures binder, or the directions in the upgrade kit.
- 3) Take out either 1/2 megabyte memory board. Sell it separately as part number A6B0204.
- 4) Repackage the Lisa, clearly labelling the package "Lisa 2". It is now equivalent to part number A6S0304 - Lisa 2.

Accessory Kit

- 5) Open the Lisa accessory kit.
- 6) Open the plastic bag from the accessory kit.
 - Discard the gray sheet entitled "Setup Procedures".
 - Discard the packing list.
 - Pull out the shrink-wrapped blank binder and set it aside.
 - Pull out the shrink-wrapped Owner's Guide.
 - Open the Owner's Guide.
 - Pull out the 5 1/4" Office System diskettes and set them aside.
 - Take out the pages and throw them away.
 - Insert the new Lisa 2 Owner's Guide pages from the upgrade kit.
 - Insert the new Lisa 2 Owner's Guide errata sheets from the upgrade kit.
 - Put the Owner's Guide back in the binder box.
 - Return the Owner's Guide in binder box to the accessory kit.
 - Reclose the accessory kit. Label the Lisa 2 accessory kit A6M0009.

Office System

- 7) Take the four plastic sleeves from the upgrade kit, containing:
 - Office System 1 & 2
 - Office System 3 & 4
 - LisaGuide
 - two blank diskettes.



Put them in the blank binder that you removed from the accessory kit and return the binder into its binder box. This is now the finished good part A6D0270, Lisa Office System.

Applications

- 8) For each application package that you have in stock:
 - Find the diskette in plastic sleeve and errata sheet for that application.
 - Attach them to the appropriate Lisa application package.
 - Open the shrink wrap.
 - Remove the sleeve.
 - Take the binder out of the box.
 - Pull out the 5 1/4" diskette for return to Apple.
 - Insert the plastic holder with micro diskette in the front of the manual.
 - Remove errata sheets presently in the manual.
 - Insert the errata sheets from the upgrade kit.
 - Return the manual to the manual box.
 - Replace the plastic sleeve.
 - Label the package with the appropriate Lisa 2 part number.
 - Sell as Lisa 2 finished goods.



Lisa to Lisa 2 Upgrade

Upgrading a Lisa 1.0 to a Lisa 2 requires three major steps:

1. Save Lisa 1.0 diskette information onto the ProFile.
 - a. If you choose to save the customer's diskette files, have the customer bring in the ProFile along with the Lisa 1.0. Refer to Appendix 1 (page 3) of the Customer Instructions that came with Upgrade Kit.
 - b. Be sure that the customer has obtained updates to the language products (Basic +, Pascal, COBOL,) that he previously owned.

NOTE: The Language product updates can be obtained by sending the master diskettes (with a return address) to:

Apple/Logo
1531 Almaden Rd.
San Jose, Ca. 95125

2. Perform the Lisa 2 hardware installation (procedures provided on the following pages).
3. Transfer data files previously saved on the ProFile to microdiskettes.
 - a. Make sure that the customer purchases enough microdiskettes to carry all of the data files previously saved on the ProFile. This would be a maximum of eight for each ProFile; two are included with the Upgrade Kit.
 - b. If you choose to reload the customer's data files onto the microdiskettes, then refer to page 2, step B, of the Customer Instructions that came with the Upgrade Kit.



The hardware procedures for upgrading a Lisa 1.0 to a Lisa 2 are listed on the table below. Follow the procedures in the order in which they are listed in the first column of the conversion table. The second column of the table tells you which section of the Lisa 2 Technical Procedures contains the specific instructions for the procedure. The third and fourth columns list the page numbers and specific steps to follow to complete the procedures necessary for the upgrade.

Lisa to Lisa 2 Conversion Table

PROCEDURE	SECTION /TITLE	PAGE	STEPS
1. Power Down and Remove AC Cord			
2. Remove Rear Panel	1-Take Apart Removing Rear Panel	13	1 & 2
3. Remove Card Cage	1-Take Apart Removing Cage Cage	19	2 & 3
4. Remove I/O and CPU Boards	1-Take Apart Removing Boards	19	3 - 5
5. Remove Old ROMs and Install New ROMs in CPU Board	Go To Page 3 Attached		
6. Remove Old Controller ROM and Install New ROM in I/O Board	Go To Page 4 Attached		
7. Clip Both Leads from R 47 and R41 on I/O Board			
8. Reinstall CPU and I/O Boards	1-Take Apart Installing Boards	20	5 - 4
9. Replace Card Cage and Rear Panel	1-Take Apart Replacing Card Cage	20	1 - 3
10. Remove Front Panel	1-Take Apart Removing Front Panel	3	1 - 4
11. Remove Drive Module	1-Take Apart Removing Drive Module	5	1 - 4
12. Install Lisa 2 Drive Module	Go To Page 5 Attached		
13. Install New Front Panel	1-Take Apart Replacing Front Panel	3	1 - 3

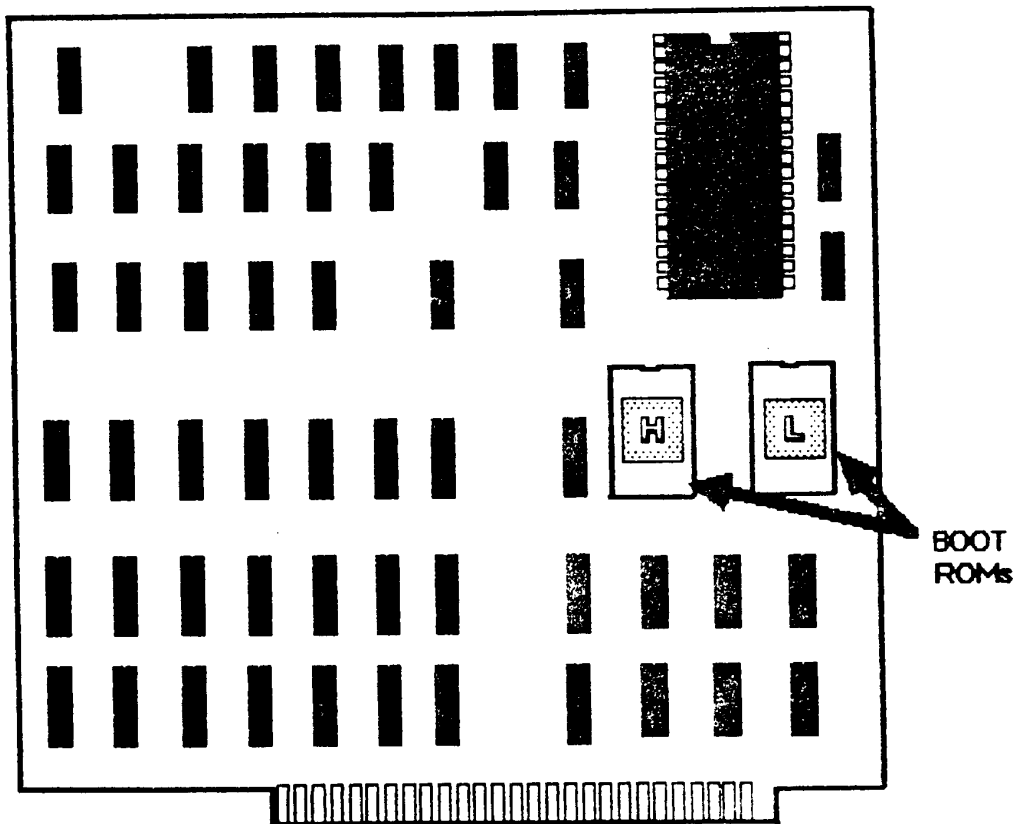


Changing ROMs

1. Follow steps a through c to complete step 5 listed on the conversion table.
 - a. Use an IC puller to remove both boot ROMs from the CPU board. (See Diagram below.)
 - b. Insert the low address ROM (labeled "L") into the 28-pin socket nearest the right edge of the CPU board.
 - c. Insert the high address ROM (labeled "H") into the socket at the left of the low address ROM socket.

CAUTION: Be sure to orient the ROMs so that the notch is facing the same direction as the notches on the surrounding chips.

CPU BOARD





2. Follow steps a through d to complete steps 6 and 7 listed on the conversion table.

a. Use an IC puller to remove the 24-pin controller ROM shown in the diagram below.

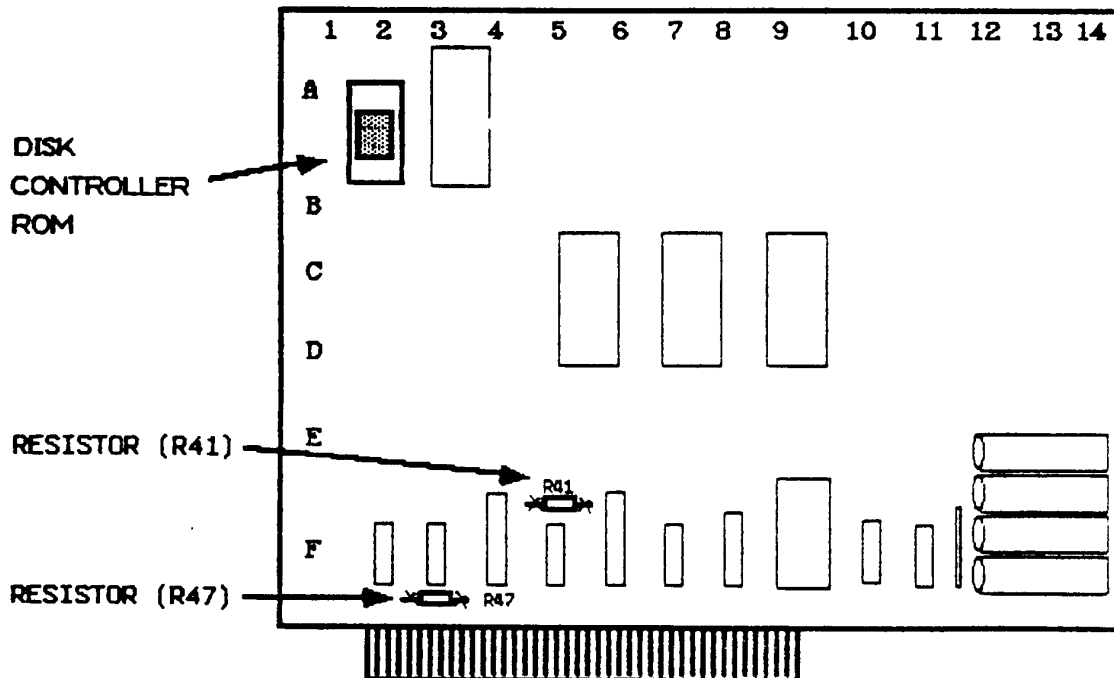
b. Insert the new Lisa 2 controller ROM into the socket from which you removed the old ROM.

CAUTION: Be sure to orient the ROM so that the notch is facing the same direction as the notches on the surrounding I/O board chips.

c. Cut both leads of resistor R47 at location F3 (on the lower left side of the I/O board). (See Diagram below.)

d. Cut both leads of resistor R41 at location F5 on the I/O board. (See Diagram below.)

I/O BOARD

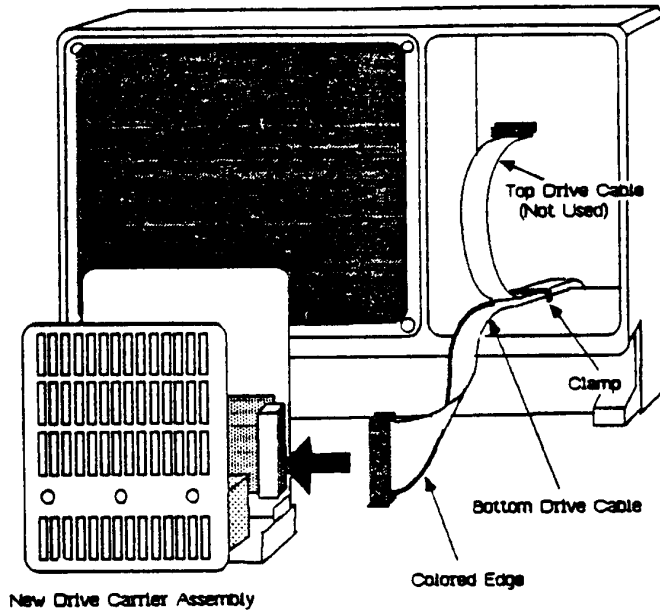




Installing the Micro Disk Drive Module

1. Locate the drive cables that are fastened to the floor of the disk drive chamber by two cable clamps.
2. Roll the top cable half way up and carefully tuck it back into the well of the disk drive chamber.
3. Locate the connector at the rear of the interface card mounted on the inner wall of the Lisa 2 disk drive carrier.
4. Connect the lower ribbon cable to the connector so that the **stripe is facing downward**. (See Diagram below).

NOTE: The stripe should be at the left hand side of the ribbon cable. If there is no stripe on the cable, then connect the lower ribbon cable so that the left side of the connector is facing downward. (See Diagram below).



CAUTION: Connecting the lower ribbon cable backward could cause damage to the micro disk drive.

5. Slide the disk drive module all the way into its compartment.
6. Secure the module by pushing in on the thumbscrew at the base of the carrier and turning it clockwise until it is snug.



LISA TO LISA 2/10 UPGRADE

SAVING FLOPPY DISK FILES

If you are upgrading a Lisa 1.0, save your floppy disk data on the ProFile, so that your files can be transferred onto 3.5" micro diskettes. Follow the procedures below if you do not know how to do this.

If you are upgrading a Lisa 2.0, or 2.5, go to Page 3, **Lisa 2/10 Hardware Installation**.

Note for Programmers: The language product versions that ran with the old Office System (version 1.0) will NOT run with the new Office System (version 3.0). So, before upgrading your Lisa, you should make sure that you have received the update to the Pascal Workshop.

1. Connect the ProFile to the Lisa 1.0.
2. Turn on the ProFile and wait until the ready light is stable.
3. Turn on the Lisa and insert a diskette containing files to be saved.
4. When the diskette icon appears on the screen, use the mouse to pull down the "File/Print" menu at the upper left corner of the screen. Select "Open" to display the contents of the diskette.
5. If you want to save all the files on the diskette, use the mouse to pull down the "EDIT" window and select "Select All Icons". Go to Step 6.

If you wish to save only certain files on the diskette, hold down the "SHIFT" key while you use the mouse to select all the icons representing the files you wish to save. (Be sure not to miss icons that may not be visible in the window.)

6. Use the mouse to pull down the "File/Print" menu and select "Duplicate".
7. Move the pointer to one of the flashing icons. Hold down the mouse button while you move the pointer to the ProFile, and release the button. All selected files will automatically be copied, one at a time, onto the ProFile.
8. Repeat Steps 3 through 7 above for all of your diskettes.



10. Turn off the Lisa and remove the diskette(s).

CAUTION: DO NOT TURN OFF THE PROFILE UNTIL THE "LISA" ON/OFF BUTTON LIGHT IS OUT!

11. Turn off the ProFile and any other peripheral devices.

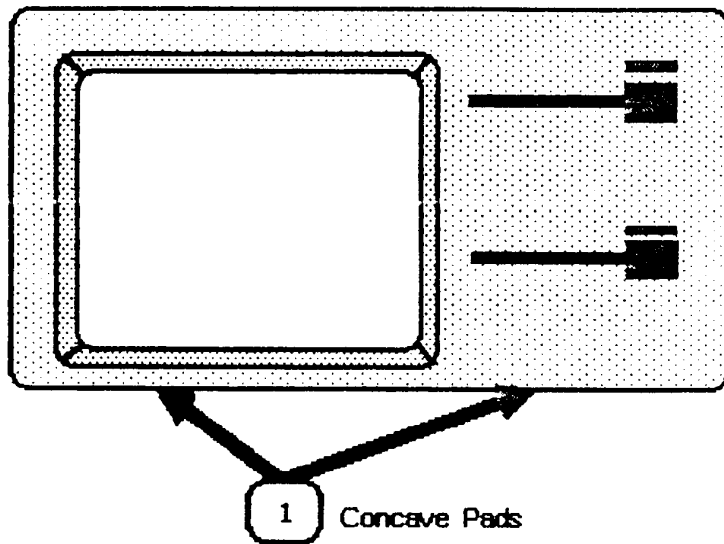


FIGURE 1

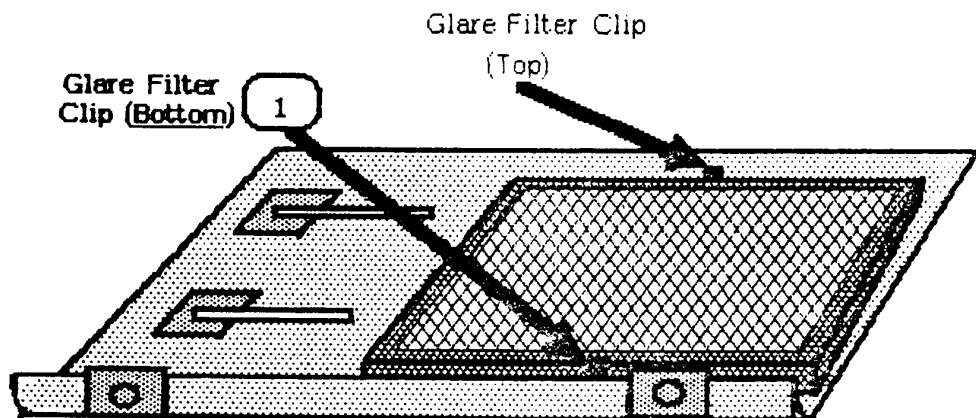


FIGURE 2



LISA 2/10 HARDWARE INSTALLATION

The **Keyboard, Mouse, AC Cord, Glare Filter, CPU Board, Memory Boards, and Expansion Cards** must be removed from the Lisa 1.0 or 2.0. After all these modules have been removed, they must be installed inside the Lisa 2/10.

NOTE: YOU MUST HAVE A PARALLEL EXPANSION CARD IN ORDER TO RECONNECT THE PROFILE TO THE LISA 2/10.

Remove the Front Panel from the Lisa 1.0 (2.0)

1. Turn the Lisa off.
2. Disconnect the Lisa 1.0 (2.0) and all peripherals from the wall outlet.

CAUTION: ALWAYS GRASP THE HOUSING (THE PART THAT PLUGS INTO THE CONNECTING SOCKET) OF A CABLE CONNECTOR WHEN DISCONNECTING OR CONNECTING IT. NEVER PULL ON THE CABLE ITSELF.

3. Disconnect the AC cord and all peripheral connectors, including the mouse and keyboard, from the Lisa.
4. Place one finger on each of the two concave pads beneath the front panel (see Figure 1, #1).
5. Push the pads up and pull the bottom of the panel forward and down.

Removing the Glare Filter

1. Set the front panel on a flat surface, face down.
2. Push the frame of the glare filter out from under the metal clip (see Figure 2, #1) located at the bottom center of the front panel.
3. Grasp the frame by the lower edge, and lift the lower edge up until the top edge pops out.

Replacing the Front Panel

1. Hold the panel with one finger on each concave pad along the bottom edge.
2. Insert the upper edge of the panel behind the lip of the top housing on the Lisa.
3. Pressing the concave pads up, push the bottom edge of the panel against the Lisa until the panel snaps into place.

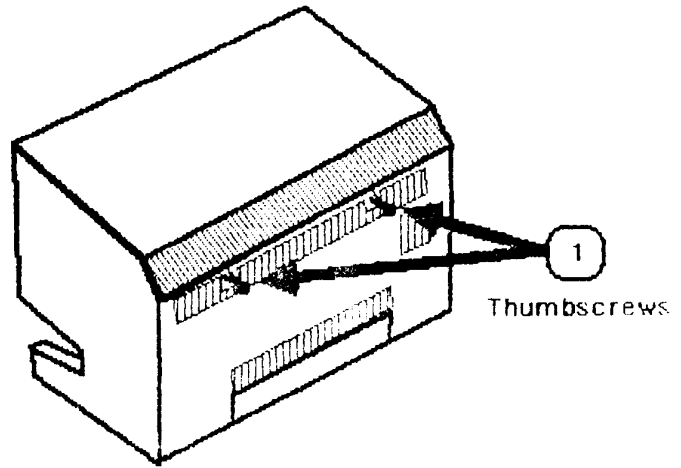


FIGURE 3

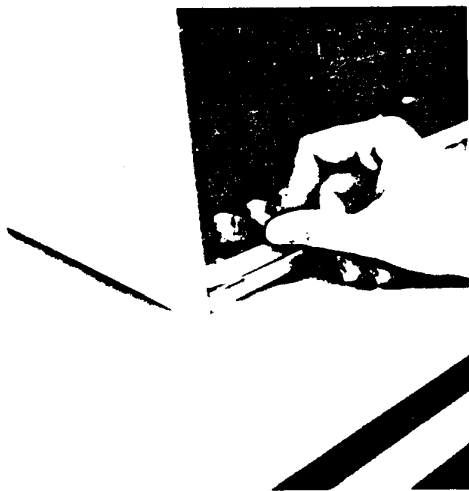


FIGURE 4

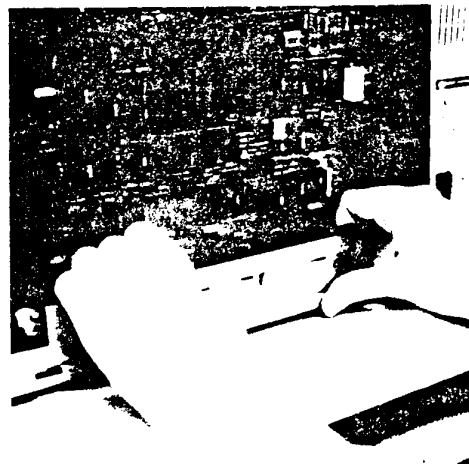


FIGURE 5



apple computer

Removing the Rear Panel

1. Turn the back of the Lisa toward you.
2. Turn the two thumbscrews (see Figure 3, #1) along the upper edge of the rear panel counterclockwise until they won't turn any further.

