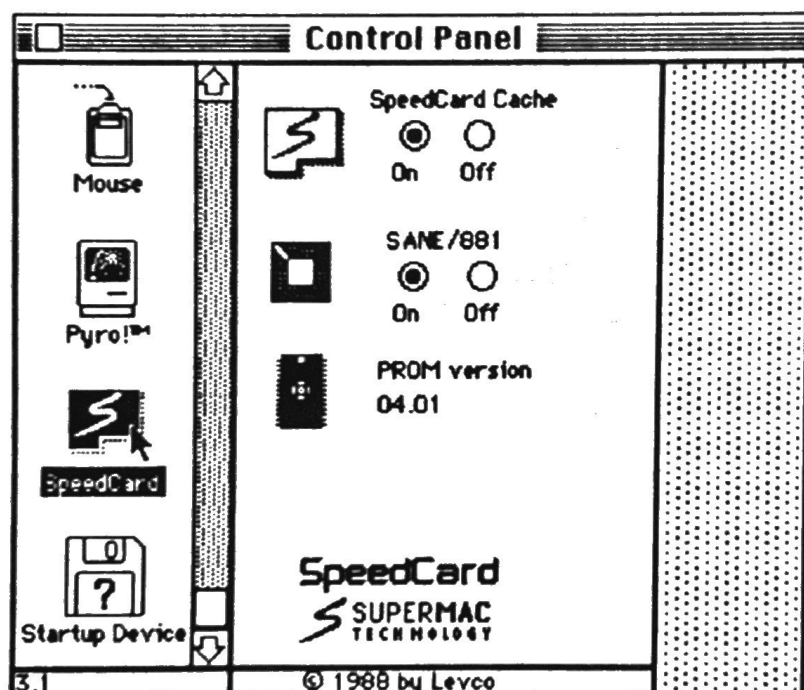


SpeedCard

Installation and User's Manual



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INTRODUCTION

The SpeedCard is a high-performance, add-on board for the Apple Macintosh SE. It plugs directly into the expansion bus on the Macintosh SE motherboard, requiring no modification.

Standard Features:

- 68000 processor rated at 15.67 megahertz.
- 16-Kilobyte static RAM cache
- 16-bit I/O expansion bus for connecting additional devices, such as high-resolution large screen monitors.

Optional Features:

- Motorola MC68881 floating-point math coprocessor running at 15.67 Megahertz.
- Expansion bus connector for use on the 16-bit I/O expansion bus. If you already have a board installed in your Macintosh SE, consult its manufacturer to verify whether it will work when plugged into the Expansion Bus on the SpeedCard board.

About This Manual

The *SpeedCard Installation and User's Manual* contains information that will help you install and take maximum advantage of your SpeedCard. The manual is divided into two chapters.

- Chapter 1 shows how to install the SpeedCard. Only authorized SuperMac dealers or qualified technicians should attempt the installation.
- Chapter 2 describes how use SpeedCard and the software that came with it. This chapter also you tells you how to temporarily bypass the

SpeedCard and run your Macintosh from its original 68000 motherboard.

This manual assumes you know how to use a Macintosh and the software you have purchased. If you are not familiar with the basic Finder operations such as launching applications, resizing windows and organizing files, review the owner's guide that came with your computer.

Unpacking

Before you begin you should check to be sure you have received all of the items shown below.

- SpeedCard board
- *SpeedCard Utilities Software* disk
- SpeedCard Installation and User's manual

If anything is missing, please contact your authorized SuperMac Dealer. Fill out and return the warranty card to validate your one-year warranty and entitle you to receive future utility software upgrades.

CHAPTER 1

INSTALLING THE SPEEDCARD

Read this entire guide before starting. Do not force anything. If you have to force it, you're probably doing it wrong. Go back and read the instructions and try again.

The SpeedCard is to be installed by qualified service technicians at authorized SuperMac dealerships only. The product is not user-installable. These instructions assume a basic knowledge of taking apart a Macintosh computer.

The operations described in this manual must be carried out at an anti-static workstation. Components on the SpeedCard are sensitive to static electricity. SuperMac Technology will not be responsible for any damage to the Macintosh or SpeedCard, if such damage results from static discharge, mishandling, or installation by other than an authorized SuperMac dealer.

A **Warning** indicates that something is potentially dangerous to either you and/or your Macintosh SE. Pay close attention to the information that follows a Warning. Failure to note all warning information could lead to damaging your Macintosh or possibly result in an electrical shock.

Warning: Remove all jewelry including rings, watches, and necklaces. Wear shatterproof safety goggles.

Locate a Good Work Area

A good work area is a well-lighted table-top that has a clear space of at least 6 square feet (i.e. 2' by 3').

The area should be free from static electricity. Static electricity is what causes those big sparks and shocks you get when you grab a door handle after shuffling across a carpeted room. It can be a real problem

in carpeted areas, especially on new or freshly cleaned carpets or on any carpet during the winter months in buildings with central heating. If possible, it is best to avoid working in a carpeted area, however, if you must work in or around carpet, give the carpet a liberal misting of tap water from a spray bottle before you start work.

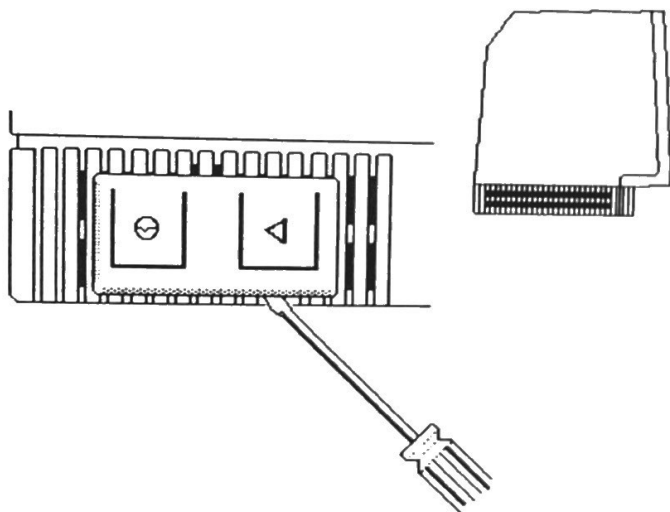
Removing all Cords and Accessories

If you are already familiar with the procedures, simply remove the motherboard and skip to "Plugging the SpeedCard Board into the Motherboard."

