Apple Lisa Computer Technical Repair Information

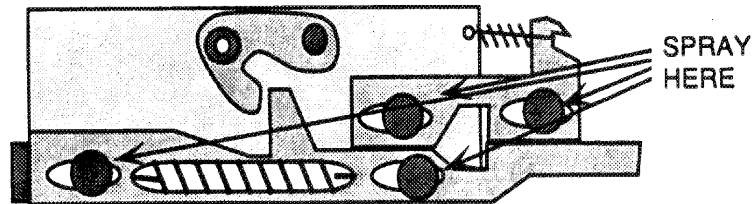# APPLE LISA COMPUTER REPAIR INFO

Part 2 of 2

Figure 21 Spray away the old grease with WD-40.

12. WD-40 both removes the old grease and relubricates the drive. No additional lubrication is necessary. Reverse steps 8 through 1 to reassemble the repaired disk drive.

      Relubricated carrier mechanisms work as good as new. Repairs last indefinitely because, unlike grease, WD-40 can't solidify.
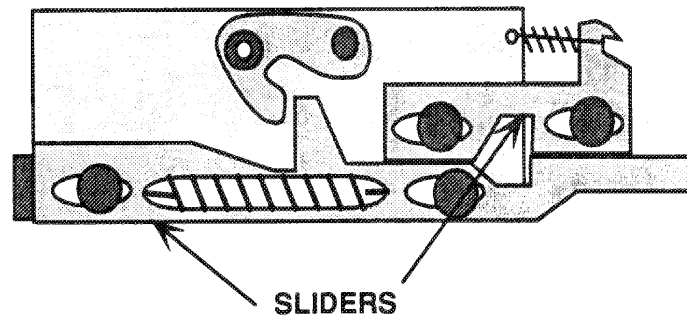

Figure 22 Work the sliders back and forth until all of the old grease is gone.

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The same procedure works for 400K Macintosh disk drives as well. The lubrication principles also apply to 800K Mac drives. Unless you operate in an hermetically sealed environment, all auto-eject drives eventually develop problems with the carrier mechanism. Tiny eject motors don't have nearly the same strength as a human finger on a push button. Periodic relubrication is (or at least it should be) part of routine maintenance.

Drive Does Not Make Eject Noises and Disks Get Stuck

Occasional eject failures which are not accompanied by eject noises indicate that the OEM Lisa drive has been replaced with an OEM Mac drive. Despite the mechanical similarity between 400K drives (right down to the part numbers!), the OEM Lisa model has a different eject mechanism. It's always triggered on shutdown, whether there's a disk in the drive or not. The OEM Mac model is not triggered, unless there is a disk in the drive. Since the Lisa can't do a disk check after a System crash, Mac drives fail to eject them when you restart the computer. Inserted disks remain in the drive, and the Lisa's boot ROM doesn't know what to make of them. There are three possible fixes.

One is to drill a 1/16 inch hole to the right of the drive opening (just like small Macs) and use a straightened heavy-duty paper clip to eject the disks. The second is to repair and reinstall the original Lisa drive. The third is to install MacWorks Plus version I.0.18 or later. Because MacWorks Plus includes 800K drive support, and since the only difference between a 800K Lisa drive and an 800K Mac drive is the mounting hardware, this problem was (and had to be) taken care of, or the 800K Lisa disk drive would malfunction exactly the same way. MacWorks Plus cures many long-standing Lisa problems. We'll be taking a very close look at it towards the end of this publication.

Grinding Noises

Grinding from the disk drive indicates a dirty stepper cam, a dirty head, and / or a clogged pressure pad. Clean the cam shaft with cotton swabs and WD-40, but don't loosen the cam retaining screw. Dirty heads should be cleaned the same as tape recorder

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heads. For easier access, pull back the pressure pad assembly as shown in Figure 23. Use a cotton swab moistened with tape head cleaner.

DRIVE HEAD

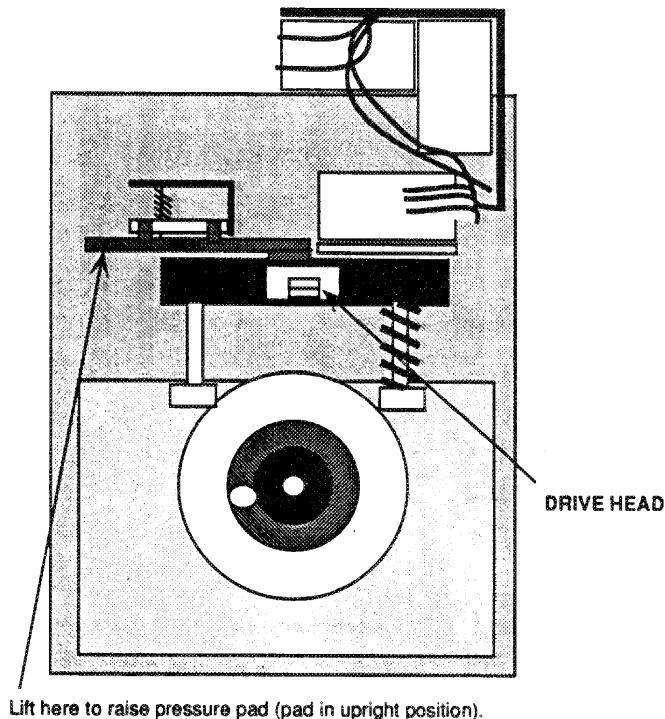Lift here to raise pressure pad (pad in upright position).

Figure 23 For easy access to the 400K drive head, pull back the pressure pad assembly.

The pressure pad is made of a cotton-like material. Brush it clean with a small lint brush. If none is available, flick the surface with your fingernail. Depending on the age and condition of the drive, be prepared for a surprising amount of disk dust! Cleaning fluids should be avoided; they tend to be absorbed.