These screws loosen but do not come free from the rear panel.

3. Tilt the panel slightly toward you and lift it away from the Lisa.

Removing Expansion Cards

Follow the procedures below to remove each expansion card from the Lisa.

1. Pull out the metal lever extending from the plastic cap at the bottom of the card. (See Figure 4.)
2. Turn the lever clockwise 90 degrees, to the 3 o'clock position. If you encounter too much resistance while turning the lever, use a pair of pliers.
3. Holding the card by the edge, pull it straight out of the slot.
4. Turn the lever counterclockwise 90 degrees, back to the 12 o'clock position.
5. Push the lever back into the plastic cap.

Removing the Card Cage

1. Brace your thumbs against the lower edge of the Lisa and pull hard on the bar that runs just above the row of connectors along the bottom edge of the card cage. (See Figure 5.)

CAUTION: BE CAREFUL NOT TO PUT ANY PRESSURE ON THE SMALL COMPONENTS JUST BEHIND THE BAR.

2. Pull the cage straight out.



Removing the CPU and Memory Boards

1. Orient the card cage so that the expansion slots are at the left, as shown in Figure 6.
2. Identify the CPU board and the two memory boards.
 - a) The CPU board has a brown lever on the right and a BLUE lever on the left. (See Figure 6, #1.)
 - b) The memory boards have brown levers on the right and YELLOW levers on the left. (See Figure 6, #2.)

CAUTION: TOUCH THE METAL CHASSIS IN THE BACK OF THE LISA BEFORE HANDLING ANY BOARDS OR CHIPS. THIS IS TO PREVENT CHIP DAMAGE FROM STATIC ELECTRICITY THAT YOU MAY BE CARRYING.

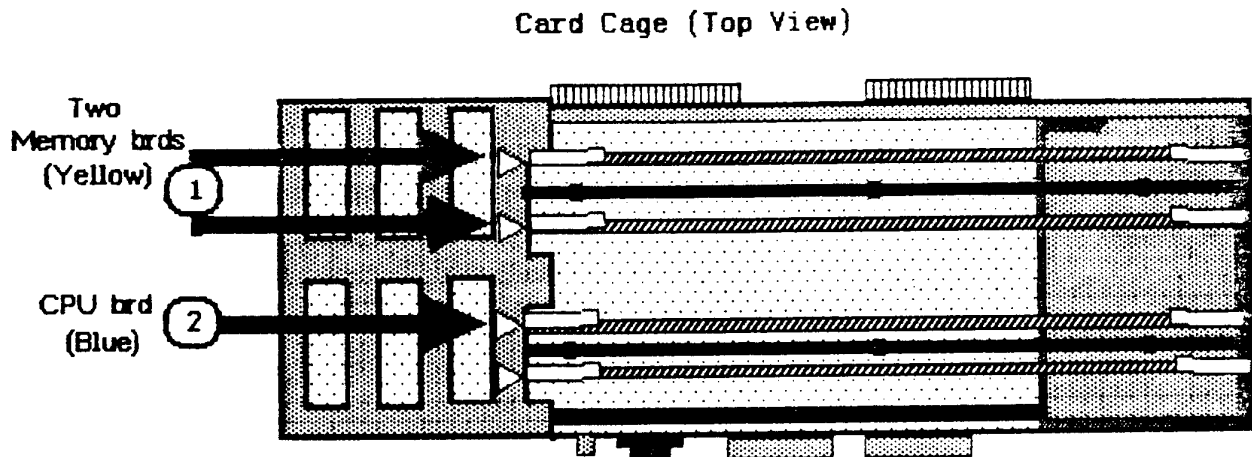


FIGURE 6

3. Place one thumb on either lever and simultaneously flip up the colored locking levers at the top of the CPU board.
4. Pull the board straight up, and remove it from the card cage.
5. Remove both memory boards the same way.
6. Slide the card cage (minus the CPU and memory boards) back into the Lisa.

The cage will offer some resistance for the last 1/4 inch, while the cage connectors slide into their slots inside the Lisa. You might have to hold the frame with your fingers and press with your thumbs against the bottom of the cage.



7. Follow Steps a through d to replace the rear panel.
 - a) Make sure that the metal prongs attached to the two thumbscrews are pointed to the left.
 - b) Insert the tabs along the lower edge of the back panel into the slots at the base of the Lisa.
 - c) Push the panel flat against the back of the Lisa.
 - d) Turn the two thumbscrews clockwise until they are snug.

IMPORTANT: PEEL THE SERIAL NUMBER LABEL OFF THE LISA 1.0 (2.0) AND ATTACH IT TO THE 2/10 UNIT. IF ANYTHING SHOULD HAPPEN TO THE MACHINE ROM ON THE CPU BOARD, THIS SERIAL NUMBER WILL ENABLE APPLE TO REPALCE IT.

Installing Modules In the Lisa 2/10

Now that you have removed the necessary modules from the Lisa 1.0 (2.0), you can begin installing those modules inside the Lisa 2/10.

1. Remove the plastic pouch containing two ROMs that is taped to the top of the Lisa 2/10.
2. Remove the anti-static foam caps from both sides of the Lisa 2/10.
3. Place the anti-static foam caps on both sides of the Lisa 1.0 (2.0).

Do not pack the Lisa 1.0 (2.0) inside the box yet.



Installing the Glare Filter

1. Remove the front panel from the Lisa 2/10. Set the panel on a flat surface, face down. Refer to the procedure (Removing the Front Panel) on page 3 of this manual if you need to.
2. Center the glare filter over the opening inside the front panel, with the raised side of the frame facing you.

Hold the glare filter against the clip (see Figure 7, #1) along the upper edge of the front panel, at a 45 degree angle.

3. While pressing down on the frame (panel) at the upper clip, rotate the lower edge until the frame slides up under the upper clip (see Figure 7).

Continue rotating the glare filter downward until it lies flat against the panel.

4. Push the lower edge of the glare filter in until it clears the lower clip, and let it slide into place under the clip.
5. Replace the front panel. Refer to the procedure (Replacing the Front Panel) on page 3 of this manual if you need to.

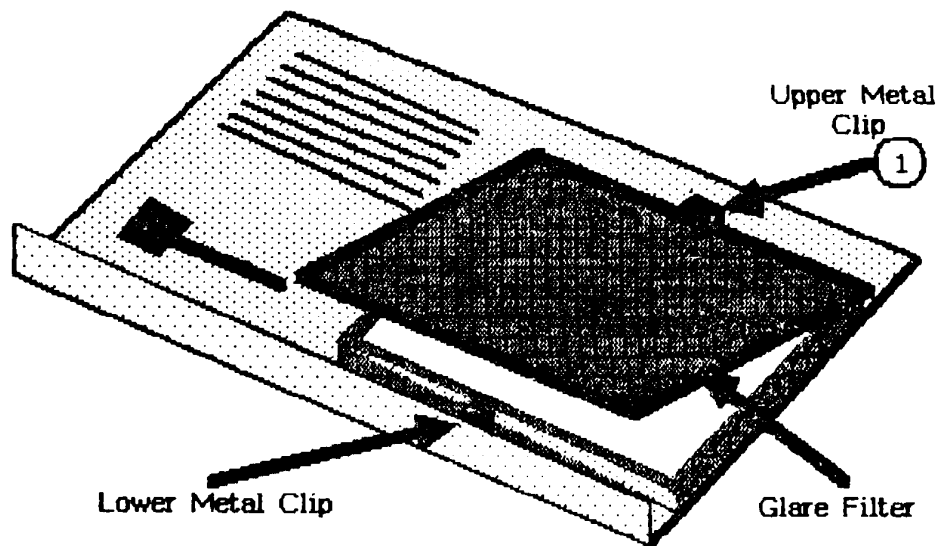


FIGURE 7

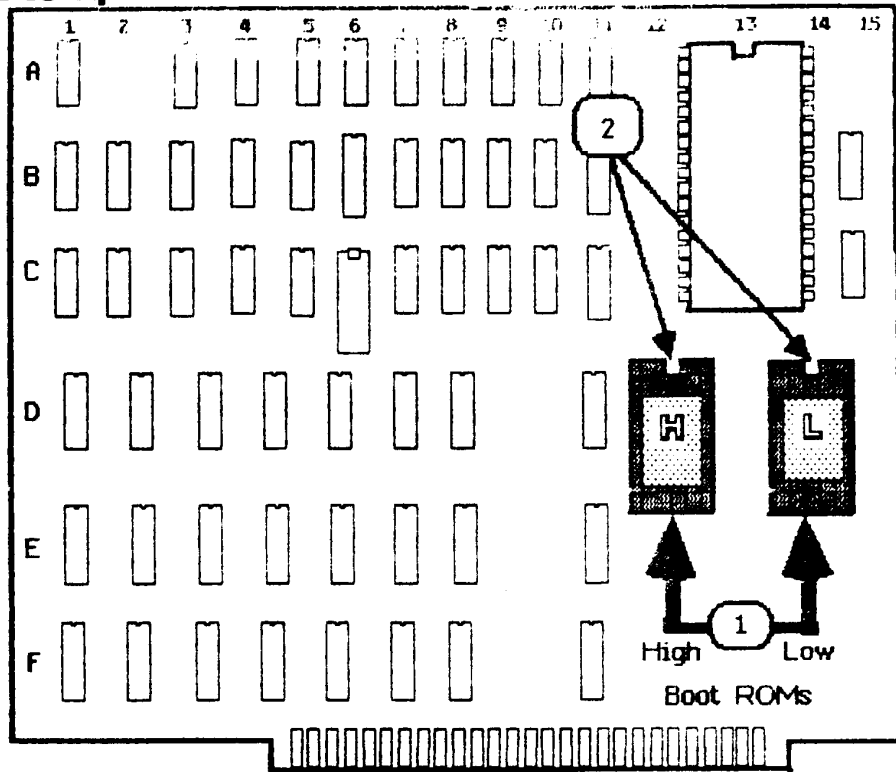


FIGURE 8

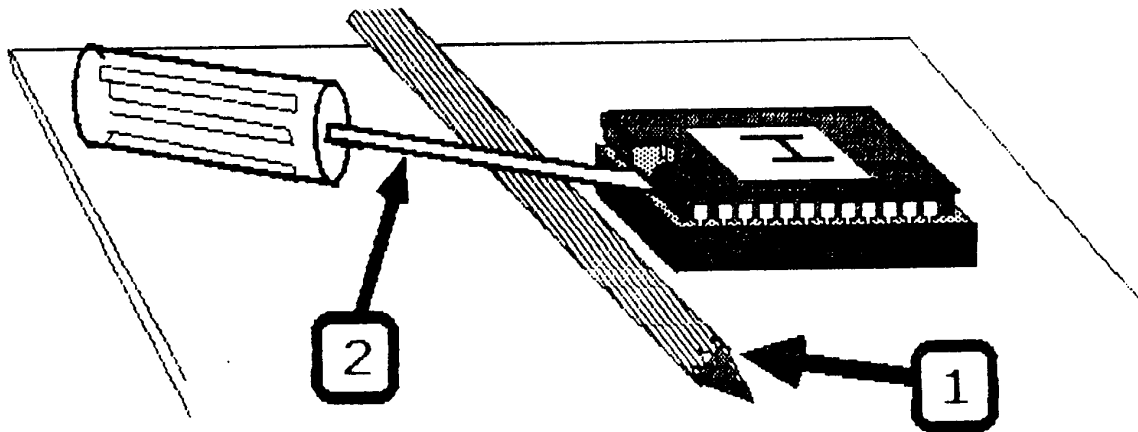


FIGURE 9



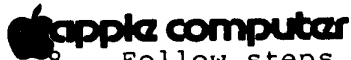
Preparing the CPU Board for the Lisa 2/10

You must replace two ROMs (chips) on the CPU board before it can work inside the Lisa 2/10.

1. Locate the Boot ROMs on the CPU board (see Figure 8, #1).
2. Follow steps a through d to remove each of the two Boot ROMs.
 - a) Lay a pencil across the CPU board directly in front the ROM (see Figure 9, #1).
 - b) Lay a small to medium flatblade screwdriver over the pencil, and between the ROM and its socket (see Figure 9, #2).
 - c) Using the pencil as a fulcrum, **gently** pry at one end, and then the other, until the ROM is loose enough to lift out of its socket.

CAUTION: DO NOT ATTEMPT TO PRY THE ROM COMPLETELY OUT OF ITS SOCKET. YOU MAY DAMAGE THE CONNECTING PINS.

- d) Lift the ROM out of its socket and set it aside.
3. Remove the new Boot ROMs from the plastic pouch and pull them off of the foam pad.
4. Place the old Boot ROMs on the foam pad and push them in.
5. Place the foam pad, with the old Boot ROMs on it, back inside the plastic pouch.
6. Tape the plastic pouch to the top of the Lisa 1.0 (2.0) (between the foam side caps).
7. Pack the Lisa 1.0 (2.0) inside the box from which the Lisa 2/10 was removed. Do not close the box yet.



8. Follow steps a through d to install the two Boot ROMs on the CPU board.

- a) Orient the chip so that the notch (see Figure 8, #2) is facing the same direction as the notches on the surrounding chips.

NOTE: The Low address ROM (labeled "L") goes into the socket nearest the right edge of the board. The high address ROM (labeled "H") goes into the socket located to the left of the low address ROM.

- b) With the chip at an angle, line the row of pins up with one side of the socket (see Figure 10, below).

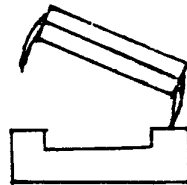
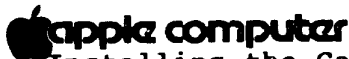


FIGURE 10

- c) Press down **gently**, but with enough force to bend the row of pins slightly, so that the other row of pins lines up with the other side of the socket.
 - d) Press down firmly on the chip to make sure that it is securely seated.
5. Check closely to make sure that all the chip's pins are in the socket, and that none of the pins are bent under.



Installing the Cage Boards in the Lisa 2/10

1. Remove the rear panel from the Lisa 2/10 and set it aside. Refer to the procedure (Removing the Rear Panel) on page 5 of this manual if you need to.
2. Remove the card cage. Refer to the procedure (Removing the Card Cage) on page 5 of this manual if you need to.
3. Identify the CPU and memory board slots into which the boards will be inserted.

All boards are installed with the brown locking lever on the right. The colored arrow on the card cage matches the color of the left tab on the board that goes in each slot.

CAUTION: Handle the boards by the levers and plastic edges only.

4. If the colored levers on the board are not already in the up position, flip them up.
5. With the brown lever on the right, slide the board into the thin grooves in the card cage.

You may have to center the bottom edge of the board in the slot. If so, touch only the plastic edge of the board. Do not touch the gold connector.

The tabs on the CPU board should be resting in the notches along the top of the cage.

The tabs on the memory boards should be resting on the black plastic frame.

6. Push down on the levers simultaneously to lock the board into place.

If this requires excessive force, check to see that the gold connector along the bottom of the board is aligned over the slot.

At this point, the lower part (rounded end) of the levers should be set in the lower notches on the plastic card cage.

7. Slide the card cage back into the Lisa. The cage may offer some resistance for the last 1/4 inch, while the cage connectors slide into their slots inside the Lisa. You might have to hold the frame with your fingers and press with your thumbs against the bottom of the cage.



Installing Expansion Cards in the Lisa 2/10

NOTE: YOU MUST INSTALL A PARALLEL EXPANSION CARD IN ORDER TO CONNECT THE PROFILE TO THE LISA 2/10.

1. Pull out the metal lever extending from the plastic cap at the bottom of the card slot. Refer to Figure 4 on page 4 of this manual if you need to.
2. Turn the lever clockwise 90 degrees, to the 3 o'clock position.
3. Hold the expansion card by the metal edge, with the green plastic facing right and the white cover facing left. Insert the bottom of the card into the connector slot and the top of the card into the plastic slot at the top of the cage. Slide the card into the cage as far as it will go.
4. Turn the metal lever counterclockwise 90 degrees, back to the 12 o'clock position. If you encounter too much resistance while turning the lever, use a pair of pliers.
5. Push the lever back into the plastic cap.

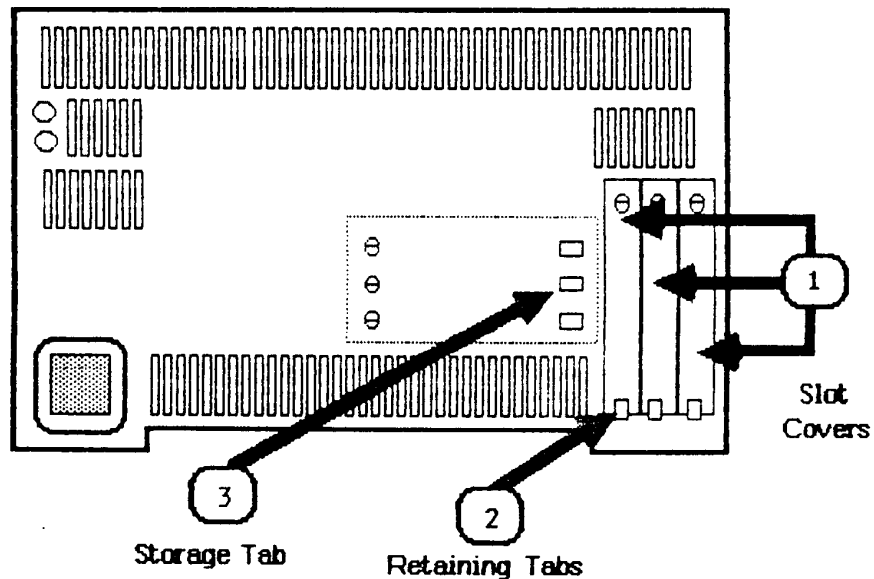


FIGURE 11



6. The slot covers (see Figure 11, #1) on the inside of Lisa's back panel block the electromagnetic emissions from inside the Lisa. If you have just installed any expansion cards, follow steps a through d to remove the cover that protects that slot.
 - a) On the inside of the rear panel, locate the slot cover for the card(s) you have just installed.
 - b) Remove the screw at the top of the slot cover.
 - c) Pull the slot cover out from behind the retaining tab (see Figure 11, #2).
 - d) Slide the slot cover behind the storage tab (see Figure 11, #3) and, using the screw previously removed, secure the other end of the slot cover.
7. Replace the rear panel. Refer to Step 6 on Page 7 of this manual if you need to.
8. Connect the AC cord in the back of the Lisa 2/10 and plug it into the wall outlet.
9. Connect the ProFile to the Lisa 2/10 and plug it into the wall outlet.
10. Connect the keyboard, mouse, and any other peripherals to the Lisa 2/10.
11. Remove the Office System manual, and the Office System diskettes from the smaller box. Follow the Office System Installation procedures to install your new Office System onto the Lisa 2/10 internal hard disk.

When you finish installing all of the 3.0 software applications, place the old 1.0 or 2.0 Office System diskettes in the box with the Lisa 1.0 (2.0). Close the box, and return it to the Apple Support Center.



Lisa/Macintosh XL Upgrade and Retrofit

Section 4

Macintosh XL Screen Modification Kit

Contents:

Installing the Screen Kit
 Replacing the ROMs.....4.3
 Installing the Transformer.....4.5
 Video Adjustments.....4.7
Hard Disk Install.....4.9
Current Repair Strategy.....4.13

CAUTION: THE USER WILL NO LONGER BE ABLE TO USE ANY LISA® SOFTWARE UPON COMPLETION OF THIS INSTALLATION!