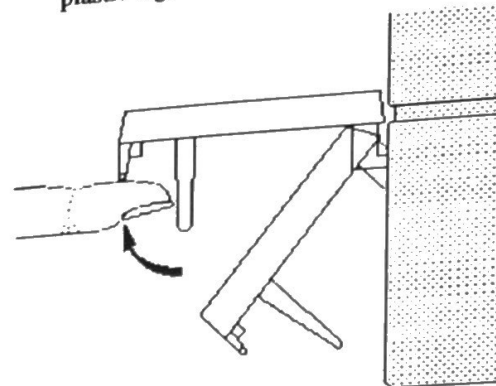
Disconnect the power cord, keyboard cable, mouse cable, and any other accessory cables attached to your Mac. Wait about 35 minutes to allow the internal capacitors, the components that store electric charge, to discharge, since they can retain very high voltages even after the machine has been turned off.

Remove the programmer's switch, if you have one, and store it somewhere where you can find it again.

1. Pry up the bottom of the switch with a small screwdriver.

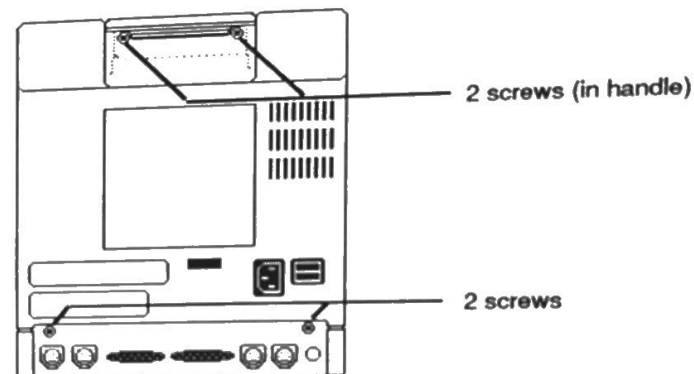


2. Remove the switch completely by pivoting it upward so that the plastic legs are cleared.



Removing the Cover Screws

There are four (4) screws that hold the front and back covers together. The following illustration shows their location.



You will have to remove all four screws. These screws require a special screwdriver (TORX T-15) to remove and install them. As each screw is removed, be sure to place it in a secure location where it can be found again.

Lay a clean, soft bath towel on your work table to prevent scratching the front cover of the Mac. Place your Mac on the towel, face down. This will give you easy access to the screws.

Locate and remove the four screws as follows: Two screws are located in the lower right and left corners of the rear cover, just above the mouse connector and just below the power connector. Locate and remove these two screws.

The other two screws are located deep inside the handle on the rear cover. By looking far up inside the handle you should be able to see two screws. Locate and loosen them completely. You will need a long TORX screwdriver.

When the screws are completely disengaged from the front case, tip the Mac back to its normal standing position. The two screws may not fall out of the handle of their own accord. If not, tip the Mac back until it is lying on its back and gently tap the handle area. If the screws still do not fall out, return the Mac to an upright position and try loosening the screws still further.

Warning: You must make sure that these four screws are completely free of the front half of the case before continuing.

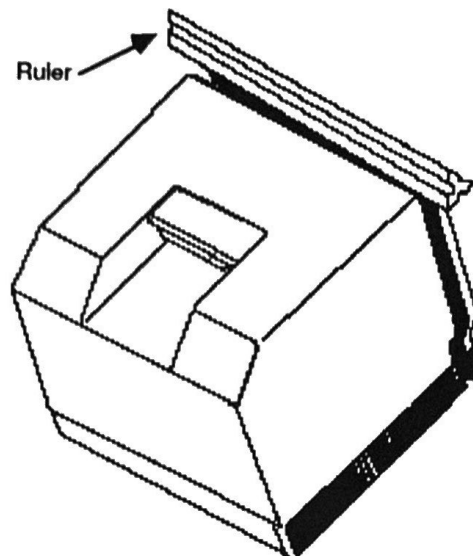
Removing the Macintosh's Case

Warning: Removing the Macintosh case exposes you to dangerously high voltages on the analog power supply board and the CRT. Use extreme caution. Do not touch metal tools to the power supply.

Stand your Mac in an upright position and locate the dividing line between the front and rear covers. The dividing line is a narrow seam, about 1/16 of an inch, that runs completely around the case near the front of the Mac about 1/2 inch from the front face.

Take a standard, triangular, plastic engineering ruler and insert the edge into the seam between the front and rear cases.

Using a ruler as a wedge, very gently pry the back and front covers apart by alternately pulling and pushing on the ends of the ruler.



After the seam has been pried apart, turn the Mac over and use the same procedure to open the seam at the bottom of the case. Continue doing this in small steps, to avoid scratching either cover or damaging the edges, until you have separated the front and back covers. The covers are sufficiently separated when you can see inside the Mac, i.e. when the crack is about 1/2 to 3/4 of an inch wide.

While this procedure is simple, some of the Mac cases are quite hard to get apart the first time. Take heart however, you are more likely to break the plastic ruler or slip out of the seam before you can hurt the case.

Note: If you are having difficulty separating the front and rear halves of the case check the following items:

- Be sure you have removed all four of the screws that hold the front and back halves of the case together.
- Make sure that you maintain approximately the same space between the front and rear halves of the case as you are prying them apart. If the gap on one side of the case gets much wider than that on the other

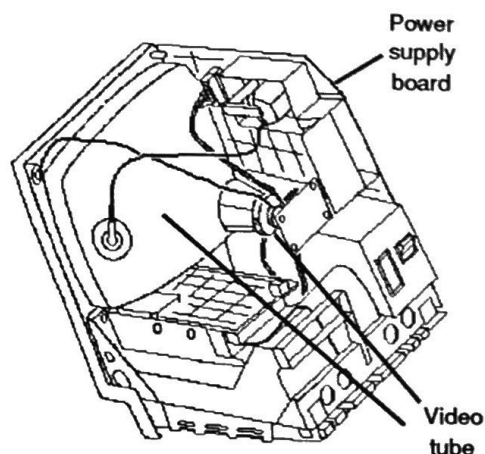
sides, it will make removing the back cover much harder. You must pry the case apart uniformly in small and even increments.