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Hard Drive Repairs

The Lisa's OEM parallel hard drives (external Profile drives and internal Widget drives) are subject to three common problems:

1. Startup error code 81—pertains to 10MB Widget drive.
2. Startup error code 84—pertains to all Lisa hard drives.
3. Sad Mac error code 0F0064—pertains to all Lisa hard drives formatted under MacWorks 3.0 or MacWorks XL. This is a system folder error message.

Startup Error 81

Startup error code 81 pertains primarily to the Lisa 2/10 and the Macintosh XL. Both models have a 10MB internal hard drive equipped with an electric brake. On startup, immediately after completion of the module tests, the electric brake makes a distinct clunk. If there's no clunk, it means the brake froze (didn't release). If the brake freezes, the hard disk can't spin; the result is a cross over the internal drive icon with error code 81 as shown in Figure 24.
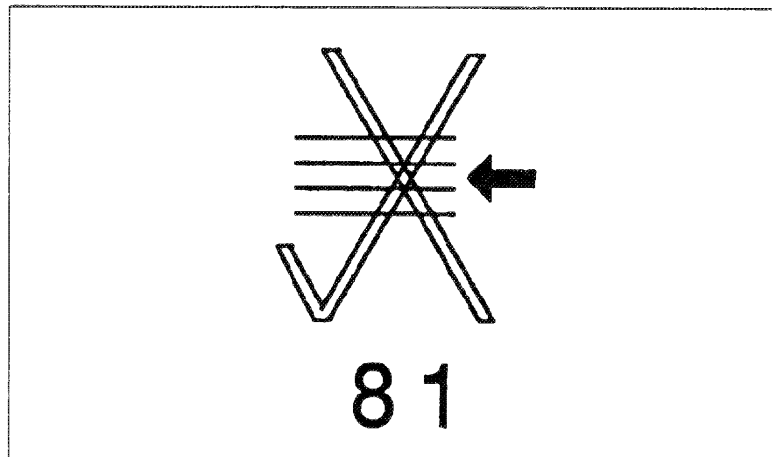

Figure 24 Error code 81 indicates a problem with the brake solenoid.

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Without further information, many people assume that they need a whole new hard drive. Rather than spend the money, they shelve the computer. Well, it's time to dust them off! Error code 81 simply means the brake is out of adjustment. You can fix it, easily, in under an hour, with a #1 Phillips-head screwdriver and a .012-inch feeler gauge. Here's the complete procedure:

1. Disconnect the computer's power cord from the wall outlet.
2. Remove the disk-drive cage as shown in Figures 1 to 3.
3. Disconnect all data and power cables from the installed drives.
4. Turn the cage upside down. This puts the relatively light disk drive on top and the relatively heavy hard drive on the bottom.
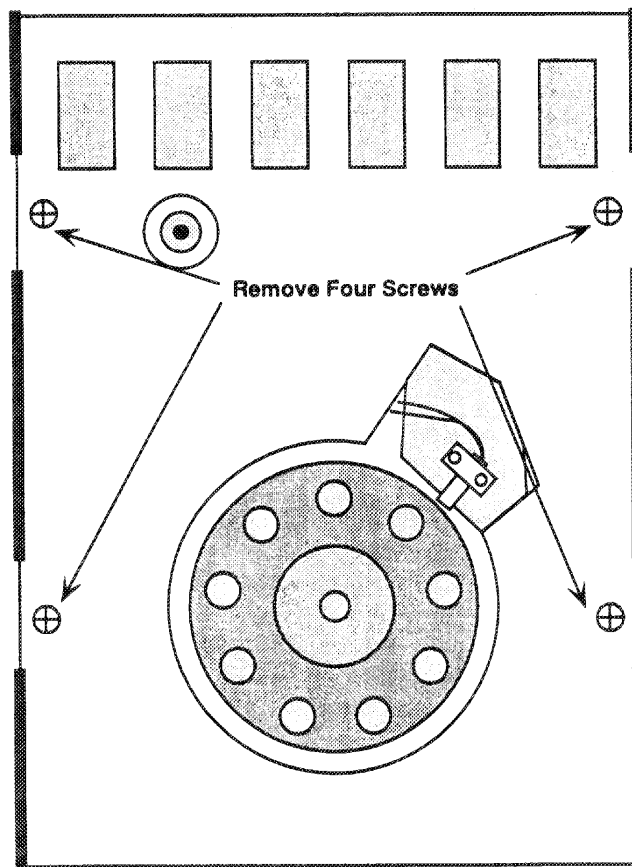
Figure 25 Four screws hold the sheet metal support bracket.

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5. Use a #1 Phillips-head screwdriver to remove six screws (three on each side of the cage) which hold the hard drive in place.
6. Lift the drive cage straight up. This leaves the hard drive upside down on the table.
7. Use a #2 Phillips-head screwdriver to remove four screws from the sheet metal support bracket as shown in Figure 25. Lift the bracket away and put it aside.
8. Locate the solenoid marked "Inertia Dynamics, Collinsville, CT USA." Insert a 0.012-inch feeler gauge as shown in Figure 26.