CPU BOARD

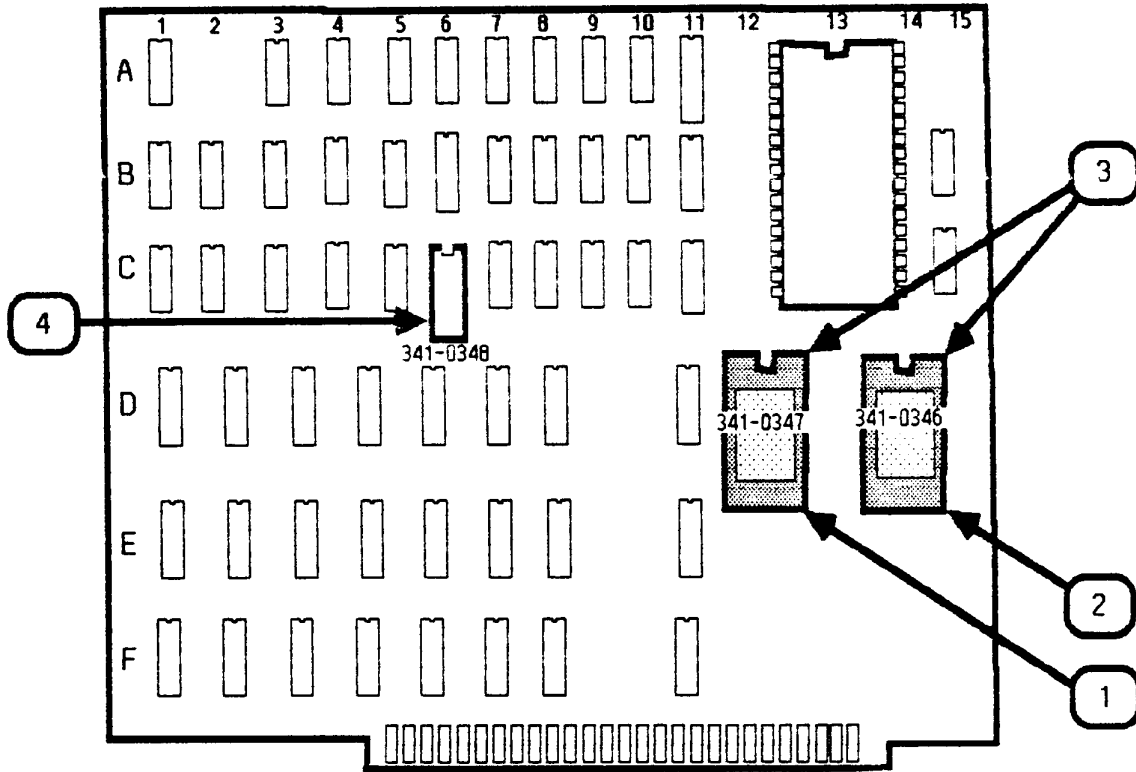


FIGURE 1



INSTALLING THE SCREEN KIT

Replacing the ROMs

1. Turn to Section 1 - "Take-Apart" of the Lisa 2 Technical Procedures.

2. Follow the procedures listed under:

a) "Removing the Front Panel"

b) "Removing Rear Panel"

c) "Removing the Card Cage"

IMPORTANT: Do step d, below, to remove only the CPU board (identified by the blue and brown levers).

d) "Removing Boards" (from the card cage)

3. Follow steps a through e to replace the two boot ROMs and the video state machine ROM.

a) Use an IC puller to remove the two boot ROMs (Figure 1, #1 & 2) from the CPU board.

CAUTION: When installing ROMs be sure to orient them so that the notches (Figure 1, #3) are facing the same direction as the notches on the surrounding chips.

b) Remove the new 28-pin ROM (P/N 341-0347) from the anti-static bag and carefully insert it into the socket at location 13-D (Figure 1, #1).

c) Remove the new 28-pin ROM (P/N 341-0346) from the anti-static bag and insert it into the socket at location 14-D (Figure 1, #2).

d) Use an IC puller to remove the 20-pin video state machine ROM at location 6-C (Figure 1, #4).

e) Remove the new video state machine ROM (P/N 341-0348) from the anti-static bag and insert it into the socket at location 6-C (Figure 1, #4).

4. Replace the CPU board by following the steps listed under "Installing Boards" in the Lisa 2 Technical Procedures binder. Do not replace the card cage.

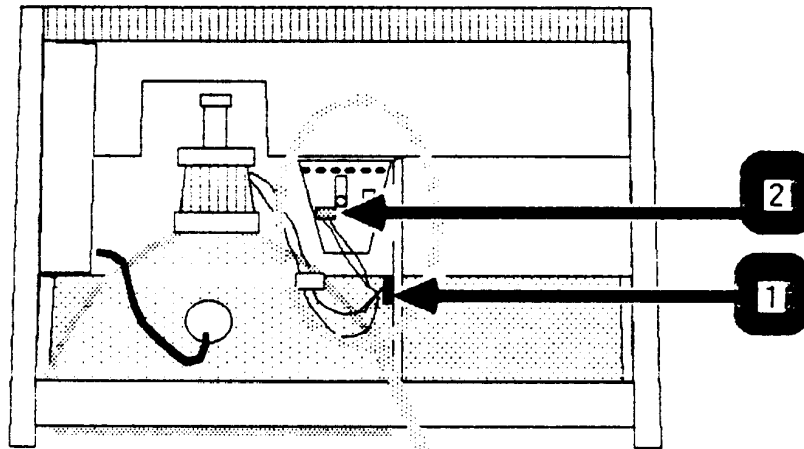


FIGURE 2

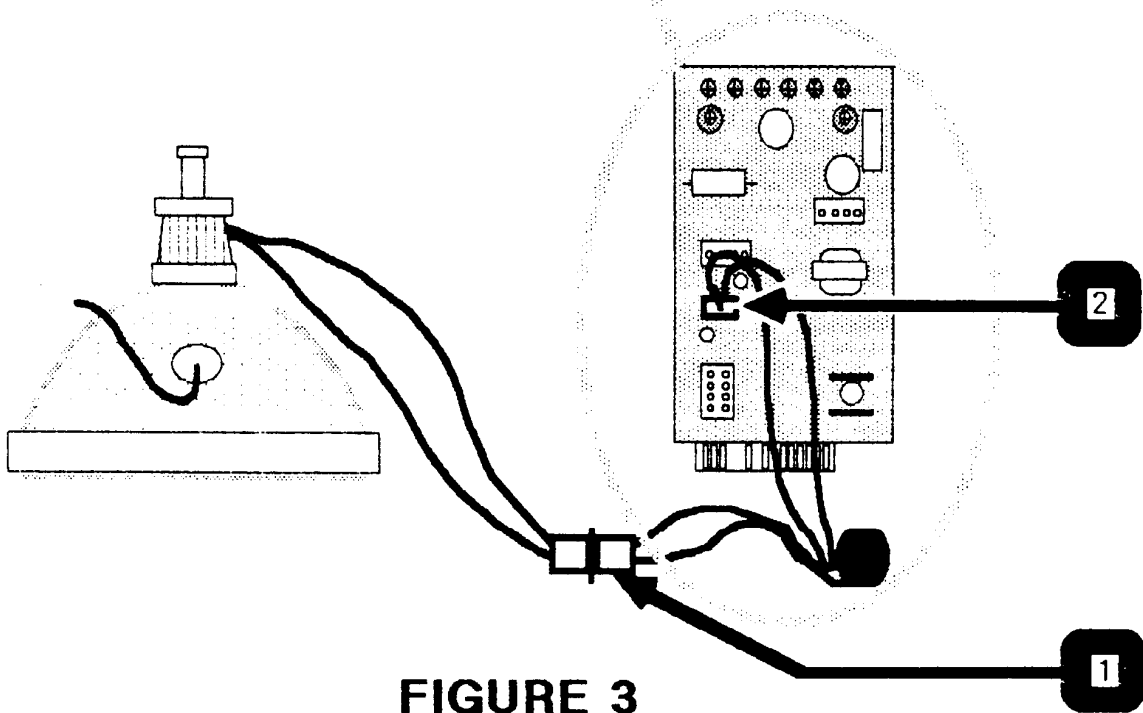


FIGURE 3



Installing the Transformer

1. Turn to the Section 3 "Video Take-apart" of the Lisa 2 Technical Procedures.
2. Carefully read through the "Safety Precautions".
3. Follow the steps listed under "Discharging the CRT".
4. Clean the section of the video chamber wall where the transformer (Figure 2, #1) will be attached. This is the section adjacent to the disk drive chamber.
5. Disconnect the yoke connector (green and yellow wire) from P2 (Figure 3, #2) on the video board.
6. Connect the yoke (green and yellow) connector to the male socket attached to the transformer. (See Figure 3, #1.) There is only one way it will fit.
7. Connect the female transformer connector to P2 (Figure 3, #2) on the video board.
8. Peel the protective paper off the adhesive tape at the bottom of the transformer.
9. Press the bottom of the transformer firmly to the side (cleaned section) of the video chamber wall. (See Figure 2, #1.)

Make sure there is no tension on the transformer cables.

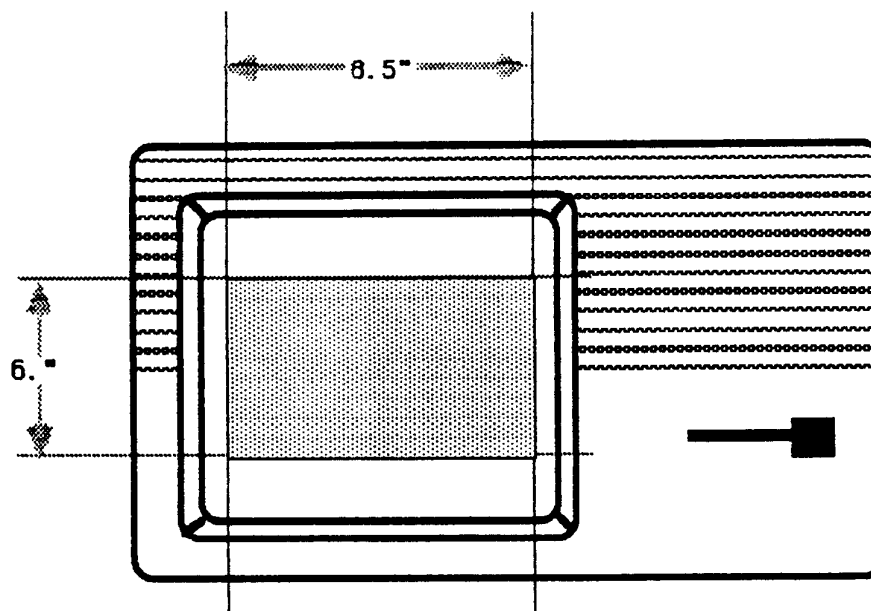


FIGURE 4



1. Clip the anode cap into the CRT.
2. Turn the Lisa so that the back is facing you.
3. Slide the card cage back into the Lisa.

The card cage will offer some resistance for the last 1/4 inch, while the cage connectors slide into their slots inside the Lisa 2. You might have to hold the frame with your fingers and press with your thumbs against the bottom of the cage.

4. Replace the rear panel. See Section 1 of the Lisa 2 Technical Procedures, "Replacing the Rear Panel".
5. Replace the front panel. See Section 1 of the Lisa 2 Technical Procedures, "Replace the Front Panel".

NOTE: Do not replace the top yet. You will need to access the video board to make adjustments.

Video Adjustments

1. Connect the power cord and mouse. Turn on the Macintosh™ XL computer.

THE FINAL ADJUSTMENTS REQUIRE THAT THE RASTER BE APPROXIMATELY 6.0 INCHES IN HEIGHT, AND 8.5 INCHES IN WIDTH.

2. When the raster (screen image) comes into view, use a flexible ruler to measure the width of the raster.
 - a) Adjust the width potentiometer (on the video board) until the picture is approximately 8.5 inches wide. (See Figure 4.)
3. Measure the height of the raster.
 - a) Adjust the height potentiometer until the picture is approximately six inches in height. (See Figure 4.)
4. Check the width and height again. Readjust the potentiometers if necessary.



5. Follow these steps to adjust the horizontal phase:

NOTE: The horizontal phase adjustment must be done when the Macintosh XL is cold. If the system has been on for more than two minutes, turn it off and wait 20 minutes before adjusting the horizontal phase.

- a) Locate the horizontal phase pot on the video board.
- b) Turn the horizontal phase pot fully counterclockwise.
- c) If a white line (band) appears at the right edge of the screen, slowly turn the phase pot clockwise until the white line completely disappears.

Once the white line disappears, do not turn the pot any further clockwise.

6. Center the picture by turning the centering rings (Figure 5, #1) attached to the CRT yoke.

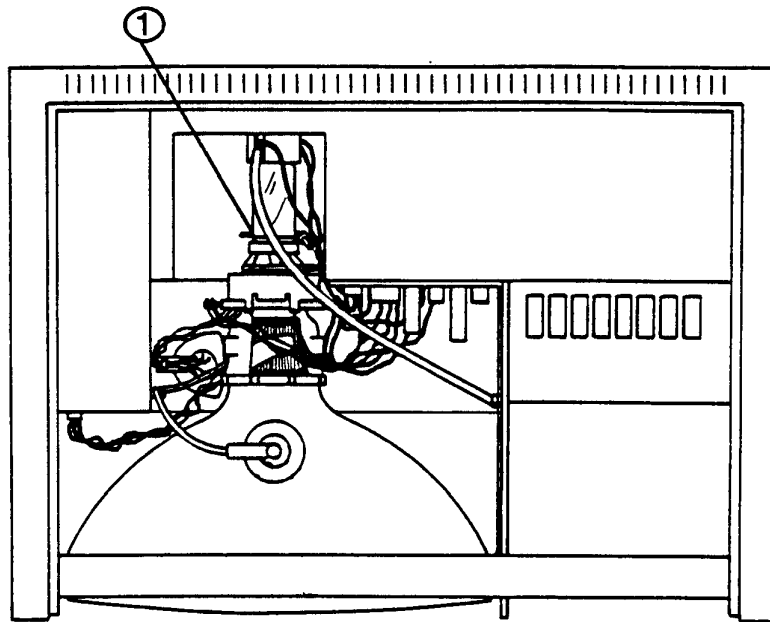


FIGURE 5



HARD DISK INSTALL

MacWorks is the Macintosh environment for the Macintosh XL. The Hard Disk Install application enables you to access the internal hard disk upon turning on the Macintosh XL.

CAUTION: PERFORMING THIS PROCEDURE WILL ERASE ALL DATA ON THE HARD DISK.

1. Remove the two diskettes from the package.
2. Turn off the Macintosh XL.
3. Insert the MacWorks diskette.
4. Power up the Macintosh XL. When you hear the first click (when the four boot ROM icons are on the screen but have not yet all been checked off) hold down the **APPLE** key and press **2** on the alphanumeric keyboard.

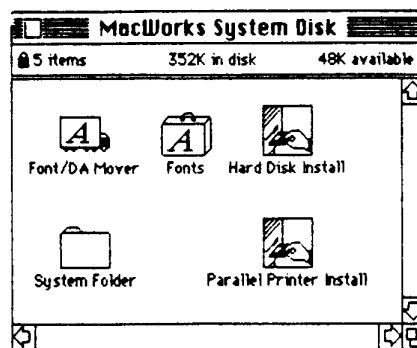
The screen will appear (white, then gray) and the disk drive will eject the MacWorks diskette.

5. Insert the MacWorks System disk into the drive.

A few seconds later, the MacWorks System diskette icon will appear (already selected) at the upper right corner of the screen.

6. Position the pointer over the word **FILE** at the upper left hand corner of the screen. Press mouse button to pull down the file window. Hold the mouse button down as you drag the pointer downward to select **OPEN**.

The MacWorks system diskette icon should open as shown in the diagram below.



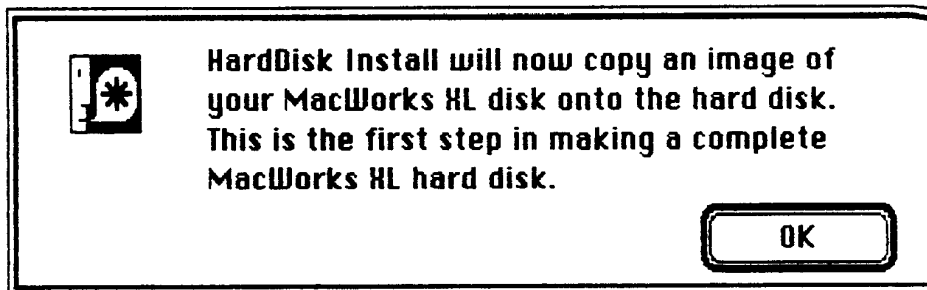


7. Position the pointer over the Hard Disk Install icon and press the mouse button to select it.
8. Pull down the **FILE** menu and select **OPEN**.

If the hard disk contains any Lisa software, a message box will appear, telling you that this is not a Macintosh disk. Select **ERASE** to initialize the hard disk.

If the hard disk already contains the Macintosh environment, a message box will appear telling you that MacWorks has already been installed. Select **UPDATE MACWORKS** so that you will not erase any Macintosh files on the hard disk.

The following message box will appear.



9. Position the pointer over the box marked **OK** and click the mouse button to accept the default.

The system will eject the MacWorks System diskette, then ask you to insert the MacWorks diskette.

10. Insert the MacWorks diskette.

The hard disk will copy the Macintosh environment. You will then be asked to insert the System disk.



11. Insert the MacWorks System Disk.

If MacWorks has previously been installed (you are updating the files), then open the MacWorks System Disk and **GO TO STEP 14**.

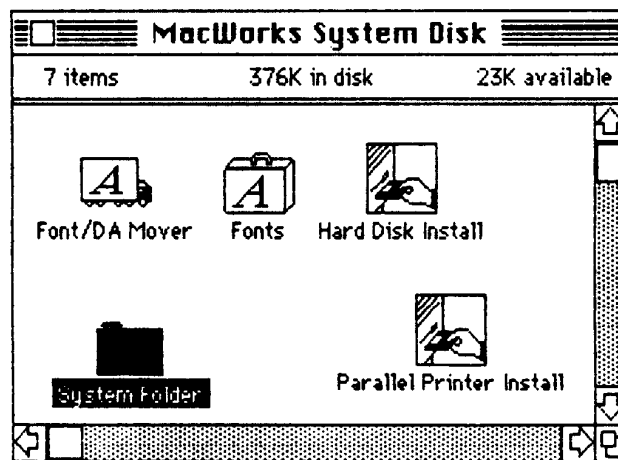
If MacWorks has not previously been installed, an instruction box will appear asking you to name the hard disk.

12. Click the mouse button over the box marked **OK**.

You will see a message telling you that the hard disk installation has been successfully completed, and that you should copy the system folder to the hard disk.

13. Click the mouse button over the box marked **OK**.

The hard disk icon and the MacWorks System Disk should appear on the screen. The system disk will be open as shown in the diagram below.



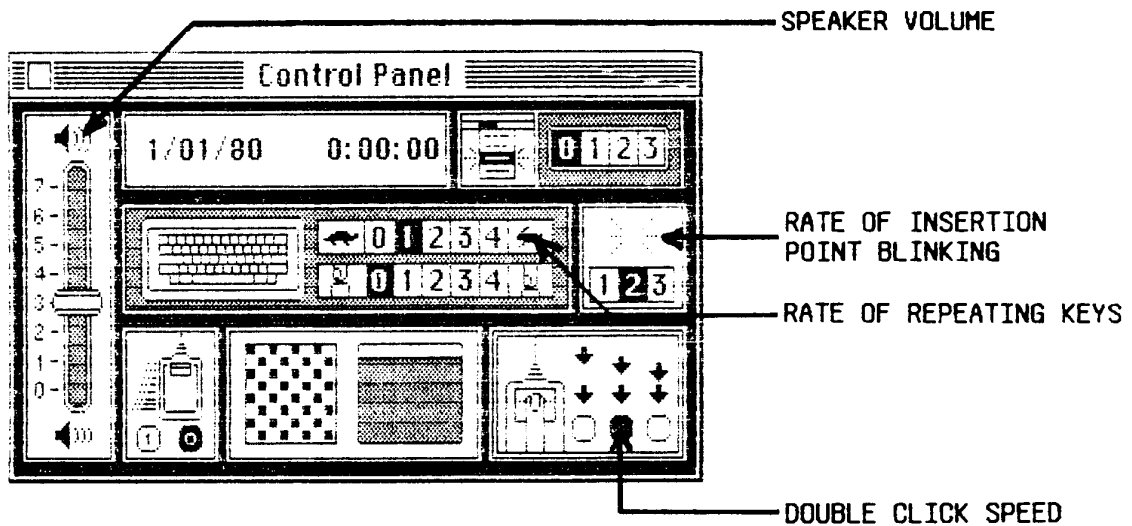
14. Position the pointer over the System Folder icon located inside the MacWorks System Disk window. Hold down the mouse button while you drag the system folder over the hard disk icon. Release the mouse button.