- Check to see that you have removed the programmer's switch from the left side of the case.

Once the cover is loose, lay your Mac face down again and pull the back cover straight up. Be gentle and watch to make sure that the front cover and all the internal parts stay down on the table.

When the back cover is completely free, set it aside. You will not need it until everything else is done and it is time to reassemble the case.

Warning: Now that the cover is removed, you are exposed to electrical components that can give you high-voltage shocks. For your own personal safety, be extremely careful. Do not touch the video display tube or power supply. Never handle or lift the video tube by its neck.



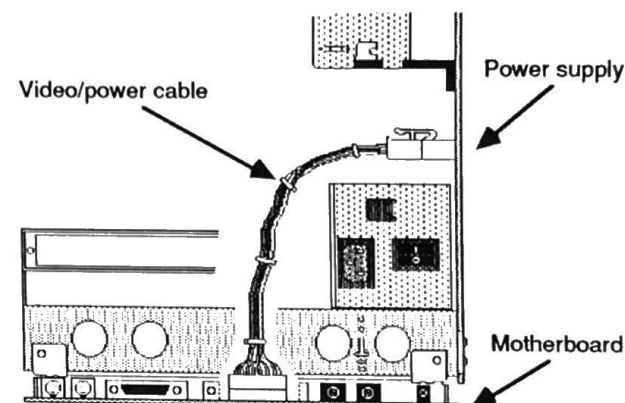
Removing the EMI Shield

The EMI (electro magnetic interference) shield is the part that looks like aluminum foil. It sits over the row of connectors on the rear edge of the main circuit board and covers the sides of the chassis as well. To remove it, simply pull it straight up and off the connectors. Set this

piece aside, or temporarily place it inside the rear cover. You will not need it until you reassemble the case.

Removing the Video/Power Cable

Locate the video/power cable. This cable connects the motherboard (the large board on the bottom of the Mac) to the video/power supply board (the large board on the side of the Mac).

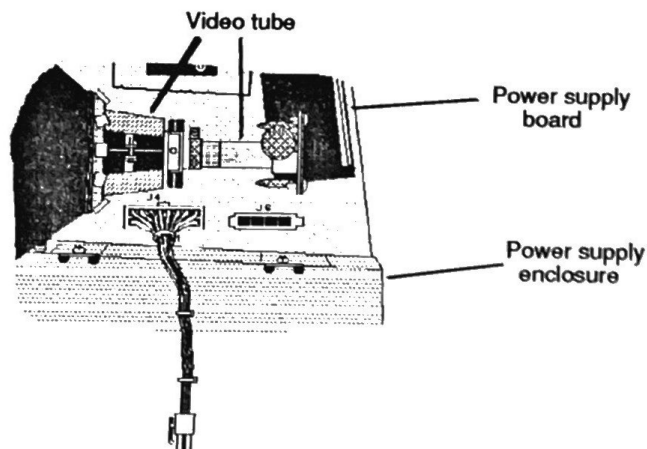


Rear view of Macintosh with case open

Both ends of the video/power cable are keyed so that they can only plug in correctly. Each connector also has a plastic latch which must be depressed in order to unplug it.

Remove the connector and cable from the motherboard by depressing the plastic latch while gently rocking the connector lengthwise and pulling on it. Be gentle, take your time, and do not pull too hard.

Warning: Do not remove the end of the video/power that connects to the video/power board. Only remove the end that attaches to the motherboard.



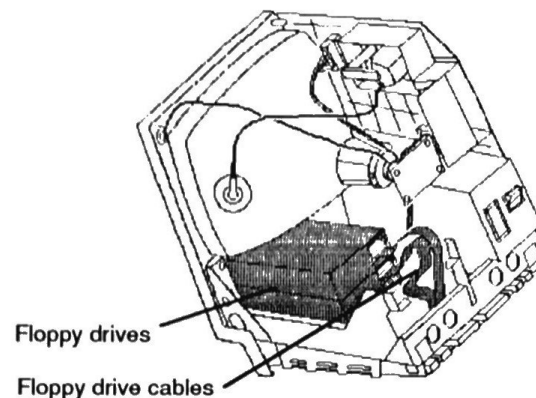
Side view of power supply with video/power cable hanging free

Removing the 3.5-disk and Hard Disk Cables

Your Macintosh SE will be one of two types. It will have either two floppy drives or a floppy drive and a hard disk drive. In this step you will remove the cables that connect these drives to the motherboard. The procedure differs, depending on which of the two configurations you have.

- If your Macintosh SE has two 3.5-inch drives:

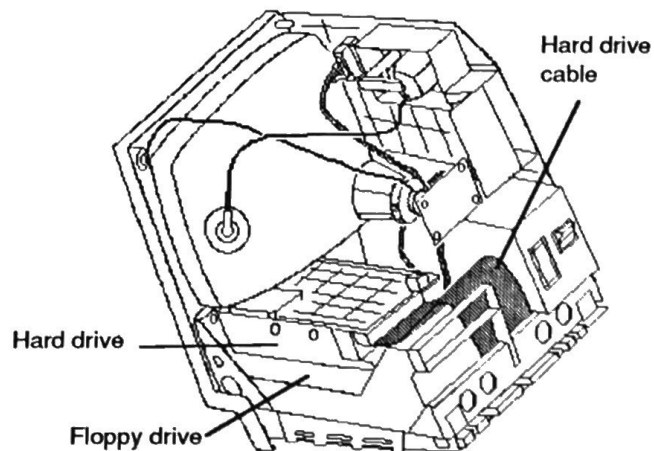
The two floppy drives are located on the right side of the Mac against the front bezel. They are connected to the motherboard by two 12" ribbon cables. Like the video/power cable, they are keyed so that it is impossible to plug them in backwards.