Tighten the screw, reverse steps 7 through 1, and everything should be OK! If not, repeat steps 1 through 9, allowing a little more or a little less clearance, until you get the brake working.
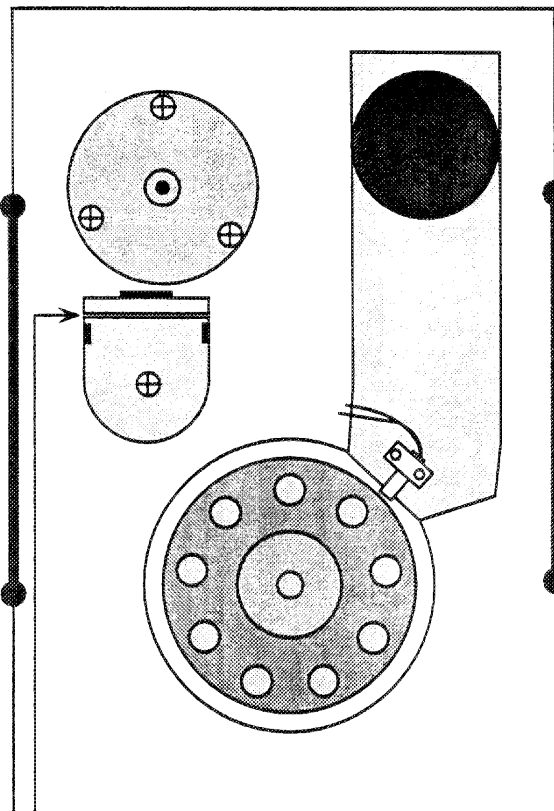
Figure 26 Adjust the brake with a 0.012-inch feeler gauge. 9. At the time of failure, clearance might be as much as 0.075 inch. Loosen the solenoid holding screw and adjust for 0.012-inch clearance.

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Startup Error 84

Startup error code 84 pertains to Profile and Widget drives. It means the boot blocks are damaged. There are three possible fixes.

Fix one involves double-reformatting the drive—first under Lisa OS, then under MacWorks XL. Double-reformatting the drive is time-consuming and it only applies to unmodified computers. You can't use this method with a Macintosh XL Screen Modification Kit unless you pull the 3A ROMs and reinstall the old ROMs. Also, double-reformatting doesn't always work.

Fix two involves reformatting the drive with MacWorks Plus version 1.0.18 or later. Holding down the Apple and the left Option keys while double clicking the MW Install icon opens the program in the expert mode. Expert mode recognizes most unmountable drives and gives the option to you to reinitialize them. Afterwards, the drive may or not be bootable.

Fix three involves sending your drive to Sun Remarketing. Using a special machine, Sun technicians can do a low level format, which rewrites the boot blocks, then a high level format, which installs the latest version of whatever operating system you've been using (Lisa OS, MacWorks XL, or MacWorks Plus). This method always works and it's a lot less painful than having to buy a whole new drive. SCSI drives can be repaired by using utilities such as Norton Utilities.

Sad Mac error code 0F0064

Sad Mac error code 0F0064 pertains to any Lisa hard drive formatted under MacWorks 3.0 or MacWorks XL. At the time the original MacWorks was written, other Macs weren't equipped with hard drives. The old System software, written to 400K floppy disk specifications, has trouble dealing with big disk directories. If over 100 files accumulate, everything slows down and eventually fails. Error code 0F0064 generally indicates an irreparable problem with the System & Finder. There are three possible fixes. The first fix involves rebooting from the hard drive while holding down the Option key. (If you are looking at the sad Mac screen hold down the left option key and press and release the power switch button.)If MacWorks itself is OK, you'll get a floppy disk icon with a blinking question mark. At that point, insert the MacWorks System

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disk. It'll load, you'll get the standard "Welcome to Macintosh" sign-on message, and, shortly thereafter, both disk icons (the floppy disk icon and the hard disk icon) should appear. Now all you have to do is replace the System files. To do that, open the System folder on the MacWorks System disk, select the System & Finder and drag them to the hard disk. A dialog box asking whether to "Replace items with the same names with the selected items?" will appear. Click OK and that's all there is to it.

The second fix applies when the hard drive icon doesn't appear. In that event, you need a special disk called Hard Disk Mount. Hard Disk mount may be obtained from Sun Remarketing for a cost of $15. Here's the complete repair procedure:

1. If the computer is on, reach around the back with your right hand and press the reset button. If the computer is off, turn it on.
2. Immediately after hearing the first click, tap any key but Caps Lock.
3. When the STARTUP FROM menu appears, insert the HD Mount disk and click the disk drive icon or hold down the Apple key and press the 2 key (the one on the keyboard, not the one on the keypad) to proceed.
4. When the HD Mount disk ejects, you'll see a floppy disk icon with a blinking question mark. "Hard Disk Mount" will be written under it.

From here on, the repair is the same as above. Insert the MacWorks System disk, and shortly thereafter, both the floppy disk icon and the hard disk icon will appear. Replace the System files and that's all there is to it.

Note: Hard Disk Mount is for repair purposes only. It's not an upgrade! Replacing regular MacWorks with Hard Disk Mount (using the Hard Disk Install Utility) is not recommended.

The third fix is to replace MacWorks XL with MacWorks Plus. MacWorks Plus provides full 128K ROM emulation, including the HFS file system, support for hard drives, support for SCSI drives, and it lets you use later versions of the Macintosh System and Finder. Install MacWorks Plus and you'll never see error code 0F0064 again.

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MacWorks Plus

MacWorks Plus was developed by Sun Remarketing in full cooperation with Apple Computer. It's an official upgrade, supplied on disk, either 400K or 800K (you have to specify which) so you can use it with both the old and the new style 3.5-inch disk drives. As of version 1.0.18, the hard disk installer program required a megabyte of standard RAM (two 512K cards). If you have a memory upgrade, the upgraded card has to be in slot 2, and a stock 512K card has to be inserted in slot 1, or the installer won't run.The important point is, you need 1Mb of memory and at least one 512K card to run the MacWorks Plus Installer program. So if you're planning to buy a memory upgrade, make sure you hang on to at least one of the original 512K cards!

What It Does

Other Macs contain two ROM (read only memory) chips packed with unique operating code. The Lisa doesn't. As soon as you turn on other Macs, portions of that code are read into RAM (random access memory). All Macintosh programs, including the System and Finder, rely on that code and presume it's going to be there. If it's not there, programs can't execute.

The MacWorks Plus Install program creates a file containing complete 128K ROM emulation on a read only portion of your diskette. Immediately after the automatic startup tests, that code is read into RAM by the Lisa's boot ROM. From that point forward, the Lisa is, for all intents and purposes, a big screen Macintosh Plus.