The System Folder will be copied onto the hard disk.



15. Position the pointer over the small Apple icon at the upper left corner of the screen. Press and hold the mouse button as you drag the pointer downward to select **CONTROL PANEL**.

The control panel will appear as shown in the diagram below.



IN THE FOLLOWING STEPS YOU WILL SET PREFERENCES FOR SPEAKER VOLUME, RATE OF INSERTION POINT BLINKING, RATE OF REPEATING KEYS, AND DOUBLE CLICK SPEED. (REFER TO THE CONTROL PANEL DIAGRAM.)

16. Locate the **speaker volume** section of the control panel. Position the pointer over the knob and hold the mouse button down while you drag the knob up to the number 3.
17. Select number 2 inside the **Rate of Insertion Point Blinking** section of the control panel.
18. Select number 1 in the **Rate of Repeating Keys** section.
19. Select the middle box located in the **Double-Click Speed** section.



20. Pull down the **FILE** menu and select **EJECT** to eject the MacWorks System Disk.
21. Turn off the power.
22. When the power lamp (inside the power switch) turns off turn the system back on.

The hard disk will step through its self-diagnostic test. The hard disk icon will appear at the upper right corner of the screen.

23. Place the pair of MacWorks diskettes back inside the holder. Give the diskettes and the MacWorks manual to the customer.

CURRENT REPAIR STRATEGY FOR A MODIFIED MACINTOSH XL

The current Lisa 2/Macintosh XL diagnostic diskette (Lisa/Macintosh XL Test) cannot be used with a modified system. A new diagnostic is available for systems with the Macintosh Screen Kit installed. It is called the Macintosh XL Modified Screen Test. It is functionally identical to LisaTest (described in Section 5 under the Lisa 2 tab in this binder).



LISA/MACINTOSH XL ILLUSTRATED PARTS LISTS

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 I/O Board.....1.15

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 Disk Drive Assembly.....3.13
 Card Cage.....3.15
 CPU Board.....3.17
 I/O Board.....3.19

end 3.22



Lisa 1.0 Technical Procedures

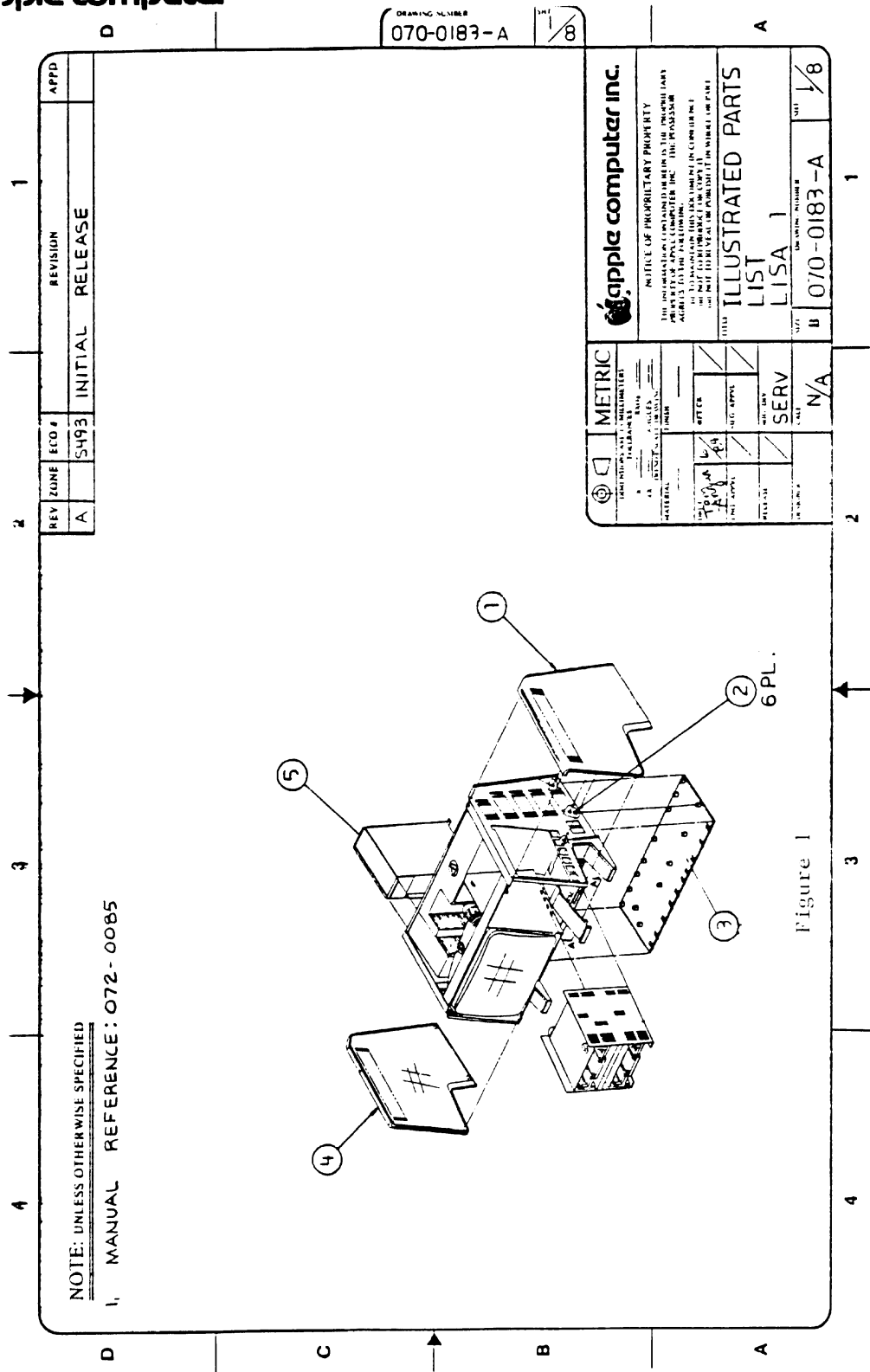
Section 1

Illustrated Parts List

The figures and lists below include all piece parts that can be purchased separately from Apple for the Lisa 1.0, along with their part numbers. These are the only parts available from Apple. Refer to your Apple Service Programs manual for prices.

Contents:

Chassis 3.....	1.1
Top Assembly.....	1.3
Video Assembly.....	1.5
Chassis 1.....	1.7
Disk Drive Assembly.....	1.9
Card Cage.....	1.11
CPU Board.....	1.13
I/O Board.....	1.15



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Figure 1



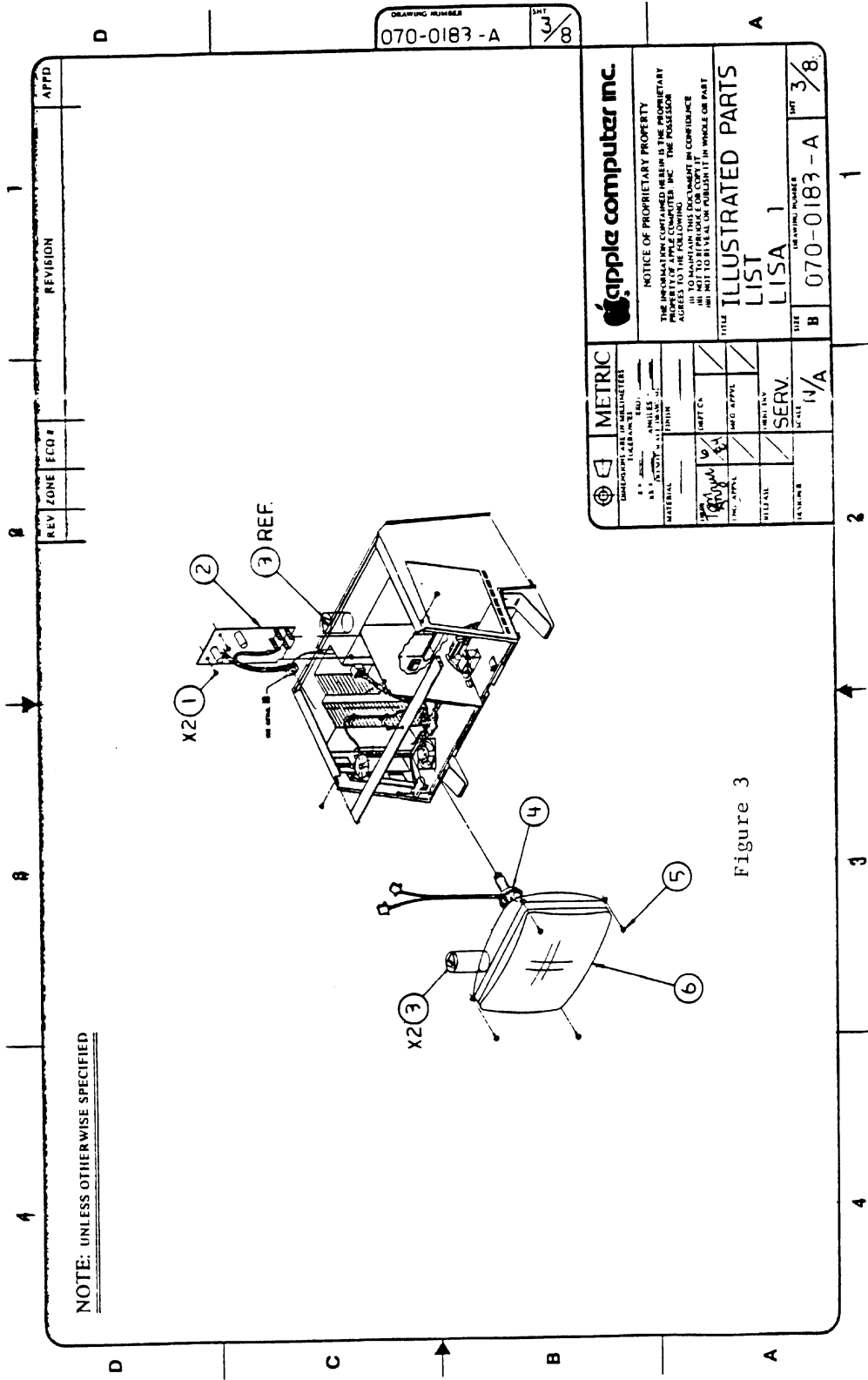
LISA 1.0 CHASSIS 3 (Figure 1)

Item	Part No.	Description
1	815-4073	Right Side Plastic
2	430-3001	Bottom Pan Screw, Tap 6-20x0.375
3	815-4090	Bottom Pan
4	815-4074	Left Side Plastic
5	661-93108	Lisa 1.0/2.0 Power Supply



LISA 1.0 TOP ASSEMBLY (Figure 2)

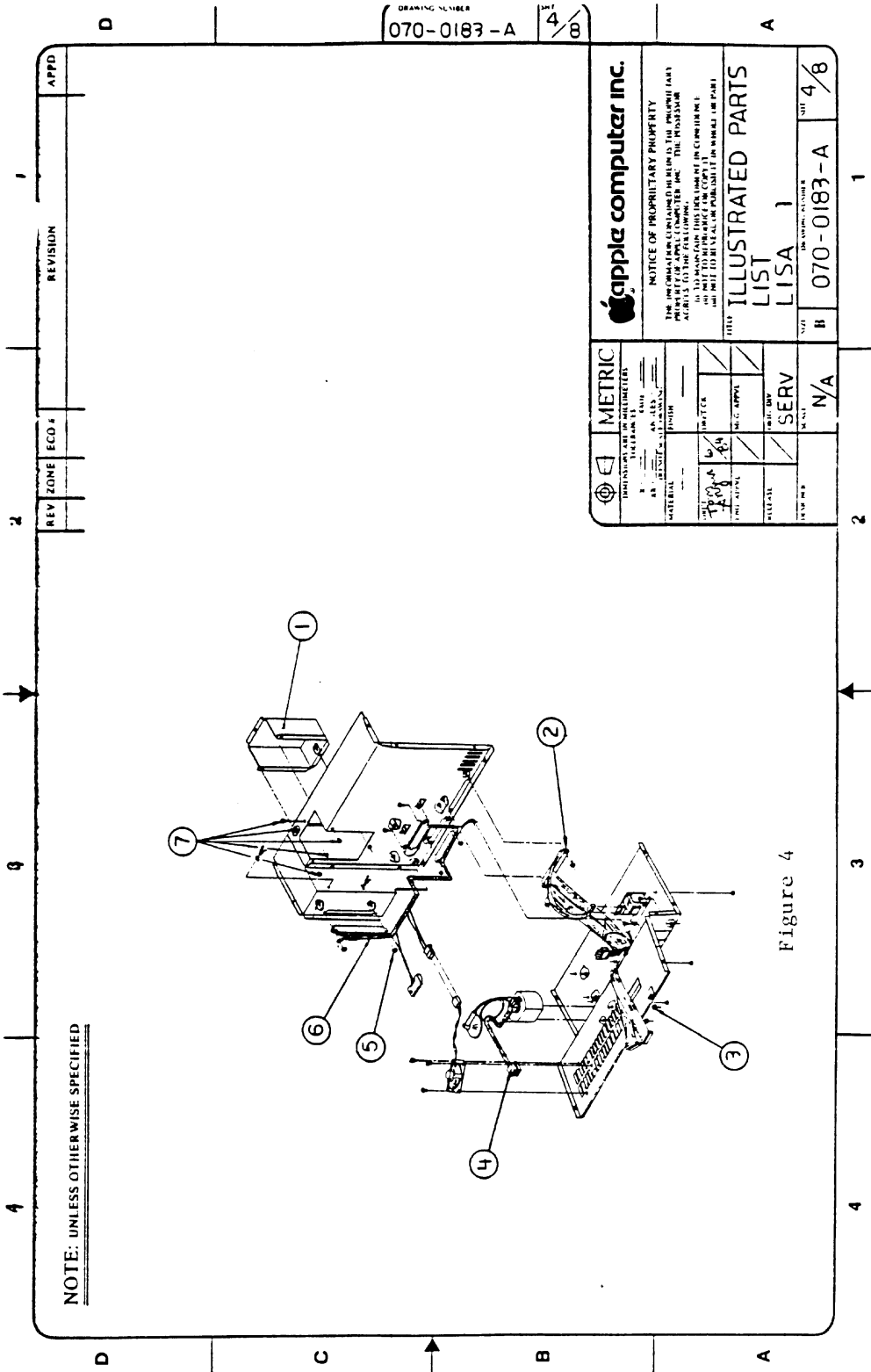
Item	Part No.	Description
1	815-4075	Top Cover Plastic
2	620-5105	Subassembly, Back
3	830-0051	Fastener, 1/4 Turn
4	076-0104	Lisa/Macintosh XL Soft Switch Assembly
5	620-5127	Lisa 1.0 Bezel Subassembly
6	620-6112	Glare Screen Assembly
7	661-93111	Lisa Mouse
8	661-93109	Lisa/Macintosh XL Keyboard
9	699-8001	Rubber Coated Mouse Ball





LISA 1.0 VIDEO ASSEMBLY (Figure 3)

Item	Part No.	Description
1	400-1603	Video Board Screw, 6-32x3/16
2	661-93107	Lisa/Macintosh XL Video Board
3	825-4002	Label, Danger
4	159-0015	Magnet, Yoke Trim
	159-0020	Magnet, Yoke, Yellow
	159-0021	Magnet, Yoke, Red
	159-0022	Magnet, Yoke, Green
	159-0023	Magnet, Yoke, Blue
5	450-0020	Serrated Washer CRT 8-32x0.375
6	076-0105	Lisa/Macintosh XL CRT Yoke Assembly



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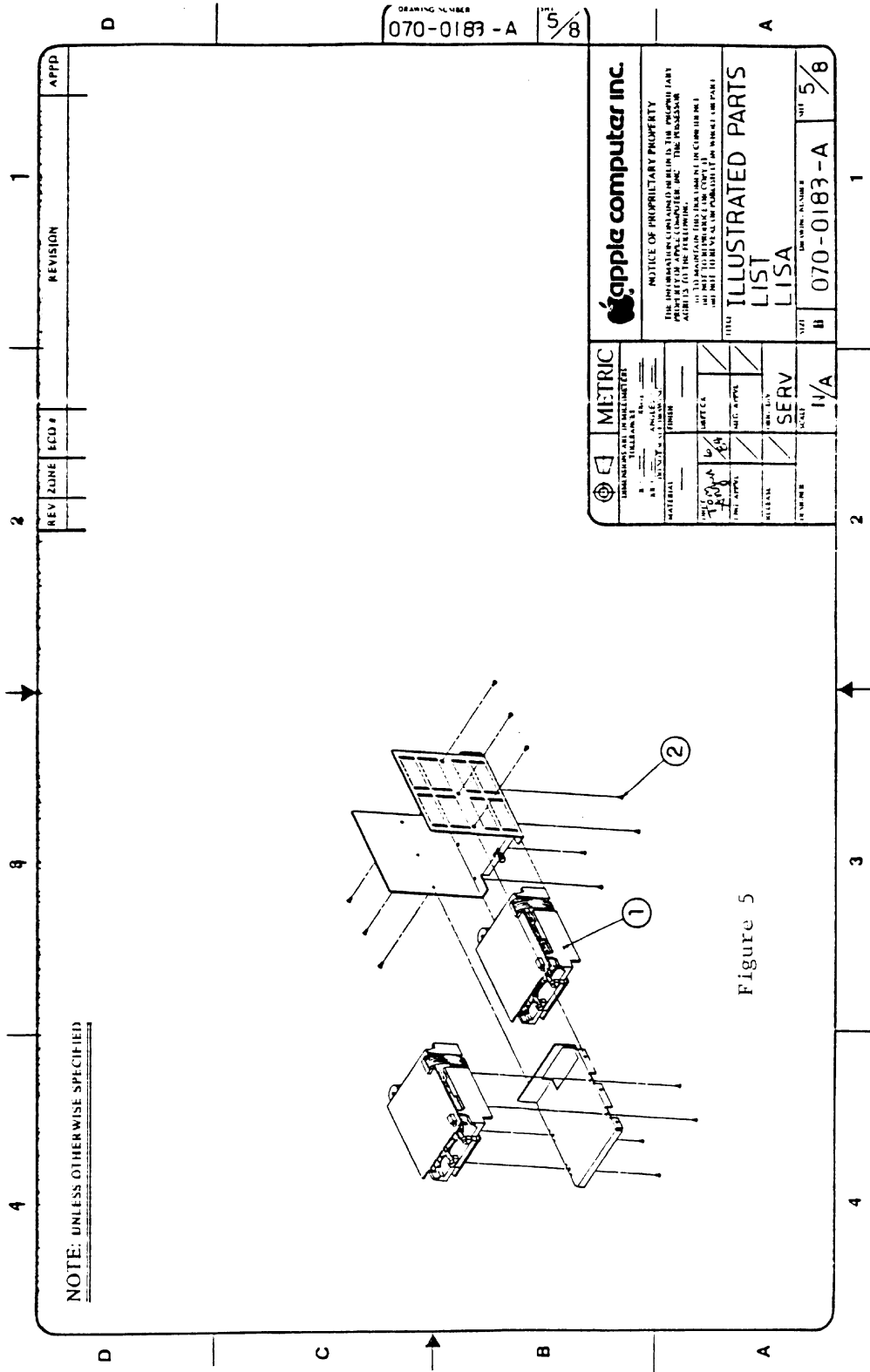
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Figure 4



LISA 1.0 CHASSIS 1 (Figure 4)

Item	Part No.	Description
1	805-4008	CRT Cup
2	591-0002	Cable Assembly, Disk Drive, Lisa 1.0/2.0
3	835-0181	Nut/Washer Assy, M3 0.5, Lisa/Macintosh XL Flyback
4	076-0106	Lisa/Macintosh XL Flyback Transformer
5	835-0150	Nut/Washer Assy, Card Cage Chamber
6	591-0003	Cable Assembly, Power, Lisa 1.0
7	400-1603	Video Board Screw, 6-32x3/16



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DATE 1/1/85		DESIGNED BY J. A.	
CHECKED BY J. A.		DRAWN BY J. A.	
APPROVED BY J. A.		DATE 1/1/85	

LISA 1.0 DISK DRIVE ASSEMBLY (Figure 5)

Item	Part No.	Description
1	661-93110	Lisa 1.0 Drive Module
2	400-3604	Disk Drive Screw, 6-32x1/4