Locate where the floppy disk ribbon cables connect to the motherboard. Unplug each from the motherboard. It is not necessary to remove both ends, only the end attached to the motherboard. Push the excess cable out of the way.

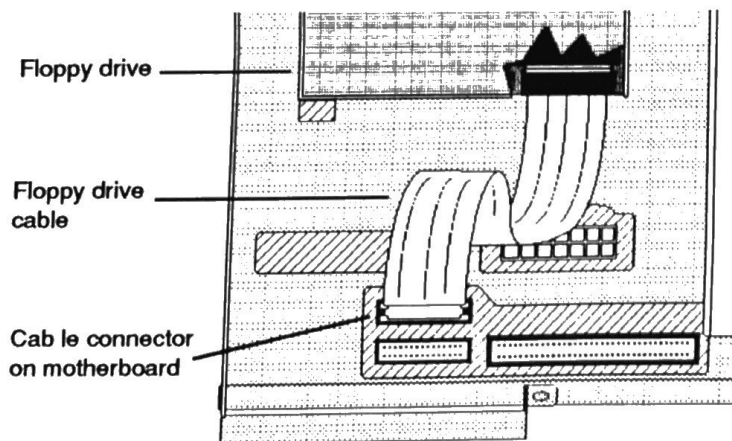
- If your Macintosh has one floppy drive and a hard disk:

The two disk drives are located on the right side of the Mac against the front bezel. The floppy drive is on the bottom and the hard drive is on top of it. The floppy drive is connected to the motherboard with a narrow 12" ribbon cable. The hard drive is connected to the motherboard with a wider ribbon cable about 7" long.



Locate where the wide ribbon cable from the hard drive connects to the motherboard and unplug it. It is not necessary to remove both ends, only the end attached to the motherboard. Push the excess cable out of the way.

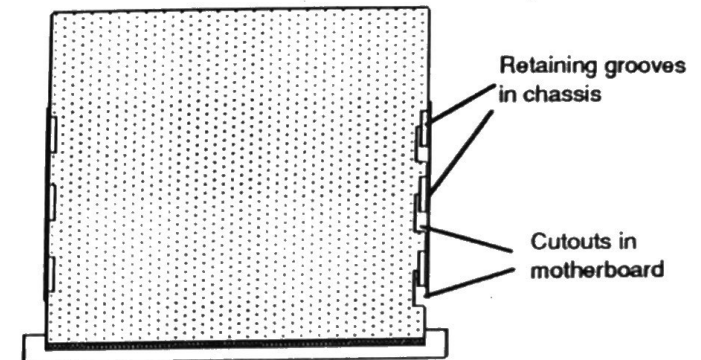
Locate where the floppy drive ribbon cable attaches to the motherboard. Unplug it from the motherboard. It is not necessary to remove both ends, only the end attached to the motherboard. Push the excess cable out of the way.



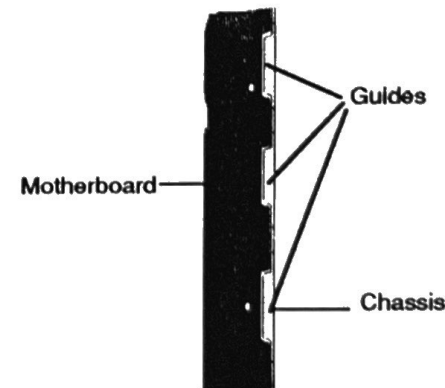
Top view of motherboard showing cable connectors

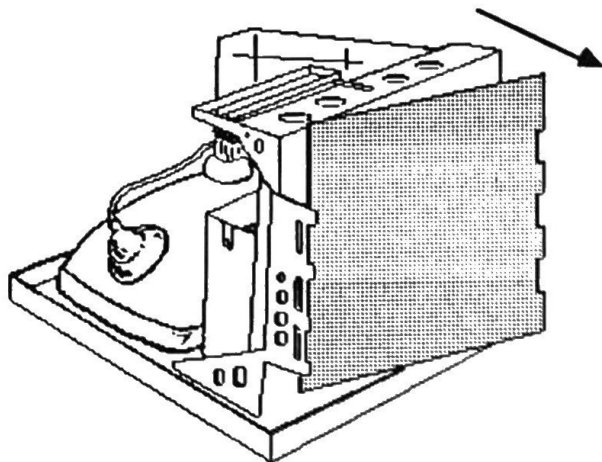
Removing the Motherboard

Lay the Macintosh SE monitor side down on a towel. You will notice that the motherboard sits in a set of six grooves built into the chassis. On the right side of the motherboard there are three cutouts that correspond to these grooves.

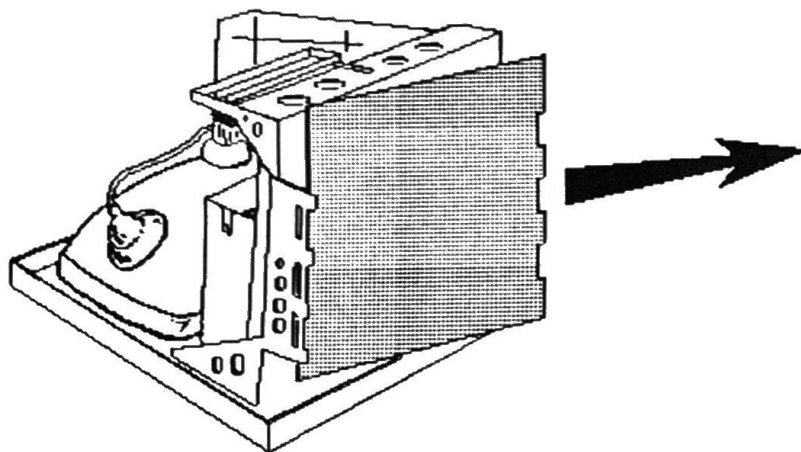


Slide the motherboard upwards until the cut-outs in the motherboard match the retaining grooves.