MacWorks Plus Hard Drive Installation

1. Since the installer program reformats (erases) the hard drive, an important preliminary step is to back up all important files. Skip old system files. MW+ 1.0.18 requires new Macintosh System software (System 6.0 or later), so backing up System files is needless. After the backup, shut down normally and wait for the power light to go out.
2. Once the power light is out, wait 15 seconds or so for the internal hard drive to wind down (if appropriate) and turn on the

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Miscellaneous MacWorks Plus Information

Once installed, MacWorks Plus loads itself from the hard drive, then it usually boots the hard drive, but sometimes it shows you a floppy disk icon with a blinking question mark instead. When that happens, the Lisa is waiting for you to insert a Macintosh System/Finder disk. If you meant to start from the hard drive, press the right option key to proceed.

To reboot from a startup disk, hold down the Apple key and push the power switch. If you keep the Apple key down, you'll see the floppy disk icon with a blinking question mark. Insert a startup floppy disk, then let the Apple key up. The System file on the floppy disk (assuming it's version 4.2 or later) will now be in control of the computer. Once you get to the desktop, the floppy disk icon will be on top. The hard drive icon will be underneath.

Upgrading to MacWorks Plus may be all you need to do to bring an old Lisa/Mac XL up to the newest specifications. It's part of the 800K disk drive upgrade. It comes with internal hard drive upgrades, and it's available separately.

Loading MacWorks Plus on a SCSI Drive

MacWorks plus on a SCSI drive is some what different than ex-plained above. MacWorks Plus does not reside on the hard drive. It must be booted from a floppy.

To load MacWorks Plus...

1) Insert the MacWorks Plus Boot disk into the floppy drive slot.
2) Turn on the computer and hold down the ⌘ key while typing a 2 during the memory test.

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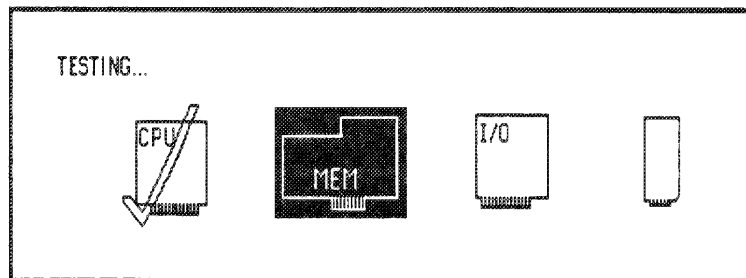
Then release. Be sure to type the 2 on the main keyboard and not on the 10-key pad. You will see the hourglass on the screen for a few minutes while the computer is working. The computer will run for a moment and the message "Loading...." will appear on the screen.

3) The Lisa system is now ready for a Macintosh Operating System. If an attached hard drive has a system folder on it (drives coming directly from Sun Remarketing will), the hard drive will automatically launch the system and finder. This will bring you up to the desktop with the Hard Disk icon in the upper right hand corner.

4) If you wish to bypass the automatic launch and boot with a Macintosh System disk or the MacWorks Plus Utilities Disk, hold down the left option key during the "Loading...." process and keep it held down until you get a diskette with a blinking question mark. Insert the Macintosh System disk or the MacWorks Plus Utilities Disk. This will bring you up to the desktop with the Diskette icon in the upper right hand corner, and you can procced with your desired action.

800K Disk Drive Upgrade

The 800K disk drive upgrade includes a new 800K disk drive, exactly the same drive that comes in every other Mac, a new disk drive ROM chip, the latest Macintosh System software, and the latest version of MacWorks Plus. All you need is a #1 Phillips-head screwdriver to install the drive and a small flat-head screwdriver to install the ROM. Figure 27 shows an 800K drive installed in a Lisa 2/5.

Lisa 7/7 users may also take advantages of an 800K drive by using the Lisa Office System driver available from Sun Remarketing for $15.

Here's the step by step 800K disk drive installation procedure:

1. Disconnect the computer's power cord from the wall outlet.
2. Remove the disk drive cage as shown in Figures 1 to 3.
3. Disconnect all data and power cables from the installed drives.
4. Remove the internal disk drive by tilting the drive cage forward

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and loosening four Phillips-head screws at the bottom. Use a #1 Phillips-head screwdriver. Support the drive with one hand as shown in Figure 17.

5. Swap drives. Support the new drive the same way. Screw it into the exact same holes.

6. Reconnect the data cables. Replace the drive cage. Reattach the front cover.

7. Remove the rear panel as shown in Figure 4.

8. Refer to Figures 11 and 12. The disk drive controller chip is on the upper left corner of the board . The disk drive ROM chips are marked with white stickers. On a Lisa, the ROM to pull is part# 341-0290 at position AI. On an XL, it's part# 341-0281D at position A2. Carefully pry both ends of the chip with a small flat-head screwdriver. Be sure to work from both ends. If you work from just one end, you'll bend and possibly break the pins.

9. Orient the new chip so that the notch is pointing upward . Make sure you use the right chip for your computer. Plug it into the socket. On a Lisa, the chip fits the socket perfectly. On a Macintosh XL, the socket is larger than the chip. Start from the bottom of the socket . The top of the socket is not used.