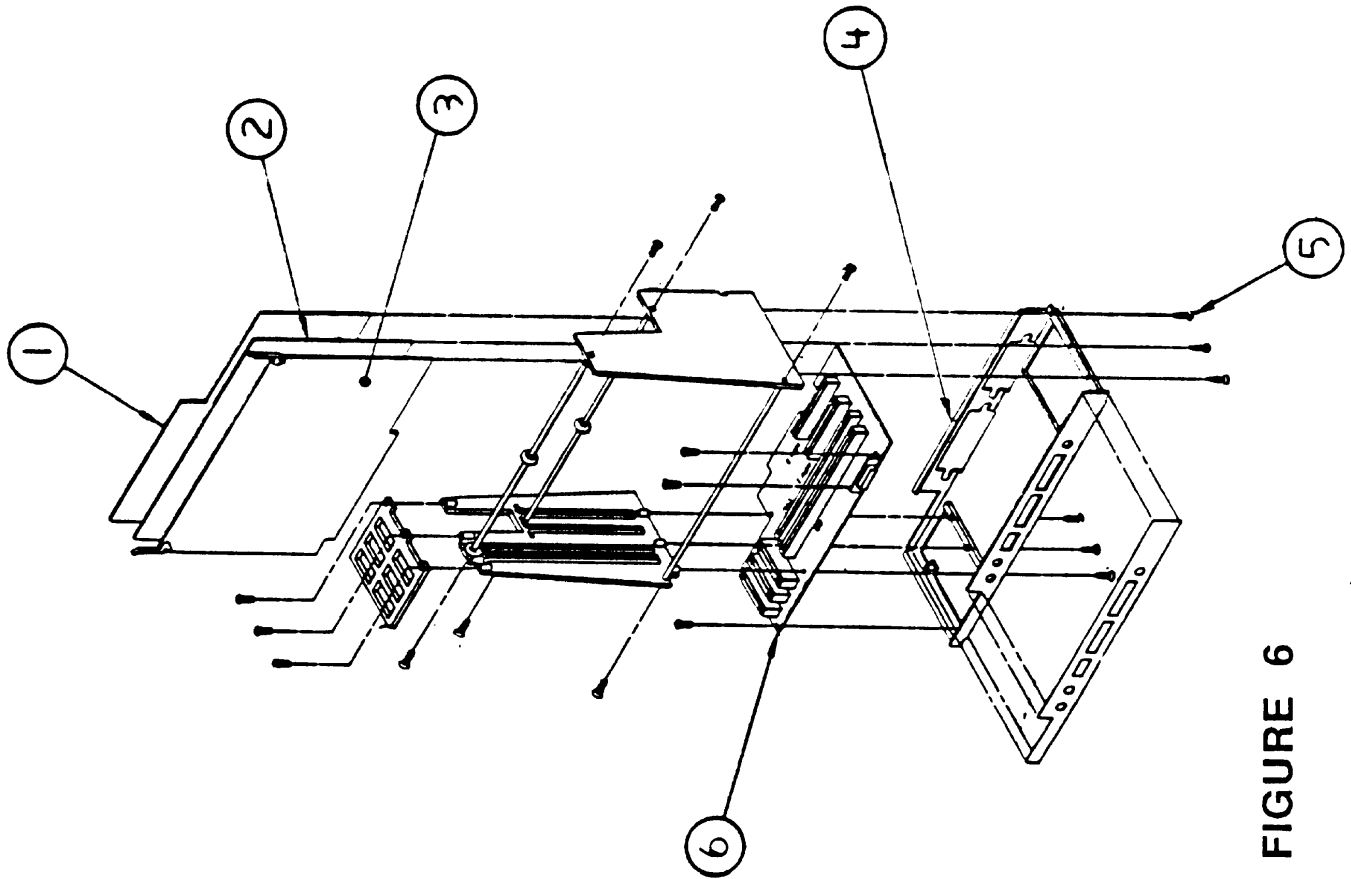


FIGURE 6

LISA 1.0 CARD CAGE (Figure 6)

Item	Part No.	Description
1	661-93105	Lisa/Macintosh XL Memory Board
2	661-93103	Lisa/Macintosh XL CPU Card
3	661-93104	Lisa 1.0 I/O Board
4	805-4046	Lisa 1.0/2.0 Card Cage Chassis
5	400-1405	Card Cage Screw, 4-40 x 5/16
6	661-93106	Lisa 1.0/2.0 Motherboard

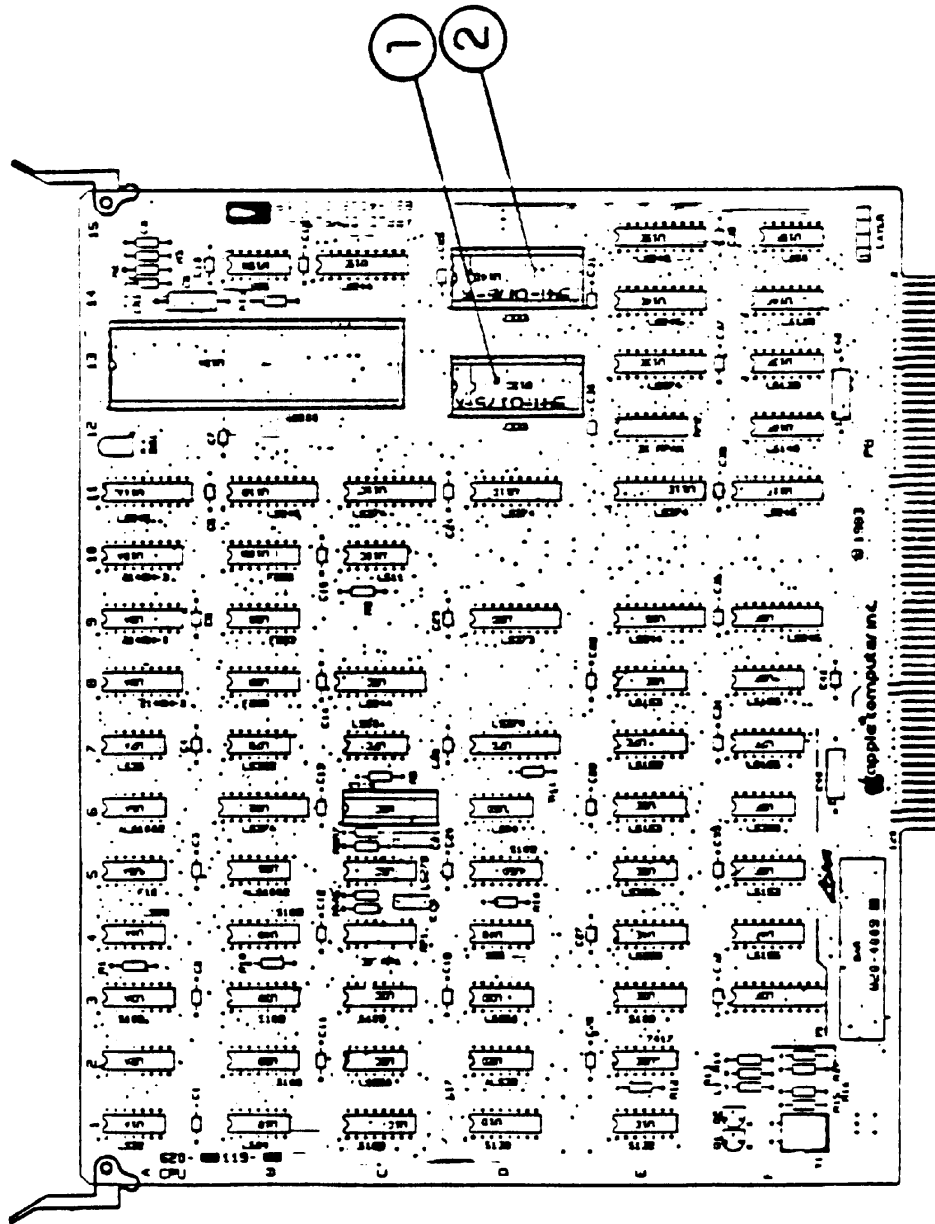


FIGURE 7



LISA CPU BOARD (Figure 7)

Item	Part No.	Description
1	341-0175	Boot ROM, High 64K
2	341-0176	Boot ROM, Low 64K



LISA I/O BOARD (Figure 8)

Item	Part No.	Description
1	341-0138	Disk Controller ROM



Lisa 2 Technical Procedures

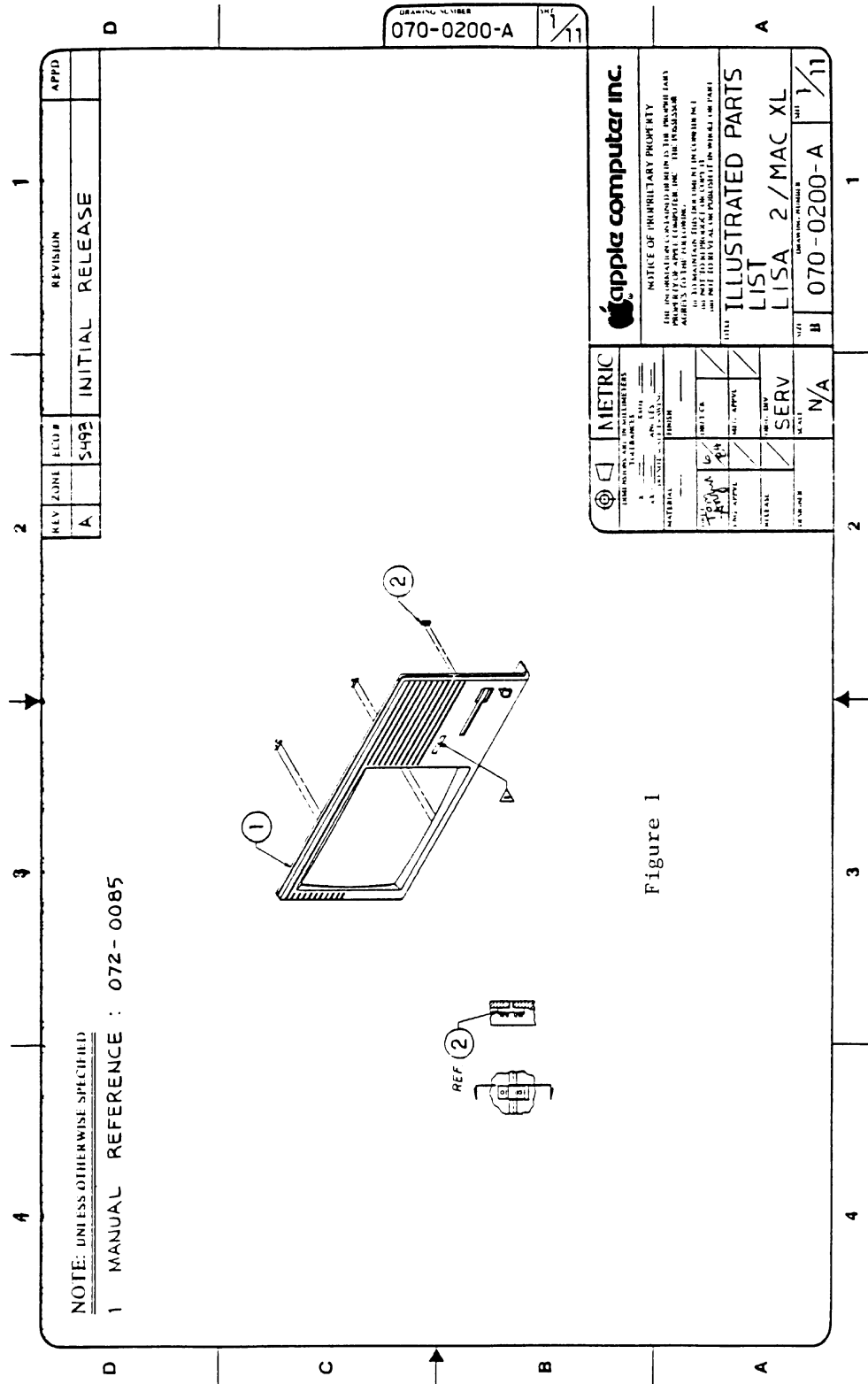
Section 2

Illustrated Parts List

The figures and lists below include all piece parts that can be purchased separately from Apple for the Lisa 2, along with their part numbers. These are the only parts available from Apple. Refer to your Apple Service Programs manual for prices.

Contents:

Front Bezel.....	2.1
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I/O Board.....	2.19



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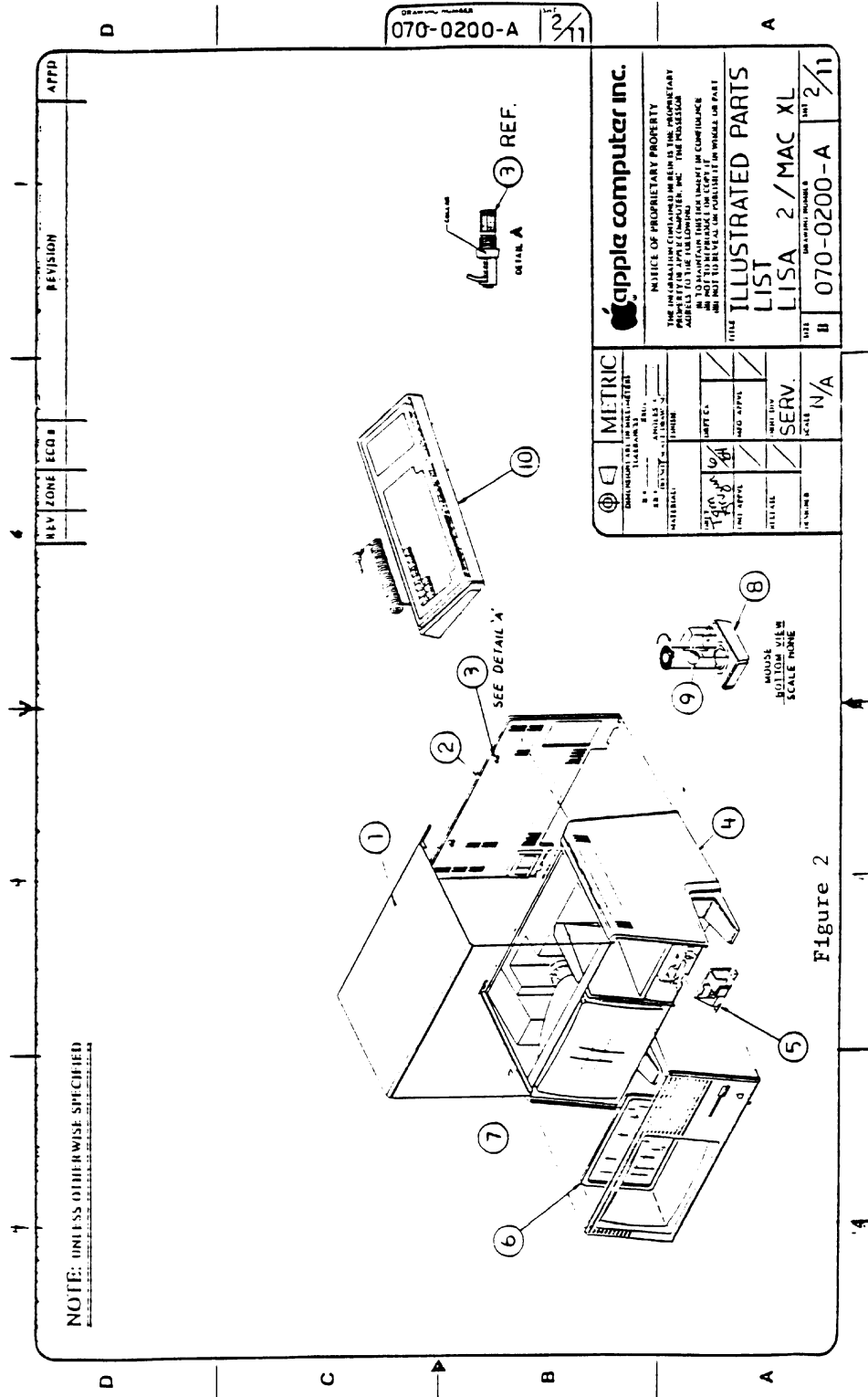
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Figure 1



LISA 2 FRONT BEZEL (Figure 1)

Item	Part No.	Description
1	620-5136	Lisa 2.0/Macintosh XL Bezel
Subassembly		
2	815-4120	Lens, Bezel LED



070-0200-A INT 2/11

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MM	INCHES	N/A

Figure 2



LISA 2 TOP ASSEMBLY (Figure 2)

Item	Part No.	Description
1	815-4075	Top Cover Plastic
2	620-5105	SubAssembly, Back Lisa
3	830-0051	Fastener, 1/4 Turn
4	815-4073	Right Side Plastic
5	076-0104	Lisa/Macintosh XL Soft Switch Assembly
6	620-6112	Glare Screen Assembly
7	815-4074	Left Side Plastic
8	661-93111	Lisa 1.0/2.0 Mouse
9	699-8001	Rubber Coated Mouse Ball
10	661-93109	Lisa/Macintosh XL Keyboard

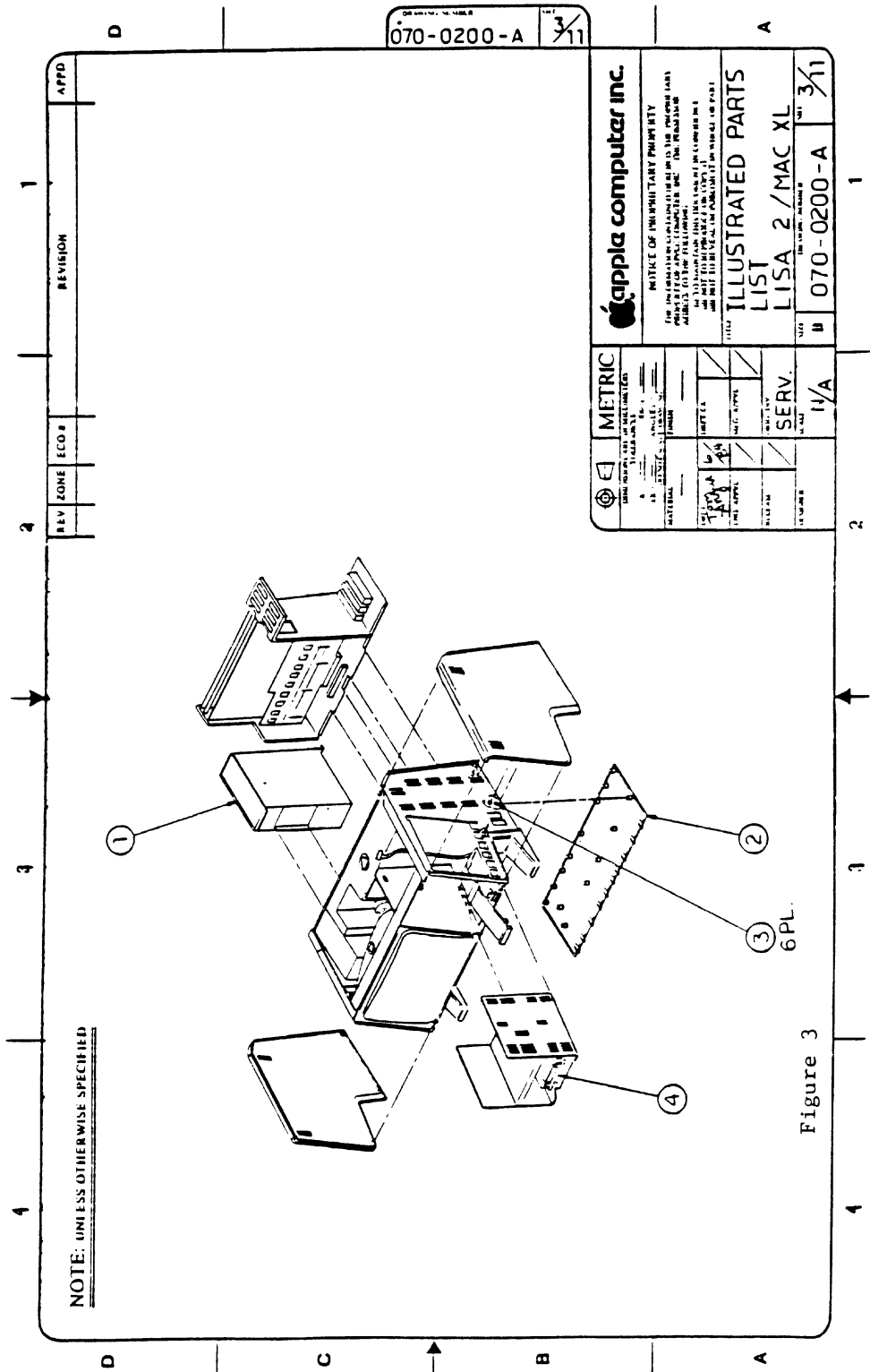
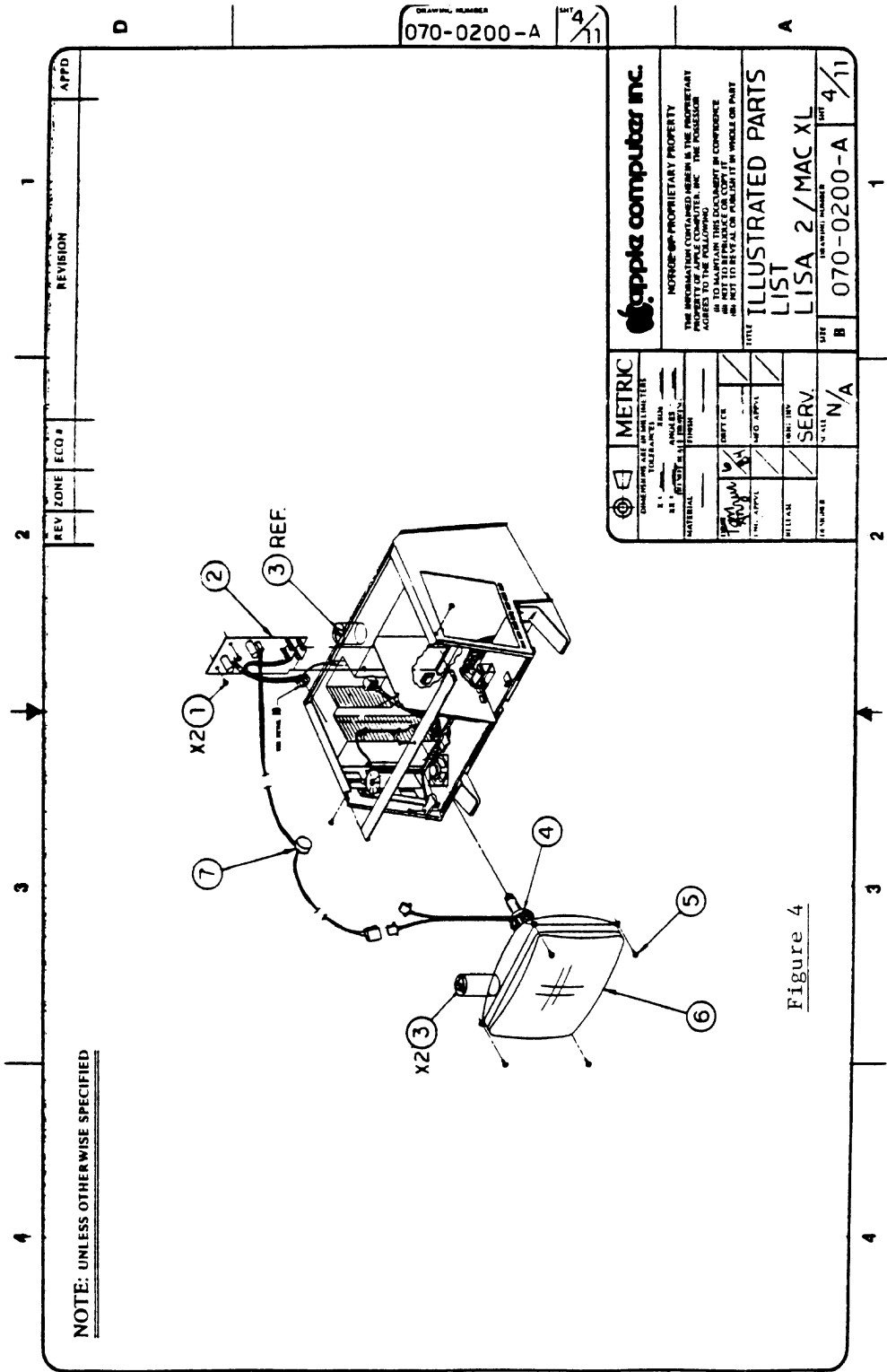