At that point you will be able to swing the right side of the board out and completely clear of the guides on the right.



Warning: The speaker wire is still connected to the motherboard. Do not move the motherboard too far from the Mac chassis yet!

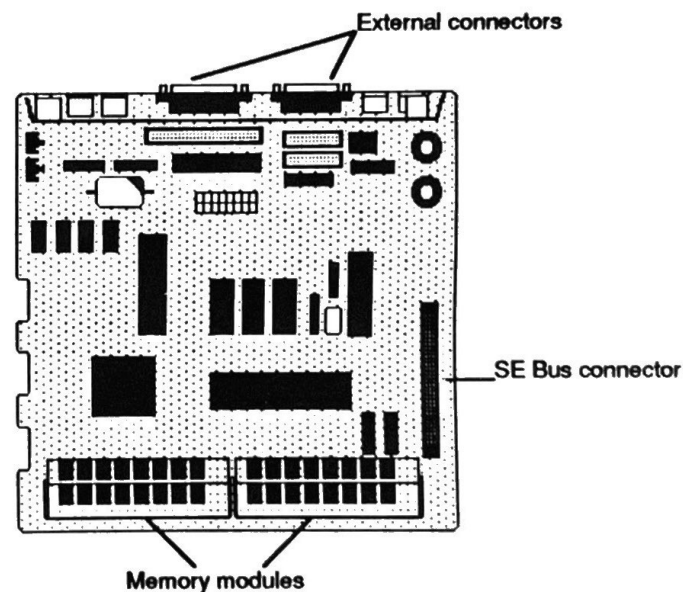
Once you have removed the motherboard you will see that there is a lead connected to it. It consists of a pair of wires twisted together with a connector on the end. This is the speaker lead. There is now enough

slack for you to move the motherboard out of the way to get at the connector. Simply unplug the speaker lead from the motherboard and let it hang free. The connector on this cable is keyed so that it can only be plugged in correctly.

Set the motherboard down on your work surface and put the remainder of the Mac aside for now. You will need most of the table space for the next part of the installation procedure.

Attaching the SpeedCard Board to the Motherboard

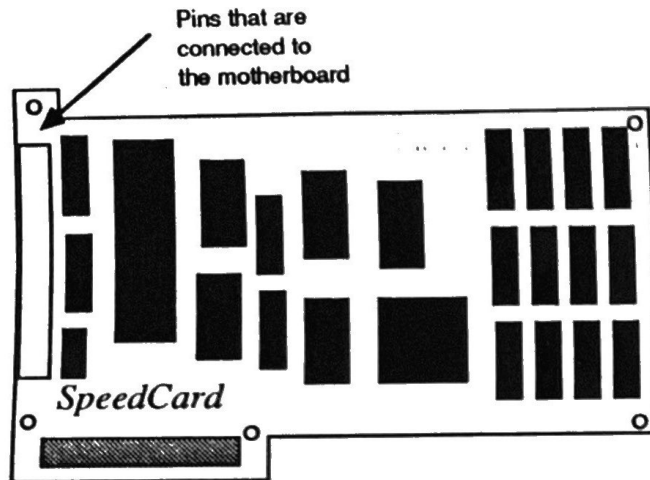
Place the motherboard in front of you with the connectors facing away from you. On the right edge of the board you will see a long, thin connector with three rows of pin holes. This is the SE Bus connector.



Top view of motherboard

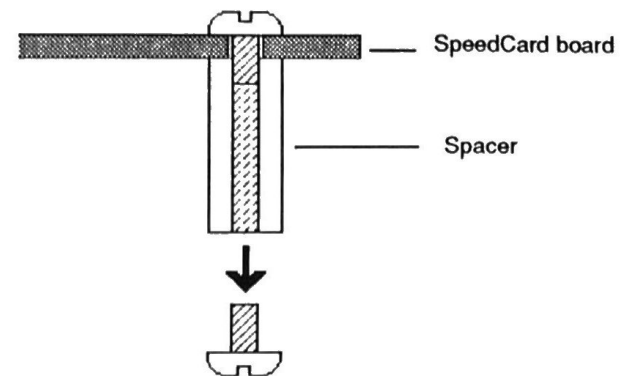
Now examine the SpeedCard board. If you look at the bottom side, i.e., the side that does not have chips on it, you will see three rows of connector pins on one edge that correspond to the pin holes on the

motherboard. See the diagram below. Check to make sure that the pins are straight and undamaged.



Removing the Plastic Screws from the SpeedCard Board

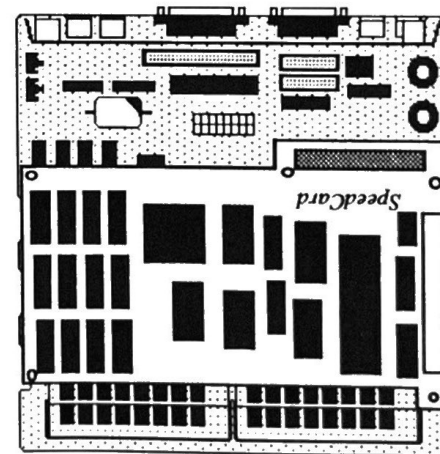
On the bottom of the SpeedCard board you will find four screws installed on spacers. These are the screws that will secure the SpeedCard board to the SE motherboard. Remove them and set them aside in a safe place. You will be needing them shortly. Be very careful not to lose these. Check to make sure that the upper screws are still tight.