10. Replace the rear cover, reattach the power cord, and that's it.
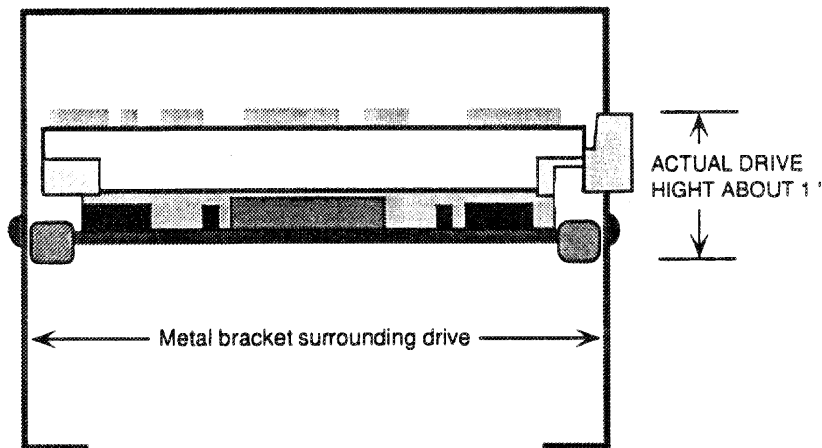

ACTUAL DRIVE
HIGHT ABOUT 1 '

Metal bracket surrounding drive

Figure 27 Profile view of an 800K drive in the mounting bracket. It takes up about half the room as a 400K drive

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Expansion Card Upgrades

The Lisa has three PC-like expansion slots to the left of the rear panel. Recently developed expansion cards simply plug into these slots. A SCSI card will allow you to connect up to 7 external SCSI devices. Together with an 800K disk drive upgrade, these cards essentially turn any IMb Lisa/XL into a big screen Macintosh Plus.
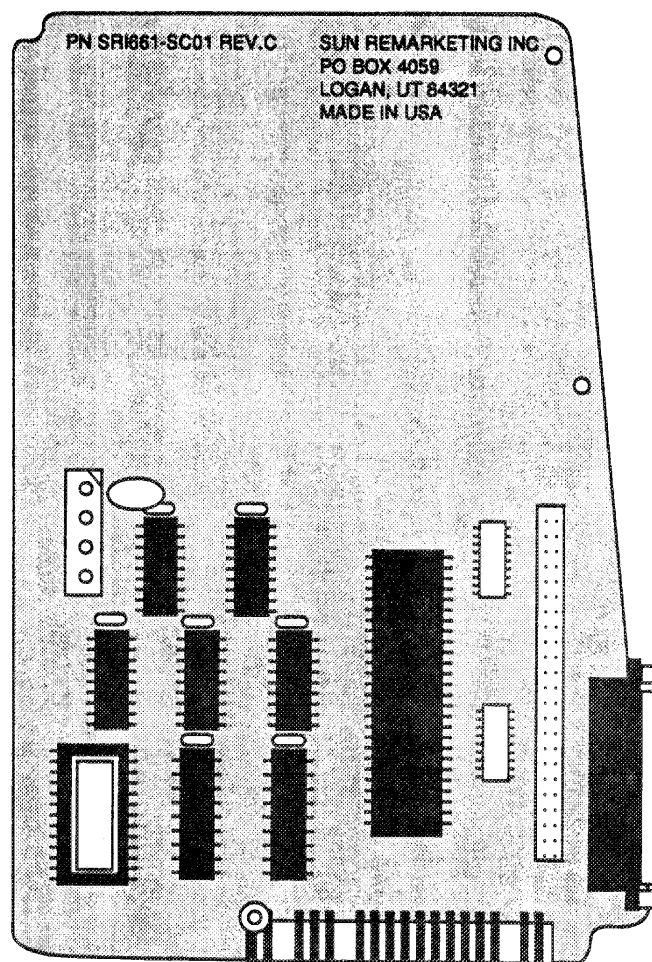

PN SRI661-SC01 REV.C   SUN REMARKETING INC
PO BOX 4059
LOGAN, UT 84321
MADE IN USA

Figure 30 SCSI card for the Lisa/Mac XL.

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Internal Hard Drive Upgrades

Through the years several hard drive options have been available. New technologies in both operating systems and the hard drives them selves make one option optimal, the Sun 40 SCSI. The Sun 40 SCSI is a true SCSI hard drive mounted on a SCSI card (see figure 30) that fits internally in the Lisa or Mac XL via one of the expansion ports. The SCSI card also allows you to connect external SCSI devices to your computer as well.

There are several reasons that this upgrade is so optimal. It uses the latest SCSI hard drive technology which offer greater speed and reliability. It also requires that you boot MacWorks Plus from a floppy. This small inconvenience allows the SCSI drive to be formatted 100% Macintosh. As a clean macintosh drive you will be able to fix troubles using programs like *Norton Utilities*. Older hard drive options require that two environments exist on the hard drive. This made user repairs virtually unheard of.

Memory Upgrades

Early AST Ramstack upgrades (long since discontinued) took the Lisa/XL to 1 .5Mb or 2.0Mb. RAM cards recently developed for the Lisa/XL use PC-style 256Kx9 single inline memory modules (SIMMS). Upgrading beyond 2Mb requires CPU board modifications as well. Although the MC68000G8 process or can logically address 16 Mb, the original design of the Lisa/XL CPU board contains only enough physical address lines for 2Mb. By contrast, the 128K to 512K Mac CPU board contains just 0.5Mb of physical address lines, and the Mac Plus CPU board contains physical address lines for 4Mb. The necessary CPU board modifications add extra memory addresses, allowing you to populate the Lisa SIMM card all the way to 4Mb.

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Video Upgrades—External Monitors

All Lisa/Mac XL computers are equipped with a composite video out connector. As shown in Figure 28, the video connector is a standard RCA jack located just to the right of the reset button, at the rear of the computer. This connector accepts ordinary RCA phono cables, defined as shielded 2-conductor wire with an RCA phono plug on each end. Unlike the Macintosh 128K to Macintosh II, it's not necessary to buy or build an add-on video card to use an external monitor on the Lisa/Mac XL. All you need is an external monitor with auto synchronous multiscanning capability and a matching composite video-in connector.

Video Upgrades—Internal Monitor—Macintosh XL Screen Kit

No recently restored Lisa/Mac XL is complete without a Macintosh XL Screen Kit. Unlike the standard 9-inch Macintosh which has square pixels, the stock Lisa/XL has rectangular pixels. With rectangular pixels, circles look like footballs, squares look like spaghetti boxes. The purpose of the Macintosh XL Screen Kit is to square up the pixels. Proportions become exactly the same as on other Macs (1 to 1), but the overall display area (608 pixels x 432 pixels) is made roughly the same as a 12-inch Macintosh II WYSIWYG monitor (640 x 480). Standard 9-inch Macs only display 512 x 342 pixels.