Figure 3



LISA 2 CHASSIS 4 (Figure 3)

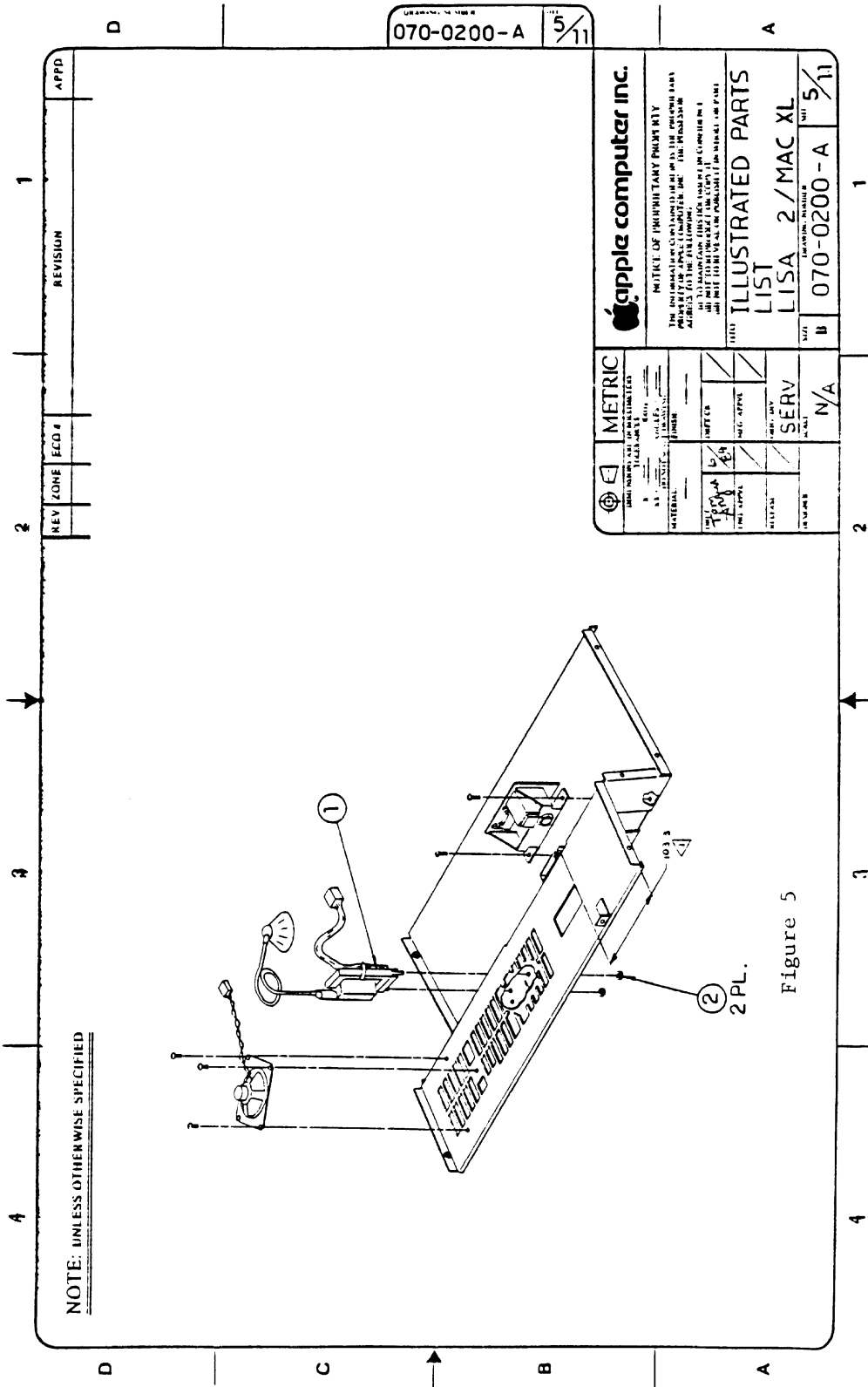
Item	Part No.	Description
1	661-93108	Lisa 1.0/2.0 Power Supply
2	815-4090	Bottom Pan
3	430-3001	Screw Tap 6-20x0.375, Bottom Pan
4	661-76156	Micro Disk Mech Assembly





LISA 2 VIDEO ASSEMBLY (Figure 4)

Item	Part No.	Description
1	400-1603	Video Board Screw, 6-32x3/16
2	661-93107	Lisa/Macintosh XL Video Board
3	825-4002	Label, Danger
4	159-0015	Magnet, Yoke, Trim
	159-0020	Magnet, Yoke, Yellow
	159-0021	Magnet, Yoke, Red
	159-0022	Magnet, Yoke, Green
	159-0023	Magnet, Yoke, Blue
5	450-0020	Serrated Washer CRT 8-32x0.375
6	076-0105	Lisa/Macintosh XL CRT Yoke Assembly
7	699-0346	Transformer



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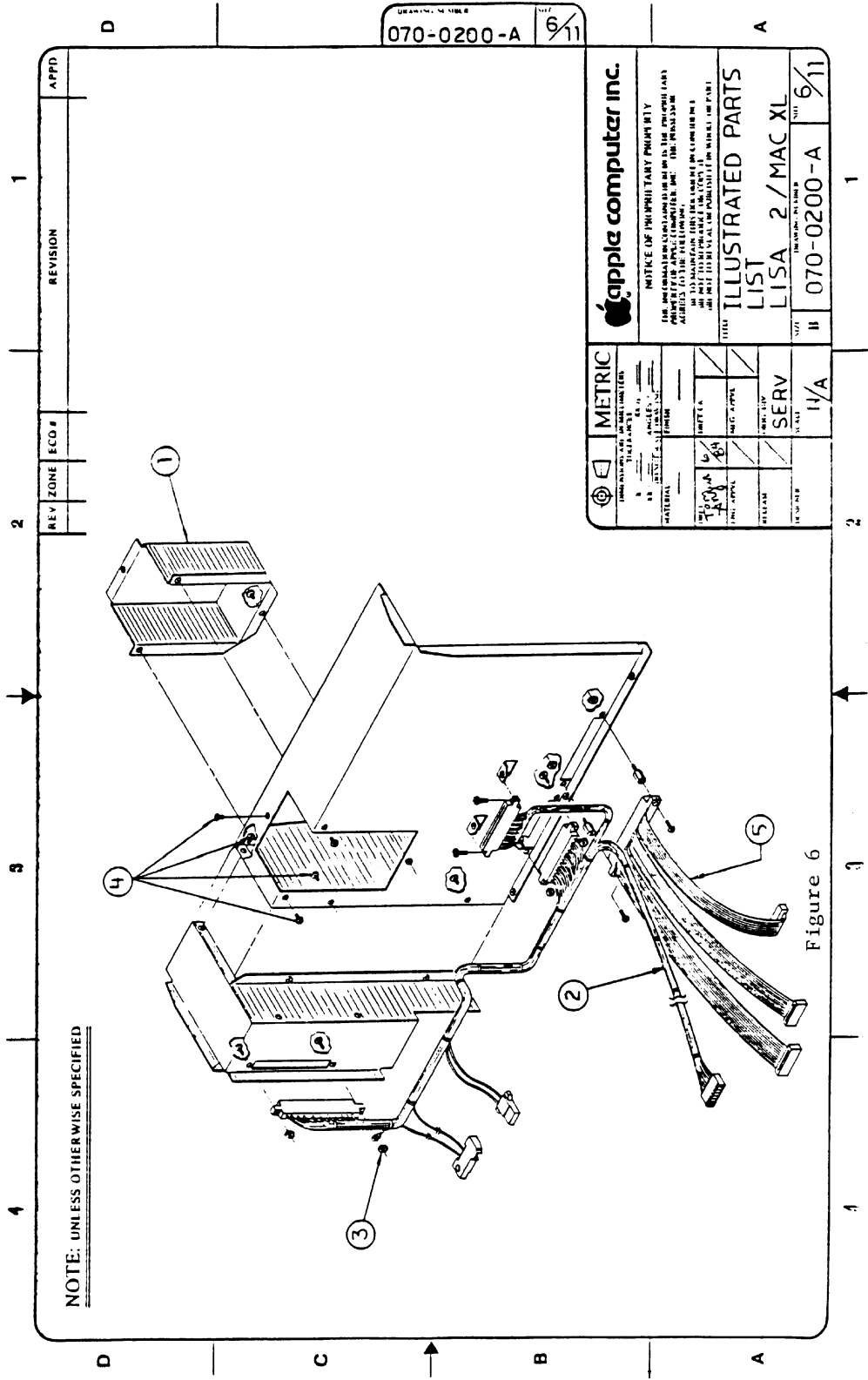
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Figure 5



LISA 2 CHASSIS 2 (Figure 5)

Item	Part No.	Description
1	076-0106	Lisa/Macintosh XL Flyback Transformer
2	835-0181	Nut/Washer Assembly M3 0.5, Lisa/Macintosh XL Flyback



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Figure 6



LISA 2 CHASSIS 1 (Figure 6)

Item	Part No.	Description
1	805-4008	CRT Cup
2	591-0020	Power Cable, 2.0/Macintosh XL
3	835-0159	Nut, Washer Assembly Card Cage Chamber
4	400-1603	Video Board Screw, 6-32x3/16
5	591-0002	Drive Cable, 1.0/2.0

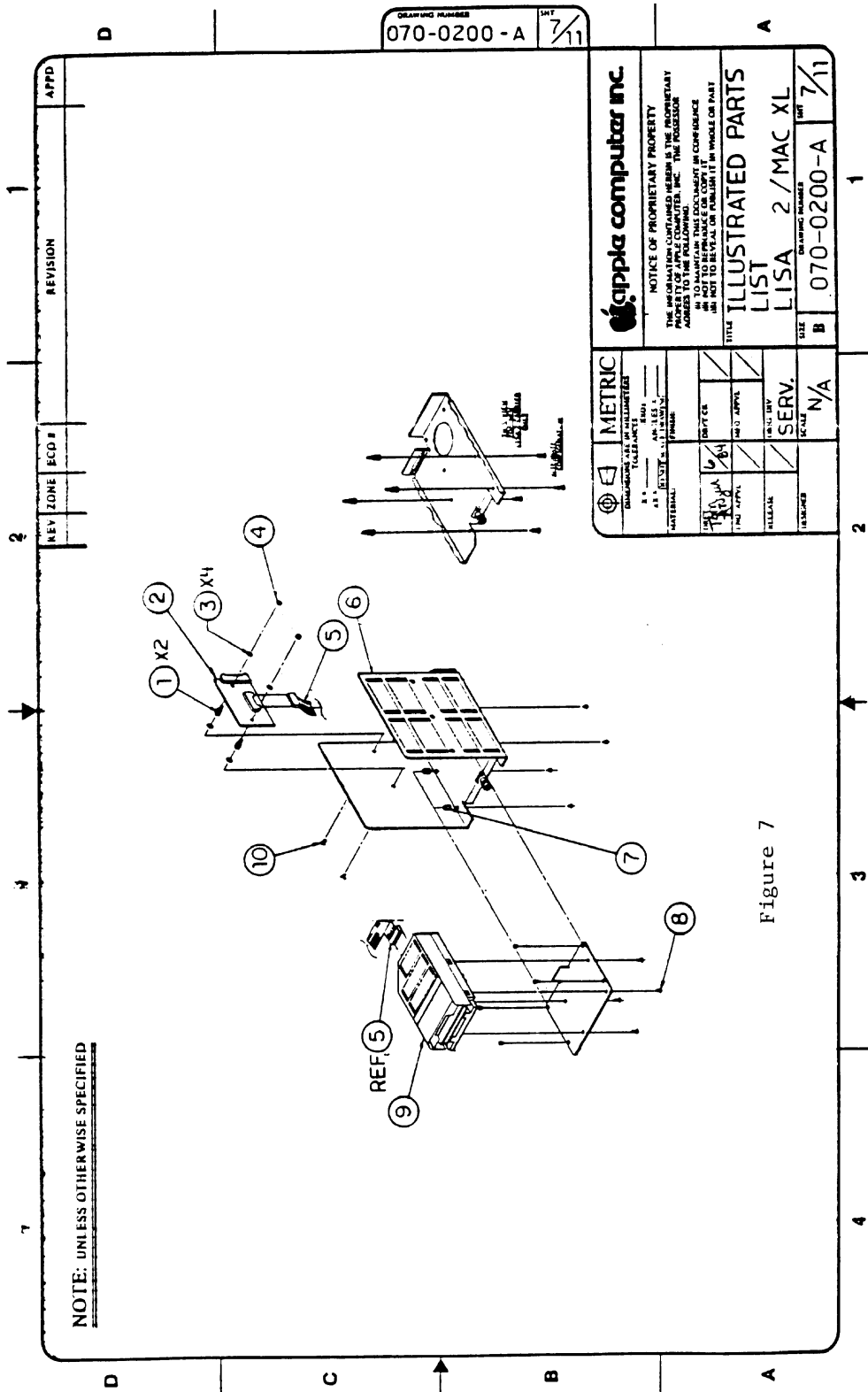


Figure 7

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LISA 2 DISK DRIVE ASSEMBLY (Figure 7)

Item	Part No.	Description
1	860-0210	Micro Disk Adapter Standoff
2	661-93194	Drive Adapter Card
3	860-0251	Washer, Internal Tooth #6
4	835-0116	Nut, Hex Size 6, Microdisk Adapter PCB
5	590-0086	Micro Disk Adapter Cable
6	805-4052	Micro Disk Drive Carrier
7	860-0009	Micro Disk Drive Standoff
8	● 410-1306	Micro Disk Drive Screw M3x0.5x6mm
9	661-76156	Micro Disk Mechanical Assembly
10	400-3604	Disk Drive Screw, 6-32x1/4

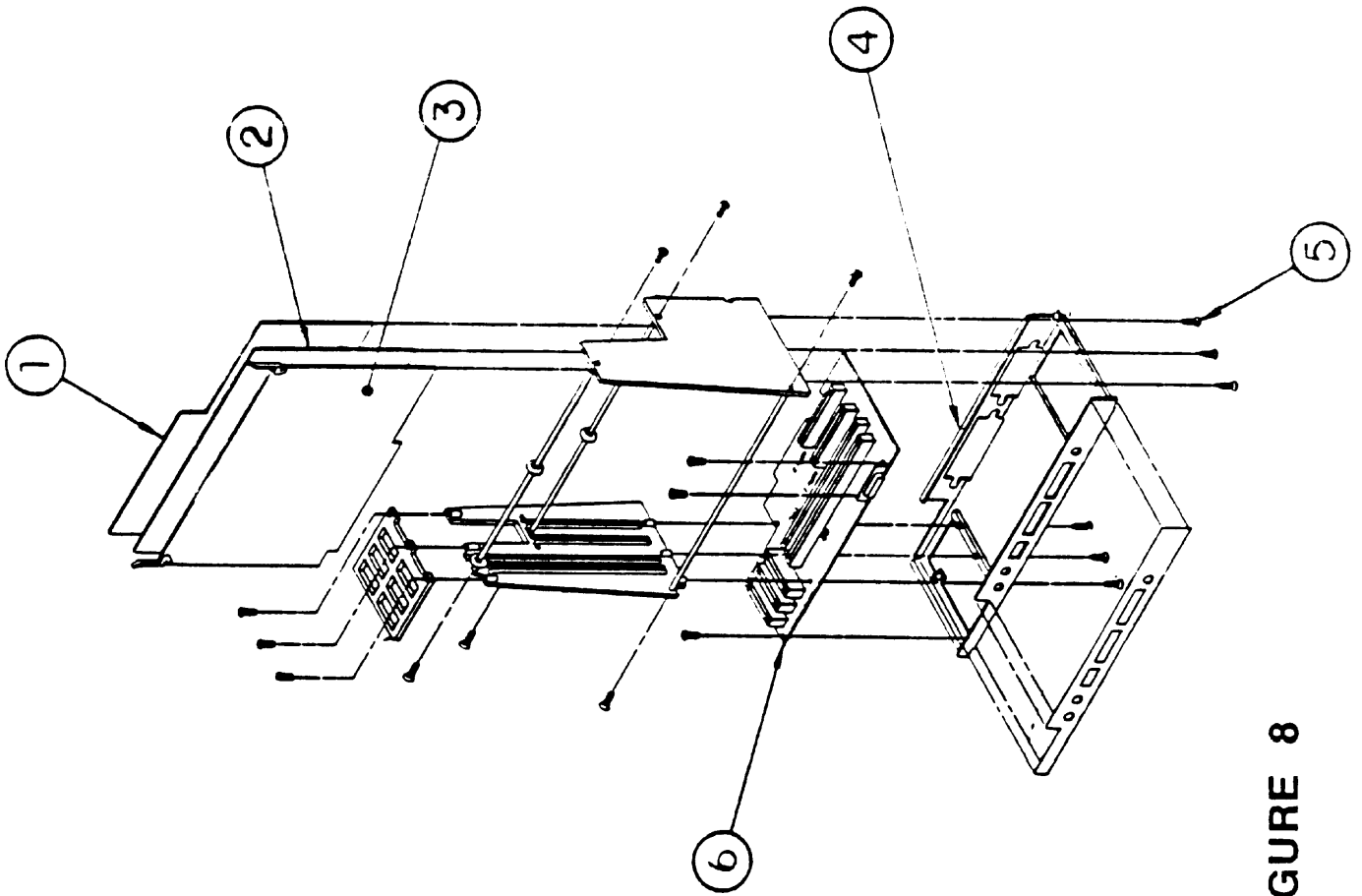


FIGURE 8

LISA 2 CARD CAGE (Figure 8)