Plugging the SpeedCard Board into the Motherboard

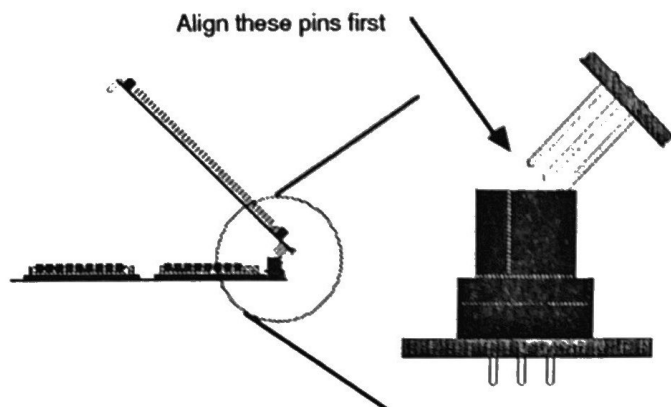
The most important consideration in plugging the boards together is to make sure that all of the pins are aligned with all the holes, that is, no rows are left unmated. To accomplish this you must be able to see the pins matched with the holes as you plug the boards together.

First line the boards up so that the connectors are together.



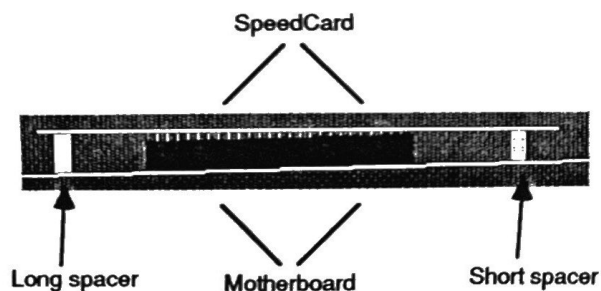
Top view of motherboard aligned with SpeedCard board

Now lift the left edge of the board so that only the two connectors are touching one another. Line the first row up with its counterparts on the motherboard connector.



Once you have the first row lined up correctly, pivot the board down onto the motherboard so that all of the pins seat tentatively into their respective holes. Look between the two boards from all sides to make sure that the pins and holes are lined up in both directions, i.e., right to left/front to back.

Once you have satisfied yourself that all of the pins are correctly seated, gently push the two connectors together until the spacers on the SpeedCard board come into contact with the motherboard.



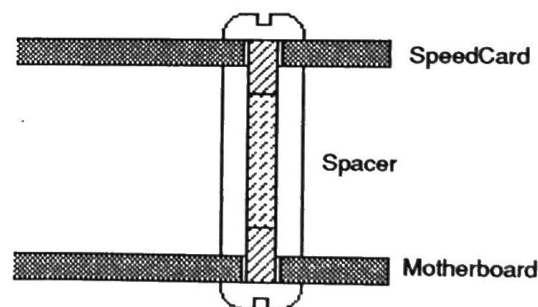
In order for the SpeedCard board to fit into the narrow space between the motherboard and the chassis, the spacers on one edge are longer than those on the other. For this reason, one end of the connector between the SpeedCard board and the motherboard is higher than the other end. Push the connectors together only until the two boards are parallel. Do not continue to push past this point because the SpeedCard board will become bowed.

Securing the SpeedCard Board to the Motherboard

Retrieve the four plastic screws that you removed from the SpeedCard board earlier. Holding the two boards together, turn them over so the bottom of the motherboard is facing up.

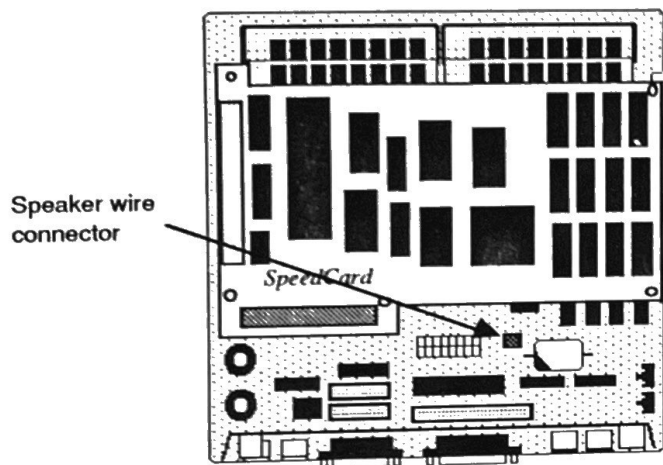
Warning: Do not tighten the screws too much or you will strip the plastic threads.

The spacers on the SpeedCard board should correspond roughly to the holes in the motherboard. Thread the plastic screws through the holes in the motherboard and into the spacers. It may be necessary to flex the boards slightly in order to match the holes up or to loosen the screws that secure the spacers to the SpeedCard board. Initially, thread the screws loosely. Once they are all threaded, go back and tighten them only until they give some resistance.



Reinstalling the SpeedCard/Motherboard

Set the Macintosh SE chassis on its face with the bottom toward you. Hold the SpeedCard/motherboard set up to the guides that originally held the motherboard alone. Reconnect the Speaker Lead that you disconnected earlier when you removed the motherboard.



Once the speaker lead is reconnected, you are ready to reinstall the SpeedCard/motherboard set. This procedure is essentially the reverse of the previous disassembly instructions.

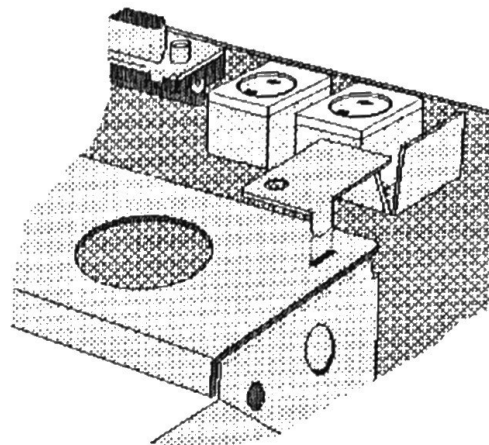
Put the left side of the motherboard into the guide on the left side of the Macintosh SE chassis.

Swing the right side forward until it comes into contact with the chassis.

Match up the guides in the chassis with the cutouts in the motherboard.