The complete screen modification kit includes new 3A boot ROMs, a new video ROM and a new yoke coil. (Newer software requires System Update 5.0 and MacWorks Plus as well.) Conscientious installation of the complete screen kit requires one to two hours. This summary will give you an idea of everything that's involved:

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1. If the set is on, power down normally and switch off the power.
2. Physically disconnect the power cord from the wall outlet. If you're the least bit hesitant about discharging the CRT, leave the set disconnected overnight. By the next morning, most, if not all, of the high-voltage charge will have dissipated.
3. Disconnect all peripheral cables, and remove the rear cover from the back of the computer. Refer to Figure 4.
4. Remove the card cage and the CPU board. Refer to Figures 9 to 10.
5. Remove the existing 20-pin video ROM from location C6 on the CPU board. Replace it with part number 341-0348.
6. Remove the 28-pin boot ROM from location D12 on the CPU board. Replace it with part number 341-0347.
7. Remove the boot ROM from location D14. Replace it with part number 342-0346.
8. Replace the CPU board and put the card cage aside. Don't reinstall it just yet.
9. Remove the top cover. Refer to Figure 13.
10. Remove all rings, watches, and jewelry. Put on safety goggles.
11. With one hand behind your back, discharge the CRT through a 10-meg resistor.
12. Unplug the green and yellow CRT (yoke) to P2 cable from the video board. As illustrated in Figure 29, P2 is located
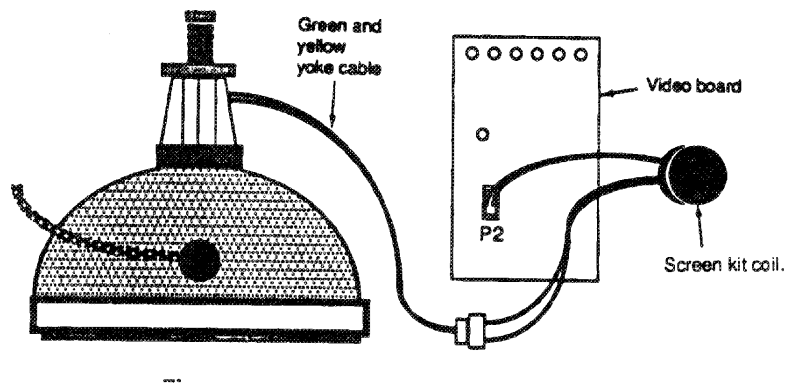

Figure 29 XL screen kit wiring details.

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approximately halfway down the left side of the board.

13. Plug the yoke cable into the new screen kit transformer. Plug the new transformer into P2.

14. The new transformer attaches to the outer wall of the disk-drive chamber with double-sided tape. Clean the area, and attach the transformer as shown in Figure 30.

15. Locate the six adjustment potentiometers labeled "CONT.," "HOR. PHASE," "HEIGHT," "V. HOLD," "WIDTH," and "V. LIN" which are at the top of the video board. As shown in Figure 31, these adjustments have been sealed at the factory and will have to be unsealed and readjusted for use with the screen kit.

16. With a sharp razor knife, carefully remove all of the sealant. The key word here is all. It's not enough just to break the sealant. Any glob that remains may artificially limit the adjustment, making it impossible to properly realign the screen. For best results, every glob of sealant must be removed!

17. Refer to Figure 9. Slide the card cage back into the Lisa, and reconnect the power cord. Turn on the Lisa/XL.
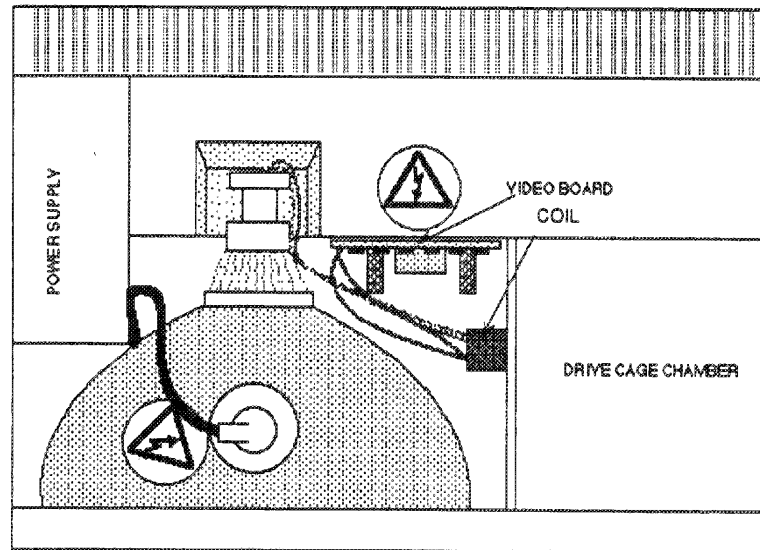

Figure 30 The new coil attaches to the outer wall of the disk-drive chamber with double-sided tape.
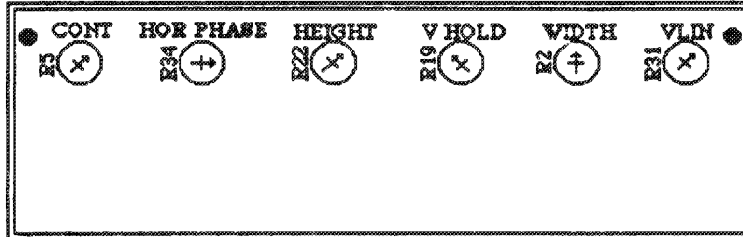
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Figure 31 The CONT., HOR. PHASE, HEIGHT, V. HOLD, WIDTH, and V. LIN adjustments are at the top of the video board.