Item	Part No.	Description
1	661-93105	Lisa/Macintosh XL Memory Board
2	661-93103	Lisa/Macintosh XL CPU Card
3	661-93198	Lisa 2.0 I/O Board
4	805-4046	Lisa 1.0/2.0 Card Cage Chassis
5	400-1405	Card Cage Screw, 4-40 x 5/16
6	661-93106	Lisa 1.0/2.0 Motherboard

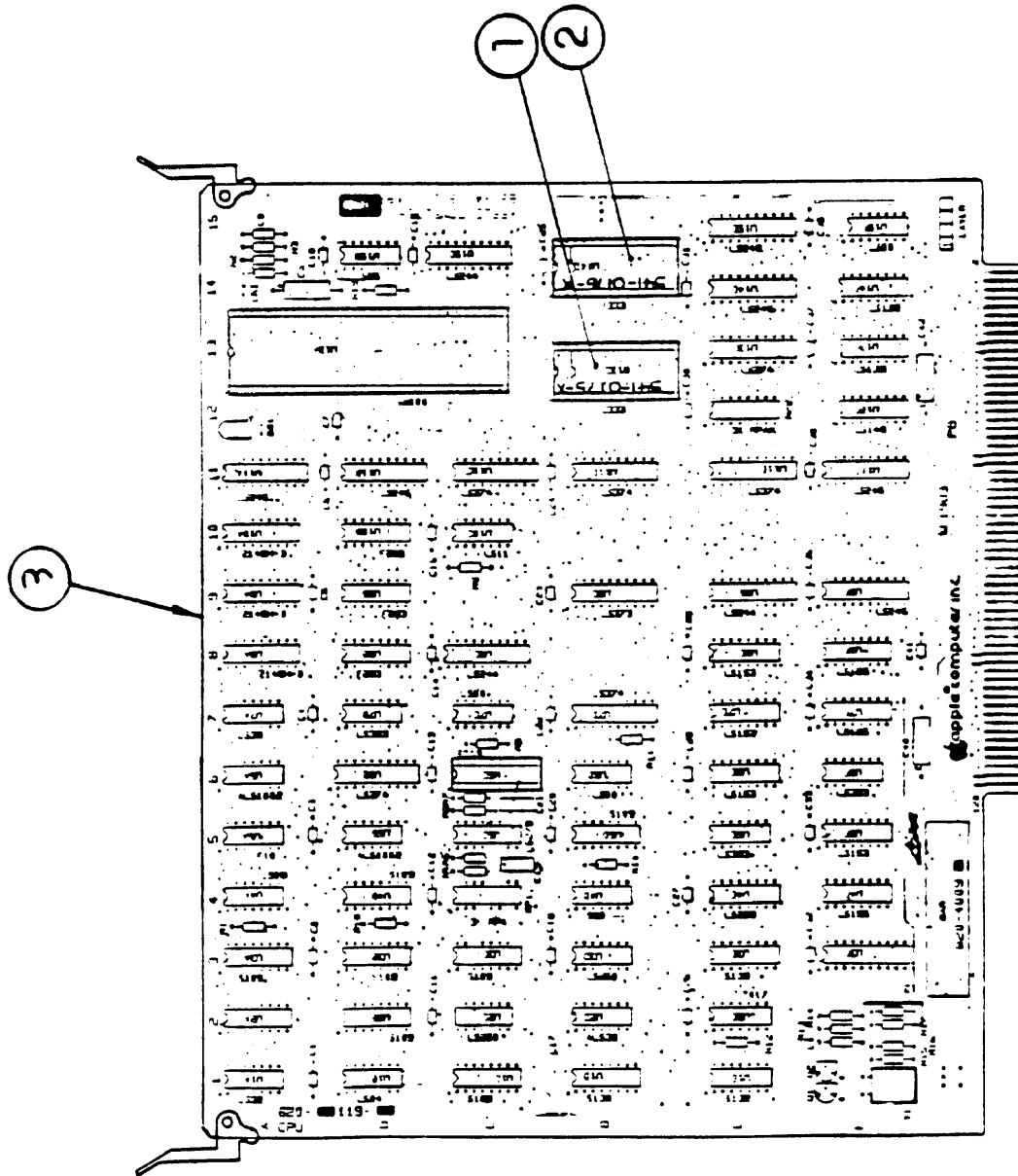
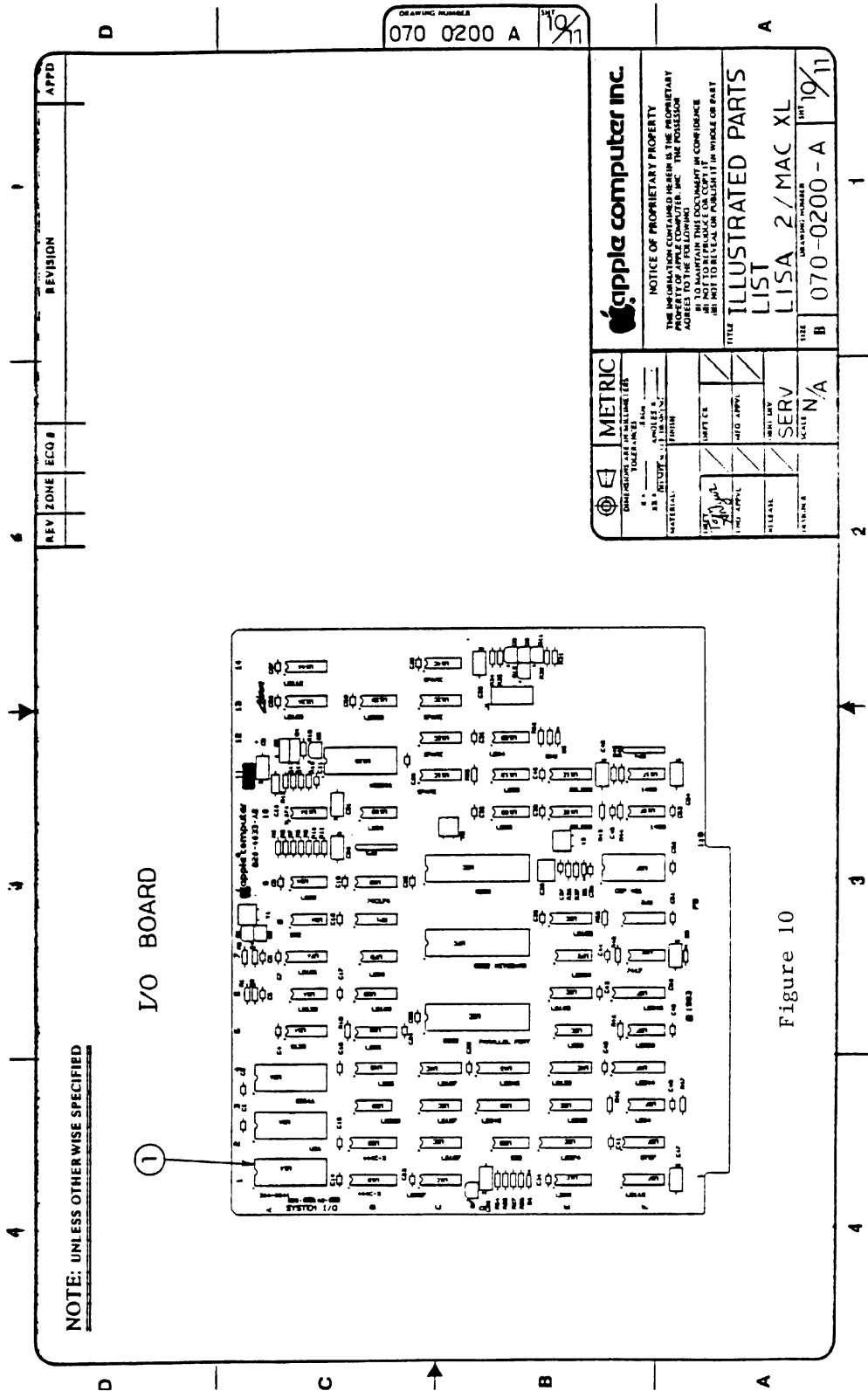


FIGURE 9



LISA/MACINTOSH XL CPU BOARD (Figure 9)

Item	Part No.	Description
1	341-0175	Boot ROM, High 64K
2	341-0176	Boot ROM, Low 64K
3	661-93103	Lisa/Macintosh XL CPU Card



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LISA 2 / MAC XL

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METRIC

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MATERIAL
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UNIT CONVERSION TABLE

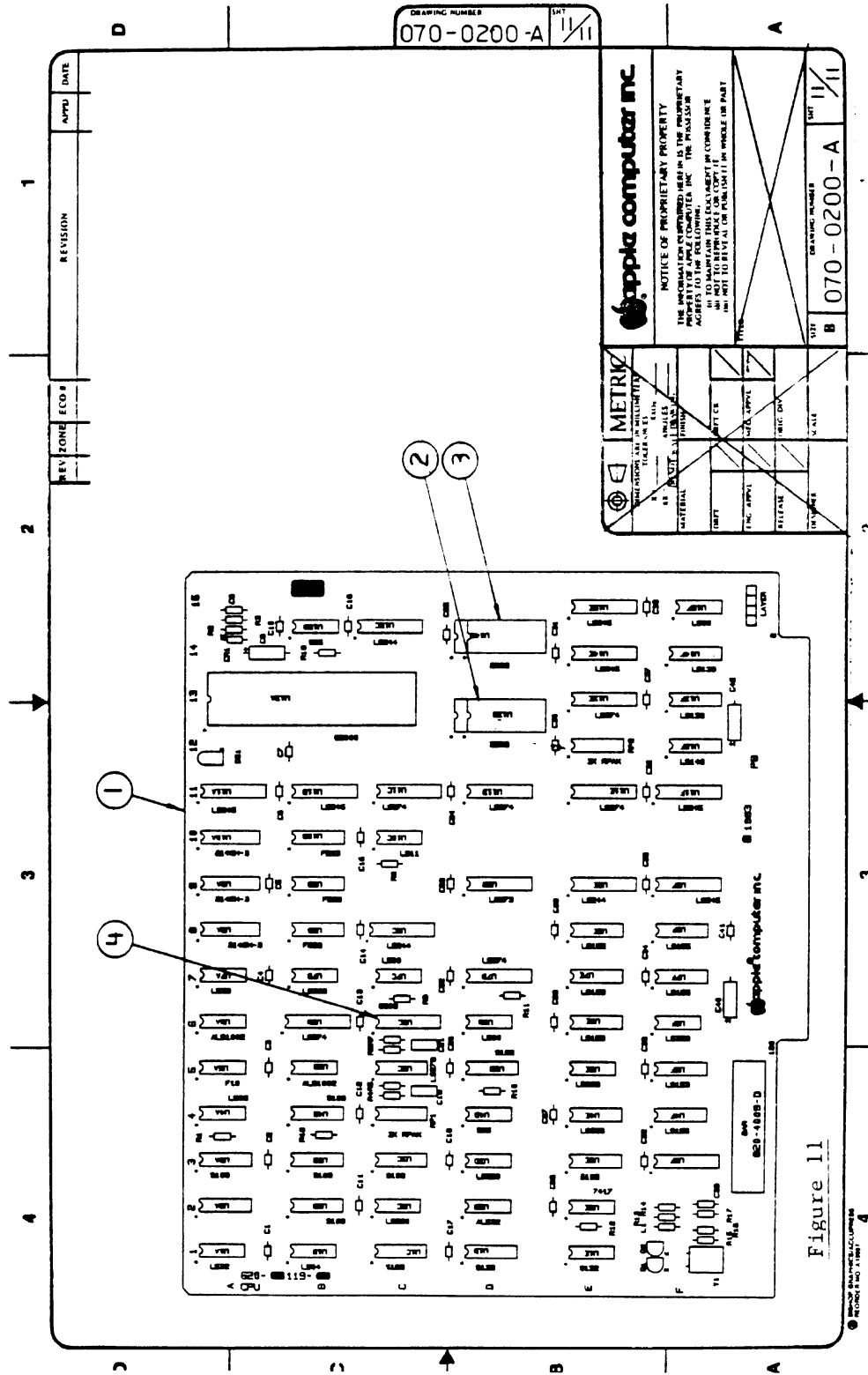
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LISA 2 I/O BOARD (Figure 10)

Item	Part No.	Description
1	341-0290	Disk Controller ROM, Lisa 2



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Figure 11

Lisa 2

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LISA 2 - MODIFIED CPU CARD (Figure 11)

Item	Part No.	Description
1	661-0298	Macintosh XL Modified CPU Card
2	341-0347	Boot ROM, High
3	341-0346	Boot ROM, Low
4	341-0348	Video ROM



Macintosh XL Technical Procedures

Section 3

Illustrated Parts List

The figures and lists below include all piece parts that can be purchased separately from Apple for the Macintosh XL, along with their part numbers. These are the only parts available from Apple. Refer to your Apple Service Programs manual for prices.

Contents:

Front Bezel.....	3.1
Top Assembly.....	3.3
Chassis 4.....	3.5
Video Assembly.....	3.7
Chassis 2.....	3.9
Chassis 1.....	3.11
Disk Drive Assembly.....	3.13
Card Cage.....	3.15
CPU Board.....	3.17
I/O Board.....	3.19



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1) MANUAL REFERENCE : 072-0085

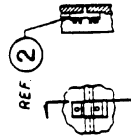
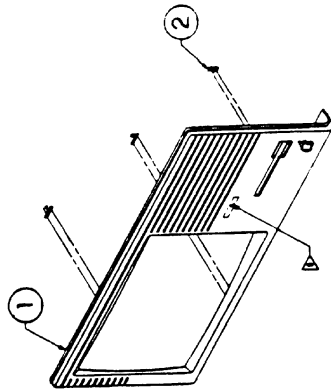


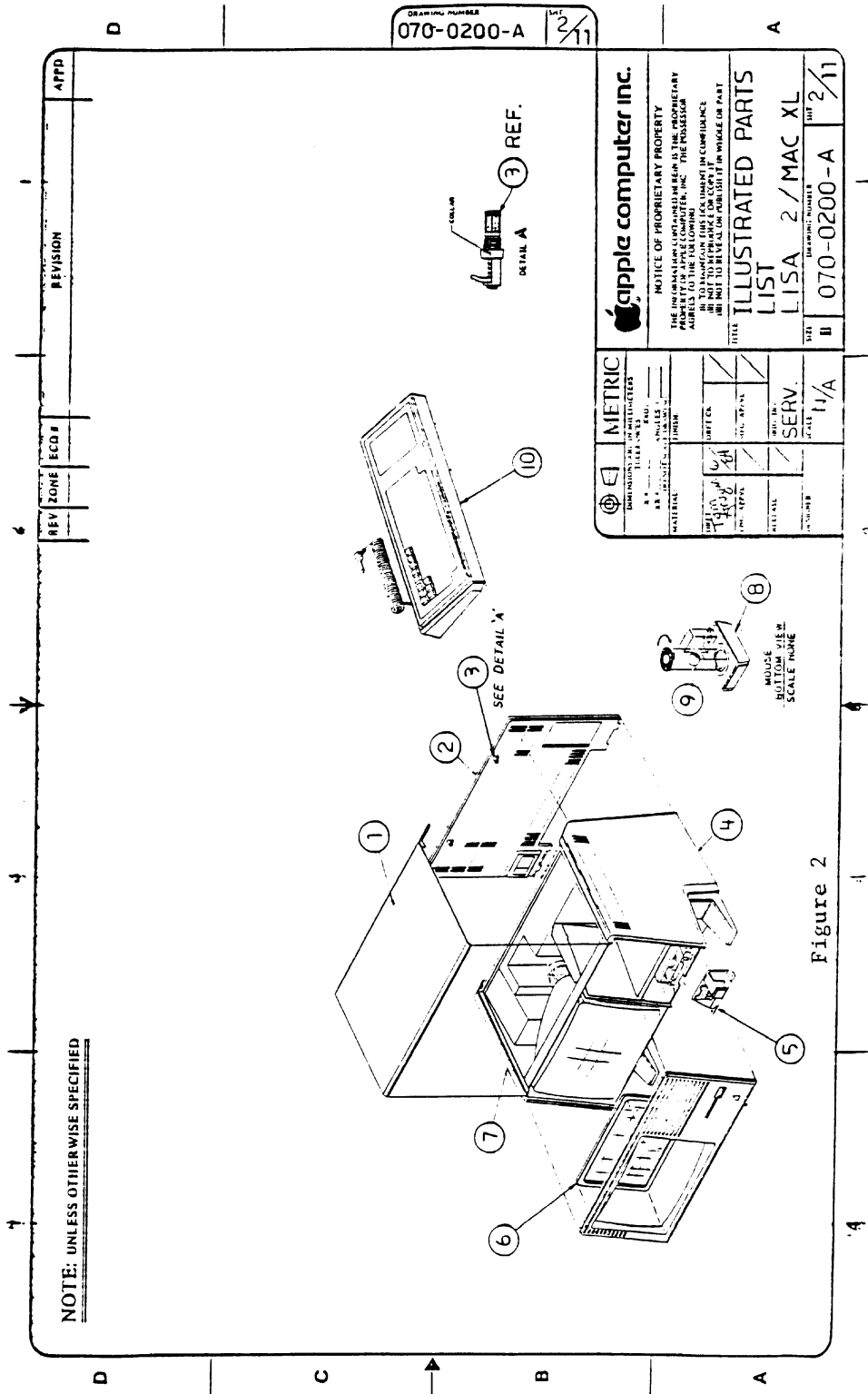
Figure 1

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METRIC DIMENSIONS IN MILLIMETERS ANGLES IN DEGREES		SERVICE N/A	



MACINTOSH XL FRONT BEZEL (Figure 1)

Item	Part No.	Description
1	620-5136	Lisa 2.0/Macintosh XL Bezel Subassembly
2	815-4120	Lens, Bezel LED



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MATERIAL	QUANTITY	SERV	SCALE
			1 1/4

Figure 2



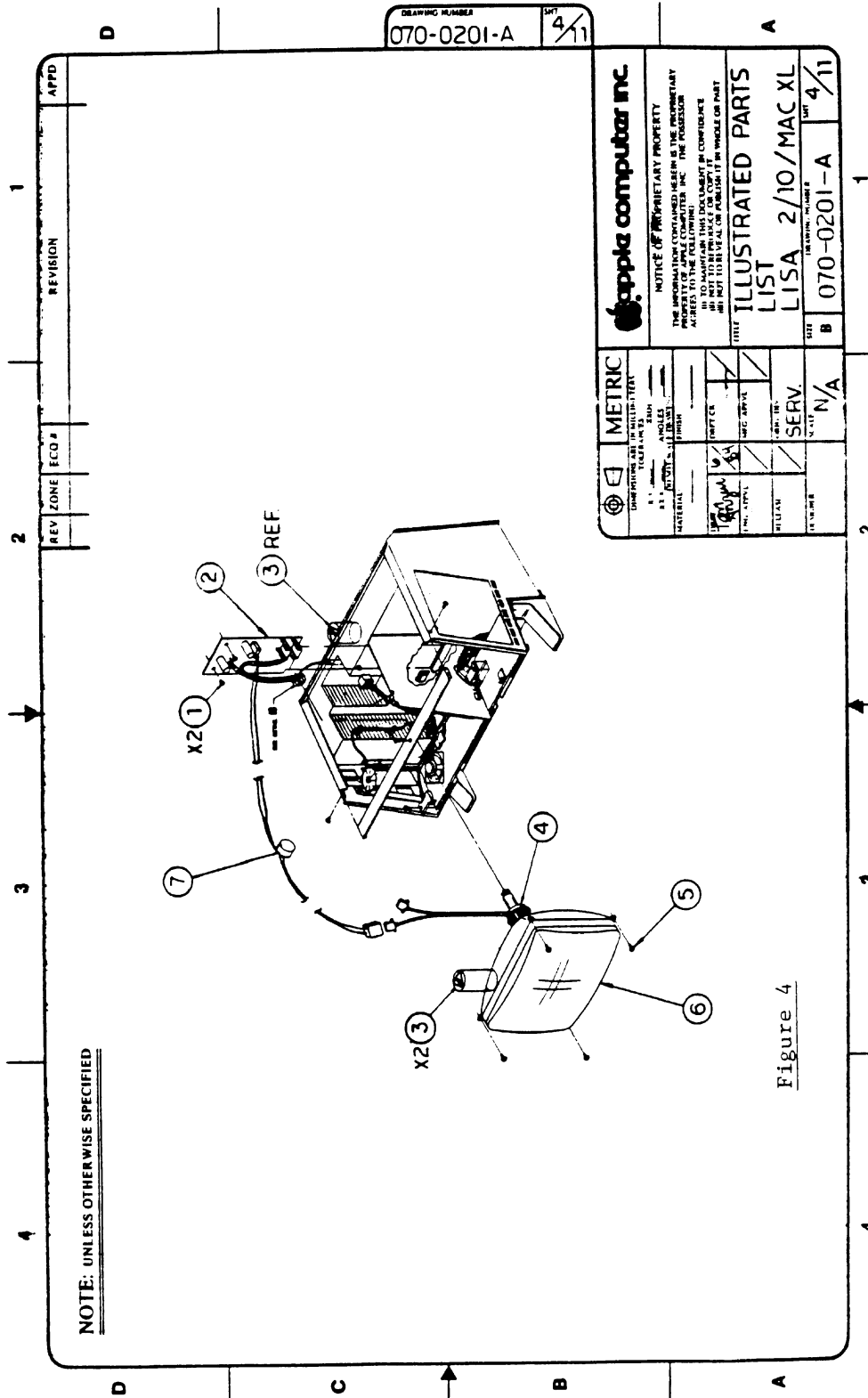
MACINTOSH XL TOP ASSEMBLY (Figure 2)