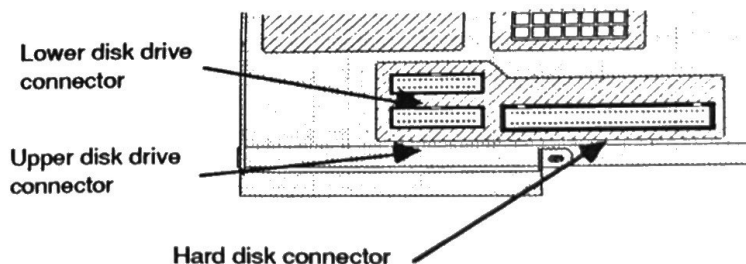
Push the motherboard into the guides. The board set should now be poised about 3/4" above its final resting place. Push it down into the guides until it stops. The metal brackets at the rear of the motherboard should be in contact with the chassis.

The small tongues of metal on the brackets should be seated in the slots in the chassis.



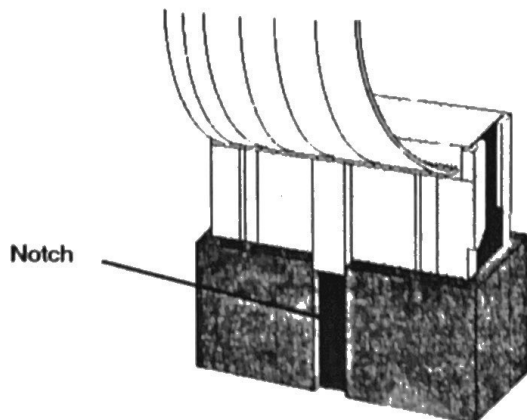
Reconnecting the Disk Drive Cables

Turn the Mac around so that you can see the disk drives and locate the disk drive connectors. The cables that you disconnected earlier should still be dangling from the drives.



If you have two floppy drives, you will be connecting them to the two floppy busses on the motherboard. If you have a floppy drive and a hard disk drive, you will be connecting them to their respective busses.

The ribbon cables are keyed, so that it is very difficult to plug them in backwards.



- If your Macintosh has two floppy disk drives:

Locate the two floppy drive connectors on the motherboard. They will be visible through an opening in the chassis.

Reconnect the two floppy drive cables to their respective connectors on the motherboard. The front connector is for the lower drive and the rear connector is for the upper drive.

- If your Macintosh has one floppy disk drive and a hard disk:

Locate the lower drive floppy connector and the hard disk connector on the motherboard.

Reconnect the ribbon cable from the floppy drive to the lower drive floppy connector on the motherboard. This is the forwardmost of the pair.

Reconnect the ribbon cable from the hard disk drive to the hard disk drive connector on the motherboard. This is the wide connector.

Note: Be sure that the plugs are fully seated. Otherwise your Macintosh may not work properly.

Reconnecting the Video/Power Cable

The video/power cable, which you removed from the motherboard earlier, should still be dangling loose as well. Reconnect it to the video/power connector on the motherboard. The small latch that holds it on should point toward the front of the machine. As with the disk drive cables, be sure that it is pushed all the way home, and check to make sure that the plastic latch is actually latched.

Testing the SpeedCard

Set the Macintosh SE upright. Verify that the main power switch is turned off, i.e., that the side of the rocker switch with a "Ø" down. Plug the machine in and turn on the switch.

Verify that the Mac SE starts up from its own internal hard disk or from a floppy disk with a System Folder on it. If everything works, you should see a logo appear momentarily with the legend "SpeedCard". Power down the Mac, unplug the power cable, and proceed to the next section.

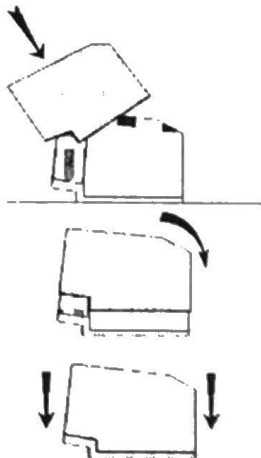
Warning: If the Macintosh does not make the familiar "Bing" sound or display anything on the screen, then turn the power off immediately. See the troubleshooting section below.

Replacing the EMI Shield

Retrieve the EMI shield that you set aside earlier and put it back so that the die-cut holes fit over the connectors at the rear of the motherboard.

Putting the Case Back Together

Put the case back onto the Macintosh SE chassis. Be careful not to damage the EMI shield or catch any of it between the case halves. The case back should slide into position easily with the edges matching all around.



Retrieve the four screws that you removed earlier. Thread each one part way into its respective threaded hole. Once they are all seated, go back and tighten them down.

Warning: Do not tighten the screws too much or you strip the plastic threads on the case.

Installation Troubleshooting

This section discusses some common problems encountered when installing a SpeedCard. If you are unable to solve a problem yourself, contact your authorized SuperMac dealer or call SuperMac technical support at 415/964-9660 for assistance. You can call Monday through Friday from 7:00 a.m. to 5:00 p.m. (Pacific time).

SuperMac also maintains a bulletin board with the latest information about SuperMac products and software updates. You are invited to post questions about SuperMac software and hardware products, and pass along tips and shortcuts you've found while using our products. The bulletin board supports 300/1200/2400 baud, and is on-line 24 hours a day. The number to call is (415) 962-1618. Your modem should be set to 8 data bits, no parity, 1 stop bit, and full duplex (8-N-1-FULL).

Problem: The fan runs but the Macintosh makes no "Bing" and nothing is displayed on the screen.

Solution: Make sure the video/power cable is seated completely on the motherboard.

Problem: A question mark appears on the screen, but a diskette placed in the drive will simply sit there and I can't eject it.

Solution: Make sure the floppy disk cable is plugged all the way into the motherboard.

Problem: A question mark appears on the screen, but the Macintosh won't start up from the hard disk.

Solution: Make sure the hard disk cable is plugged all the way into the motherboard.

Problem: I have two floppy disk drives and the Macintosh starts up from the wrong one.

Solution: Reverse the floppy drive cables. The drives will continue to operate in reverse priority order if you leave the cables reversed.

Problem: The Macintosh is acting strange; or I get a "Sad Mac" icon; or or an error code

Solution. Remove the SpeedCard/motherboard and check to see that the two board are seated correctly.