18. Adjust an accurate VOM meter to the lowest DC volt scale capable of measuring 5.0 V DC. Attach the black probe to the Lisa chassis. Locate the HOR. PHASE potentiometer, labeled R34, which is second from the left as you face the front of the video board. Turn around and face the rear of the video board. Find the point where R34 is soldered to the printed circuit. Insulate the red VOM probe with a piece of shrink tubing. Carefully touch the tip of the insulated, red probe to the rightmost of the potentiometer's three solder joints. (Note: if you do this while leaning over the front of the computer, the 5.0-V joint will be on your left.) Be careful not to short uninsulated probe tips to the steel card reading is out of range, go on to step 19. If it's in range, skip to step 21.
19. Refer to Figure 5. Turn off the Lisa/XL. Face the rear of the computer and unplug the power cord from the power supply. Unscrew the knurled knob and remove the supply by pulling straight back. New units may offer some resistance. Pull straight back.
20. As shown in Figure 32, find the access hole on the left side of the power supply. With a long-handled 1/8-inch slotted screwdriver, tweak the +5.00-V adjustment pot (RII) clockwise 1/16 of a turn. Reinsert the supply and measure again (repeating step 18). If the meter still doesn't read +5.00 volts, repeat steps 18 through 20 until it does.
21. The Macintosh XL Screen Kit generally causes horizontal foldover which manifests itself as an annoying 1/8-inch to 1/4-inch white bar at the left edge of the screen. Turn the horizontal phasing control (at the top of the video board) counterclockwise until it's gone. Properly adjusted, the pointer on the HOR. PHASE pot will typically indicate eleven o'clock. If you can't ad-
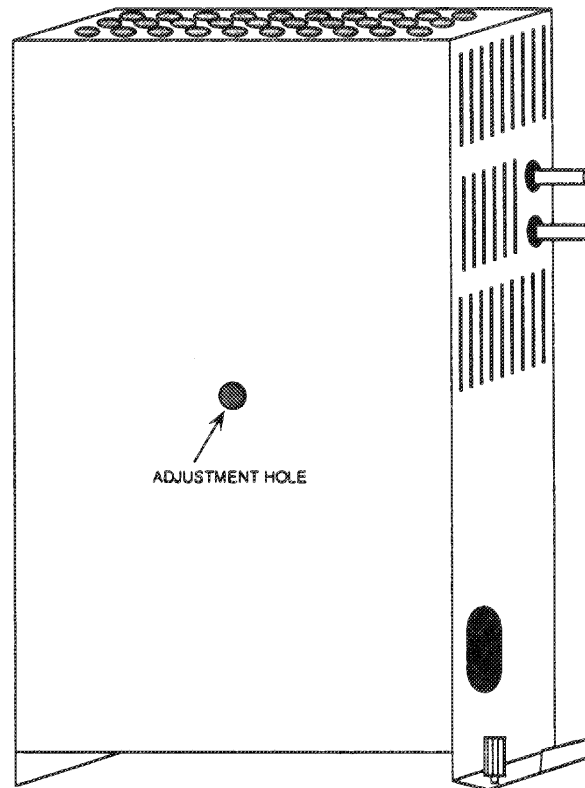
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Figure 32 The +5.00-V adjustment can be reached through this access hole on the left side of the power supply.

just the HOR. PHASE pointer pas twelve o'clock, check for excess sealant and remove it as noted in step 16. If the pointer turns fully counterclockwise and you still have a foldover problem, check the +5.00 voltage adjustment as noted in steps 18-20.

The next step requires accuracy and involves the use of a soft cloth ruler (also known as a dressmaker's ruler). Use a good one. Because the edge protectors on cheap rulers are only haphazardly cemented to the tape, the first and last inches could be off by as much as 1/8 inch! Attempting the final alignment procedure with an inaccurate ruler will prove futile. Choose a

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quality cloth ruler. Check it carefully for accuracy before proceeding.

22. Boot MacWorks or MacWorks Plus. Measure the screen size. Don't be surprised if you have to turn both controls fully counterclockwise (to approximately 8 o'clock). The final raster should measure exactly 8.44 inches in width and 5.99 inches in height. If it's substantially larger than that, shut down the Lisa /XL and remove the power cord . Pull the card cage, observe the metal chassis and find the L3 (coarse width) access hole. As shown in Figure 33, L3 is located below the alignment pots and has to be tuned from the back side of the board. Insert a plastic hexagonal alignment tool through the access hole and turn L3 counterclockwise (in), one full turn. That should do it. Reinstall the card cage, reboot, and repeat the HEIGHT and WIDTH adjustments for best linearity.
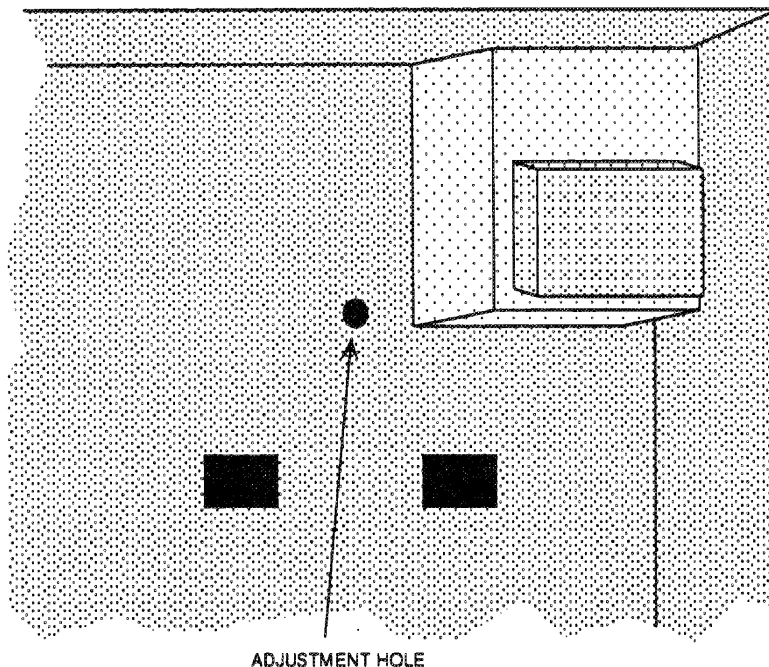

ADJUSTMENT HOLE

Figure 33 L3, the coarse width control, is located below the alignment pots and has to be tuned from the back side of the board.