Item	Part No.	Description
1	815-4075	Top Cover Plastic
2	620-5105	SubAssembly, Back
3	830-0051	Fastener, 1/4 Turn
4	815-4073	Right Side Plastic
5	076-0104	Lisa/Macintosh XL Softswitch Assembly
6	620-6112	Glare Screen Assembly
7	815-4074	Left Side Plastic
8	661-96155	Macintosh Mouse
9	699-8001	Rubber Coated Mouse Ball
10	661-93109	Lisa/Macintosh XL Keyboard



MACINTOSH XL CHASSIS 4 (Figure 3)

Item	Part No.	Description
1	661-73172	Macintosh XL Power Supply
2	815-4090	Bottom Pan
3	430-3001	Screw Tap 6-20x0.375, Bottom Pan
4	661-76156	Micro Disk Mech Assembly
5	661-93176	Macintosh XL Hard Disk Assembly



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Figure 4



MACINTOSH XL VIDEO ASSEMBLY (Figure 4)

Item	Part No.	Description
1	400-1603	Video Board Screw, 6-32x3/16
2	661-93107	Lisa/Macintosh XL Video Board
3	825-4002	Label, Danger
4	159-0015	Magnet, Yoke, Trim
	159-0020	Magnet, Yoke, Yellow
	159-0021	Magnet, Yoke, Red
	159-0022	Magnet, Yoke, Green
	159-0023	Magnet, Yoke, Blue
5	450-0020	Serrated Washer, CRT 8-32x0.375
6	076-0105	Lisa/Macintosh XL CRT Yoke Assembly
7	699-0346	Transformer



MACINTOSH XL VIDEO ASSEMBLY (Figure 5)

Item	Part No.	Description
1	076-0106	Lisa/Macintosh XL Flyback Transformer
2	835-0181	Nut/Washer Assembly M3 0.5, Lisa/Macintosh XL Flyback

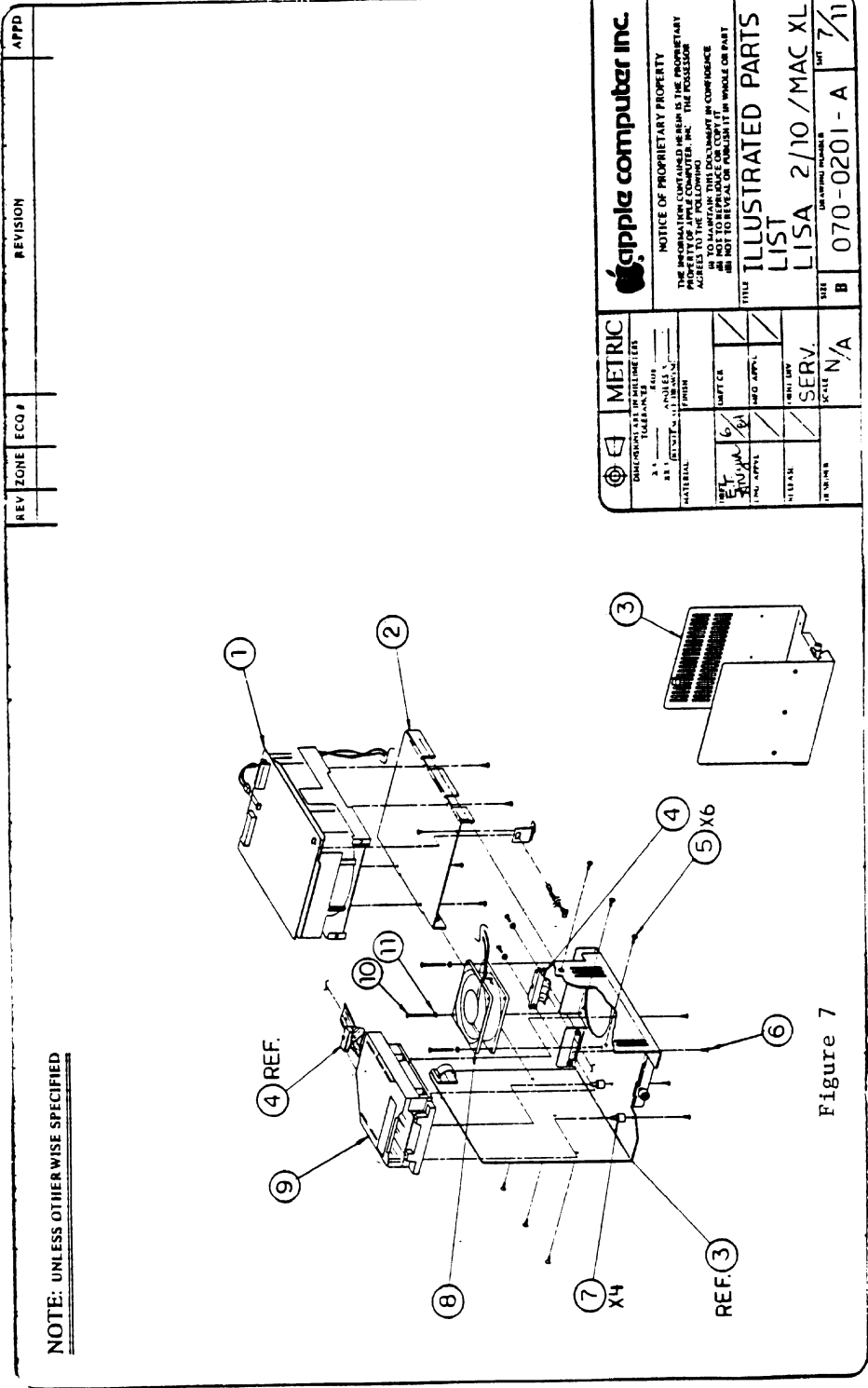


MACINTOSH XL CHASSIS 1 (Figure 6)

Item	Part No.	Description
1	805-4008	CRT Cup
2	591-0014	Drive Cable, Macintosh XL
3	591-0020	Power Cable, 2.0/Macintosh XL
4	835-0150	Nut, Washer Assembly Card Cage Chamber
5	400-1603	Video Board Screw, 6-32x3/16



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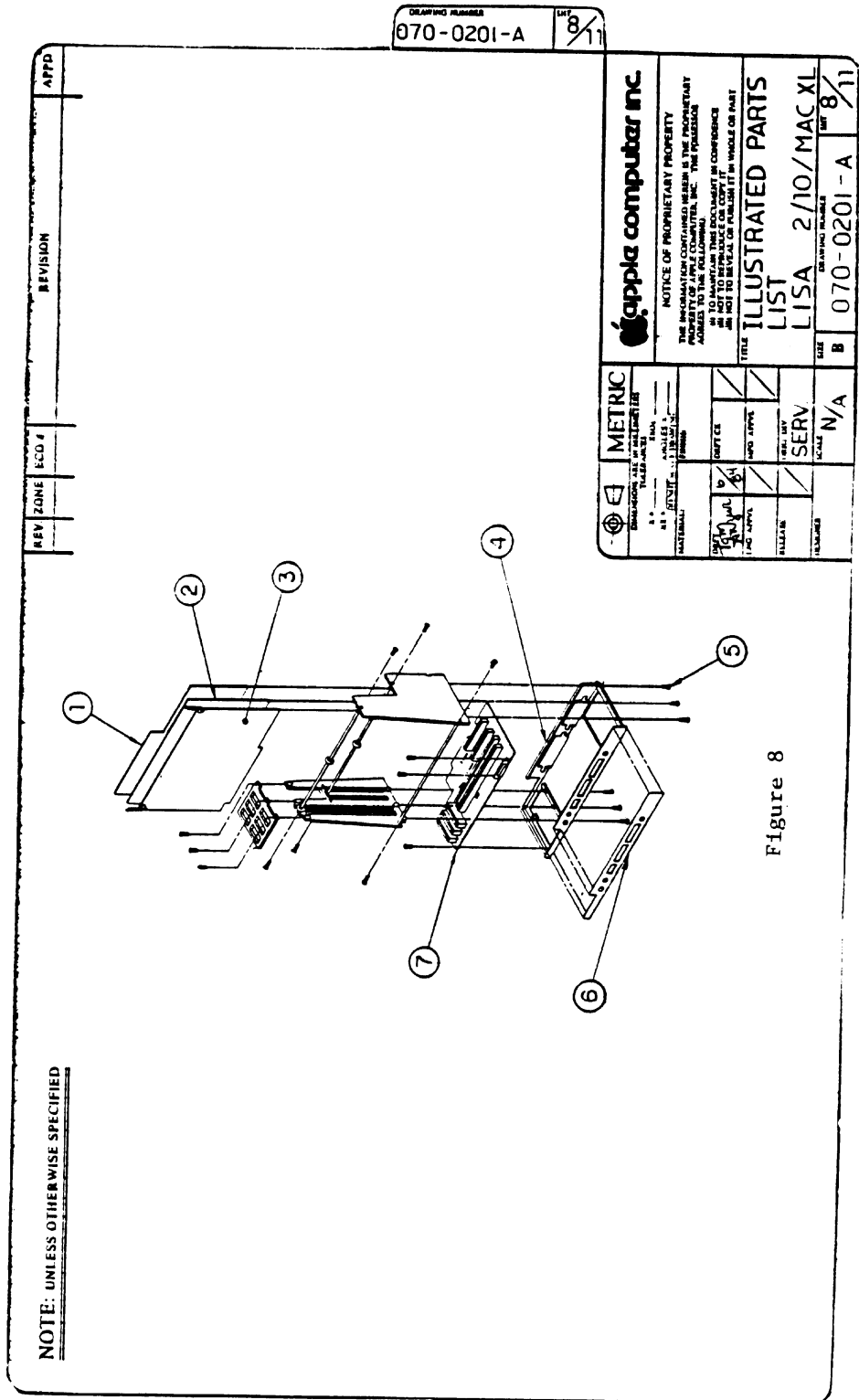
Figure 7

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TITLE LISA 2/10 / MAC XL		SHEET B	
PART NUMBER 070-0201-A		DATE 7/11	
SCALE N/A		SERVICE N/A	
MATERIAL STEEL		FINISH POLISHED	
DIMENSIONS 6.35		TOLERANCES ±0.13	



MACINTOSH XL DISK DRIVE ASSEMBLY (Figure 7)

Item	Part No.	Description
1	661-93176	Macintosh XL Hard Disk Assembly
2	805-4054	Micro Disk Drive Carrier Shelf
3	805-4052	Micro Disk Drive Carrier
4	591-0017	Micro Disk Extender Cable
5	400-3604	Micro Disk Drive Screw, 6-32 x 1/4
6	410-2306	Micro Disk Carrier Bottom Screw, M3x5x6mm
7	860-0009	Micro Disk Standoff
8	600-0030	Macintosh XL Fan
9	661-76156	Micro Disk Assembly
10	406-1618	Fan Screw 6-32x1
11	860-0251	Fan, Internal Tooth #6



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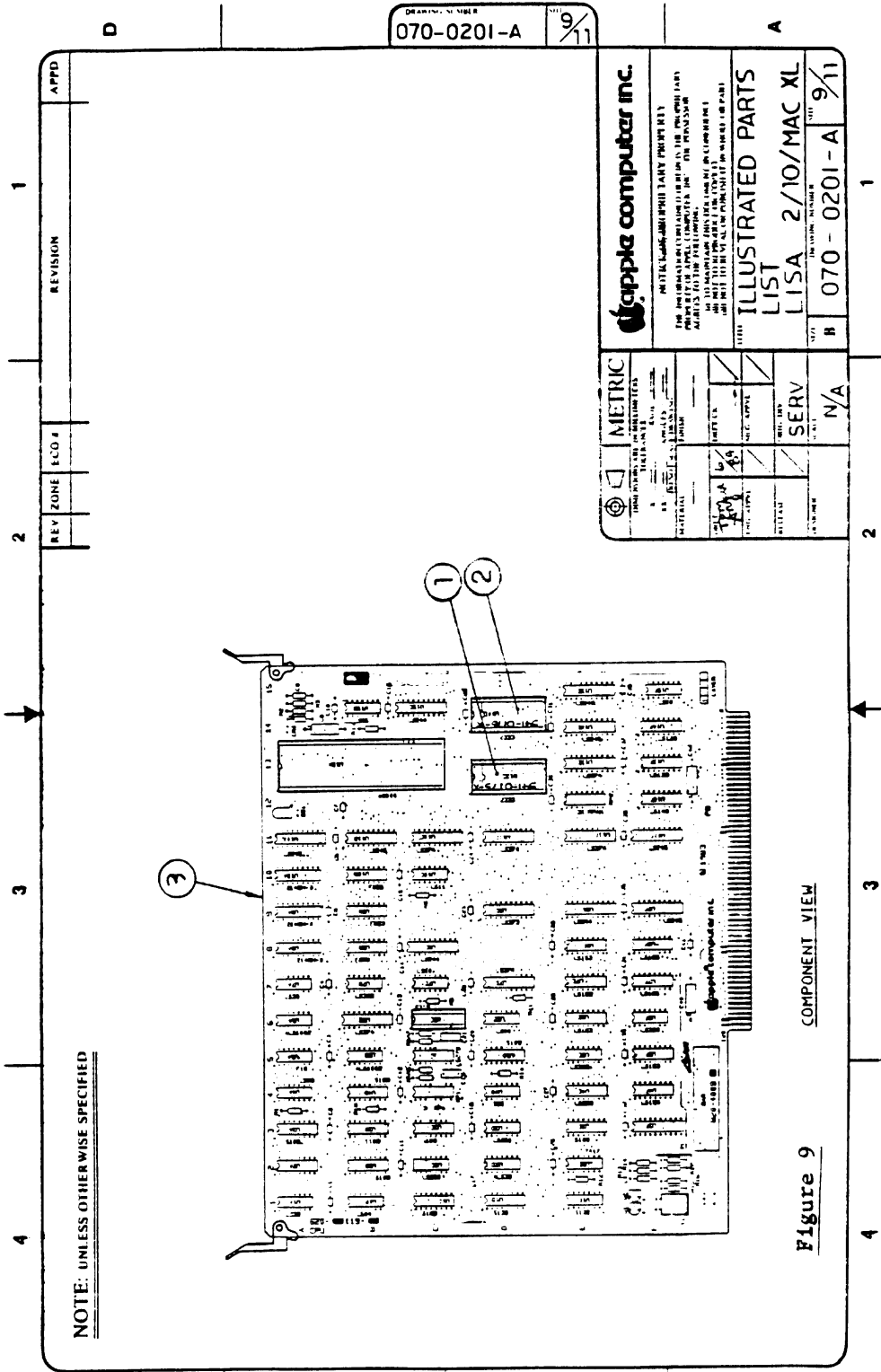
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DRAWN BY: <input type="checkbox"/> J. J. COOPER <input type="checkbox"/> J. J. COOPER <input type="checkbox"/> J. J. COOPER <input type="checkbox"/> J. J. COOPER		DATE: 8/11	

Figure 8



MACINTOSH XL CARD CAGE (Figure 8)

Item	Part No.	Description
1	661-93105	Lisa/Macintosh XL Memory Board
2	661-93103	Lisa/Macintosh XL CPU Card
3	661-93171	Macintosh XL I/O Board
4	805-4051	Macintosh XL Card Cage Chassis
5	400-1405	Card Cage Screw, 4-40x5/16
6	825-4052	Label, Connector
7	661-93170	Macintosh XL Motherboard



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Figure 9 COMPONENT VIEW

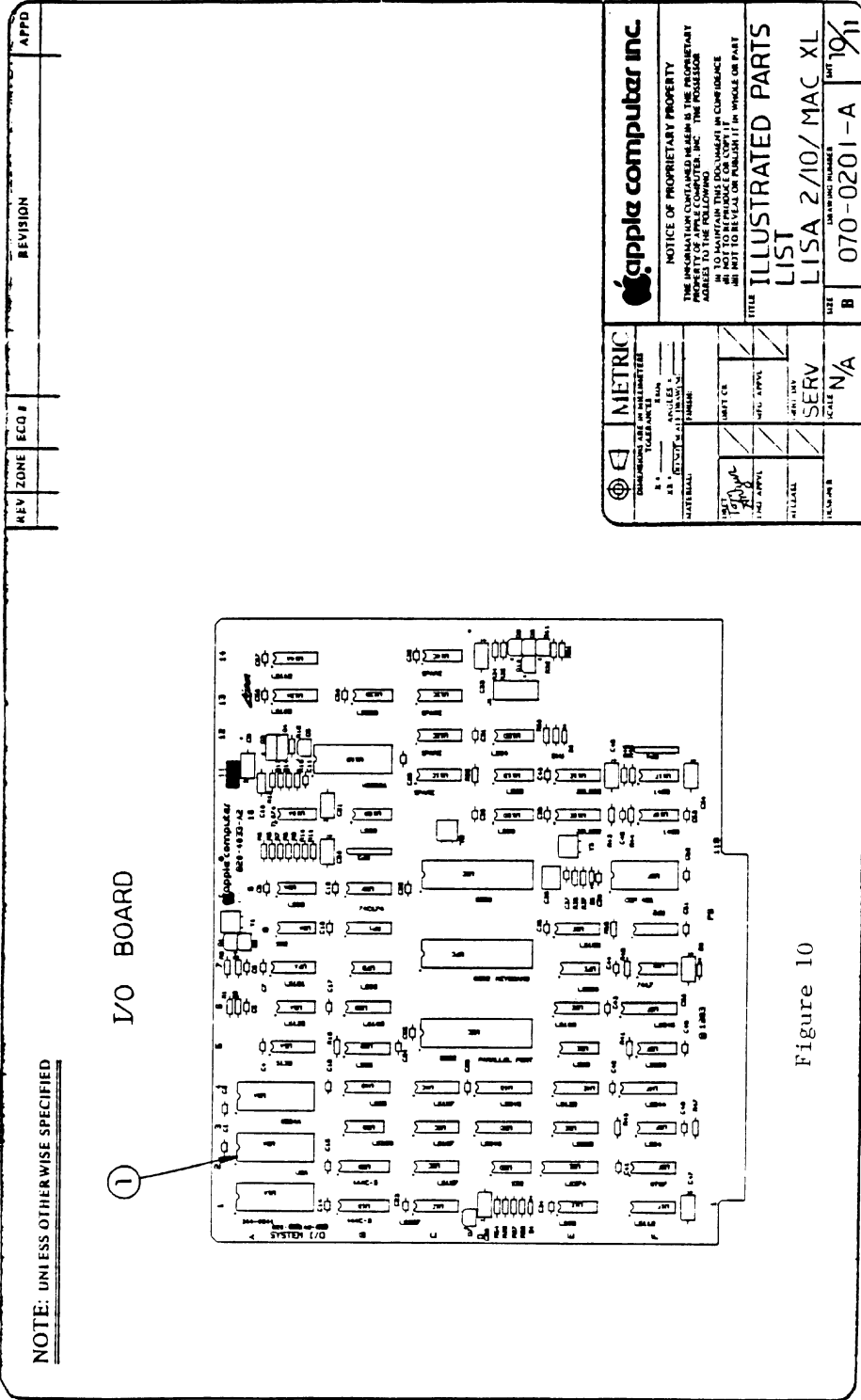


LISA/MACINTOSH XL CPU BOARD (Figure 9)

Item	Part No.	Description
1	341-0175	Boot ROM, High 64K
2	341-0176	Boot ROM, Low 64K
3	661-93103	Lisa/Macintosh XL CPU Board



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LISA/MACINTOSH XL I/O BOARD (Figure 10)

Item	Part No.	Description
1	341-0281	Disk Controller ROM, Macintosh XL



LISA/MACINTOSH XL - MODIFIED CPU CARD (Figure 11)

Item	Part No.	Description
1	661-0298	Macintosh XL Modified CPU Card
2	341-0347	Boot ROM, High
3	341-0346	Boot ROM, Low
4	341-0348	Video ROM

FINIS