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23. With a draw or paint program try drawing true squares and circles. Circles should be nice and round and not egg shaped. squares should be square. The display should also be square to the frame. If any of these conditions exist continue with step 24. If not, skip to step 28.

24. If the raster is intolerably off-center or tilted, shut down the Lisa/XL and remove the power cord. Remove jewelry, put on goggles, etc., and discharge the picture tube again.

25. Refer to Figure 12. Remove the sealant from the purity rings at the neck of the CRT until both rings move freely.

26. Refer to Figure 9-2. In the event the raster was also tilted, loosen the yoke retainer as well.

27. Plug in the Lisa and, while exercising all precautions, adjust the purity rings using just one hand, until the raster is centered on the screen. Next, adjust the yoke, if necessary, until the raster is square to the screen. With one hand still behind your back, carefully snug the yoke.

28. Complete the installation by relocking the adjustments to the PC board with fresh sealant.

29. Replace the top and the back cover. You now have a big-screen WYSIWYG Macintosh display.

One final note, as mentioned earlier in this chapter, when the XL Screen Kit is used with the Lisa's light duty 1.2-A power supply (Apple Part# 6206103), audible transformer ringing may result, horizontal retrace lines may become noticeable, and a slight screen flicker may be introduced. The fix is to install the Lisa's heavy-duty 1.8-A power supply (Apple Part# 699-0189).

Summary

Despite the implication, an XL Screen Kit is not something you buy to turn a Lisa into a Mac XL. It's something you buy to turn Lisas and Mac XL's into WYSIWYG big-screen Macintoshes. Combined with an 800K disk drive upgrade, the result is a big-screen 1024K Macintosh. Combined with a SCSI card, the result is a big-screen Macintosh Plus. Combined with an internal hard drive, the result is a big-screen Macintosh SE. Add on an accelerator card, and what you've got is somewhere between a Macintosh SE and the

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Macintosh II.

Consider the similarities: All three computers have detachable, dual voltage, heavy-duty power supplies. All three computers accept internal hard drives. All three have built-in expansion slots. All three have internal boxer fans. All three have heavy-duty keyboards with integral numeric keypads. The Macintosh II is regularly matched to a 12-inch monochome display. The Lisa/Mac XL is permanently matched to a 12-inch monochrome display. You could almost say that the philosophy has come full circle.

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Apendix A—General Trouble Shooting

No Power.

    a) Front or back cover not seated tightly (pg. 5)
    b) Power supply fuse needs to be replaced (pg. 7)
    c) Bad Power Supply (pg.5)
    d) Bad outlet

Power flicks briefly then cuts out.

    a) Bad Power Supply (pg. 5)
    b) Bad Video Board (pg. 41)
    c) Bad Soft Switch (on/off button)

Screen goes blank & computer stays on.

    a) Bad Video Board (pg. 41)
    b) Bad Screen Mod Coil (pg. 43)
    c) Bad Video State ROM (pg. 10)

Video jumps, rolls or flickers on the screen.

    a) Video board needs adjusting. (pg. 44)
    b) Power supply needs adjusting (pg. 45)

"Continue or start up" from message when trying to boot up.

    a) Check error codes on pg. 16

Restarts after "Welcome to Macintosh" screen

    a) Bad system folder (boot from floppy and replace the system folder)
    b) Use FIND FILE to search for a second system icon and remove.
    c) Using 512k memory with MacWorks Plus

Screen shakes with "Welcome to Macintosh" start up screen.

    a) Bad system folder (boot from floppy and replace the system folder)
    b) Use FIND FILE to search for a second system icon and remove.

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Sad Mac error with black screen.	a) Bad system folder. (pg.32)
Screen is not displaying characters the way they are printing out.	a) Need to install the Screen Mod Kit (pg.41)
Hard disk is not being recognized.	a) Reinstall Macworks X/L, MW Plus or Lisa Office. b) Disconnect hd cables and reconnect. c) check for brake problem on 10mb drives. (pg. 29) d) Return drive to Sun Remarketing for factory format. e) If using an SCSI drive, slide the card back and in the slot to reseat the card.
400k floppy drive problems	a) Refer to pg. 22
800k Dive reading board. extremely slow.	a) Replace the 800k drive chip on the I/O
800k Drive continually ejects diskettes	a) Pull test pins 9 and 20. Count from top to bottom starting right to left. Pin one upper right hand corner. Pin 3 is just to just to the left of pin one.
Apple Talk problems	a) Cut resister on R38 and scratch trace on chip1489 right hand side third trace down. (Only on the Lisa I/O not on Mac XL I/O
Batteries on I/O board are corroded.	a) Remove batteries. Computer will draw power from the outlet to run the clock when pluged in.

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Printer not printing	a) Check Chooser. Port A = modem port. Port B = Printer b) Cable should be a modem cable with a modem eliminator cable.
Printer Prints 1/2 of the page then prints garbage.	a) Handshaking problem. Lisa requires hardware handshaking. (Imagewriter SW 2-3)
Printer shuts down during printing.	a) Macworks Plus bug. Obtain a new copy of the Macworks Plus program.
Error appearing on screen during shutdown	a) Macworks Plus bug. Will not effect functionality of the computer or cause any loss of data.

FINIS

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"Lisa Repair Sun 51 .pict" 78 KB 1998-10-28 dpi: 72h x 72v pix: 327h x 572v