CHAPTER 2

USING THE SPEEDCARD

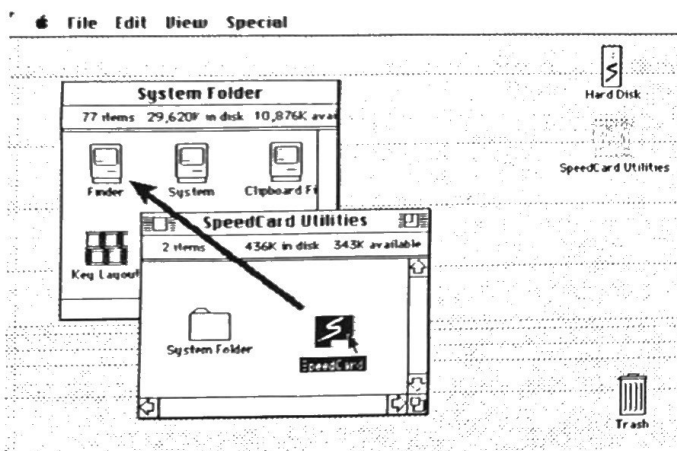
This chapter tells you how to use the SpeedCard and the software that came with it.

Installing the SpeedCard Control Panel File

Follow these instructions to install the SpeedCard Control Panel File.

Only use the SpeedCard Video Control Panel device with System 4.1 or greater. System 4.2 or later is recommended.

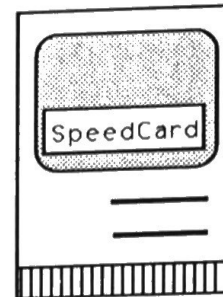
1. Insert the *SpeedCard Utility Software* disk into the drive.
2. Copy the SpeedCard icon to the System Folder of the hard disk or startup disk.



If you do not have a hard disk, you will need to copy the SpeedCard icon into the System Folder of every startup disk.

Starting Up in SpeedCard Mode

Once the SpeedCard is installed, your Macintosh will automatically start up in SpeedCard mode. After turning on the Macintosh, a message identifying the SpeedCard is displayed during startup:

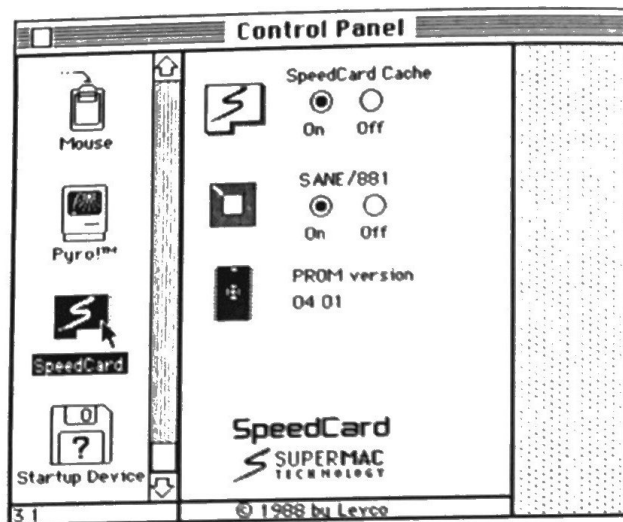


Macintosh starting up in SpeedCard mode.

Your Macintosh will *always* start up in SpeedCard mode unless you physically disconnect the SpeedCard or temporarily bypass the SpeedCard (see "Switching to Standard 68000 Mode" later in this chapter).

The SpeedCard Control Panel Options

The SpeedCardControl Panel options let you enable/disable the features of the SpeedCard. You must copy the SpeedCard Control Panel file into the System Folder of your hard disk or startup disk as described above to access the options. Once installed, choosing Control Panel from the Apple menu and clicking on the SpeedCard icon brings up a dialog box similar to the following:



SpeedCard Control Panel.

The SpeedCard Control Panel options let you enable/disable the following features:

- **SpeedCard Cache**

Lets you turn on or off the cache.

The cache is a small amount of memory built into the 68000 which holds the most frequently used instructions for direct access. The default setting is on.

Some software copy protection schemes are not compatible with the cache. In these circumstances, turn the instruction cache off. Turning the Cache off may slow down the performance of your Macintosh slightly.

- **68881 (Floating Point Math Coprocessor)**

Indicates whether or not a 68881 math coprocessor is installed, and shows the version number if one is installed.

This chip greatly speeds up floating point calculations. The coprocessor increases the performance of math-intensive software such as spreadsheet applications, three-dimensional modeling packages, statistics and simulation programs.

If you have the 68881 installed, the version or mask number of the chip will be displayed. If you do not have the 68881 installed, the word "none" will appear.

Temporarily Switching to Standard 68000 Mode

This section tells you how to temporarily bypass the SpeedCard and run the Macintosh from its original 68000 motherboard.

You need to have the programmer's switch installed on the side of your Macintosh SE to start up in standard 68000 mode. The switch comes with your Macintosh snaps into place on its left side.

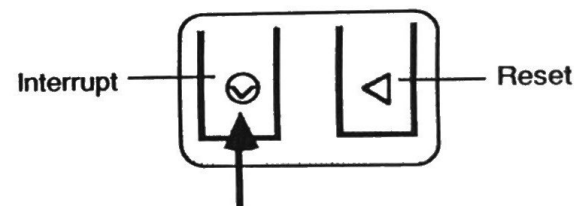
Follow these steps to temporarily switch to standard 68000 mode:

1. Power on the Macintosh.

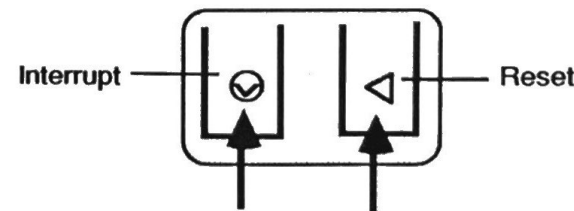
OR

Quit any active applications and select Restart from the Special menu.

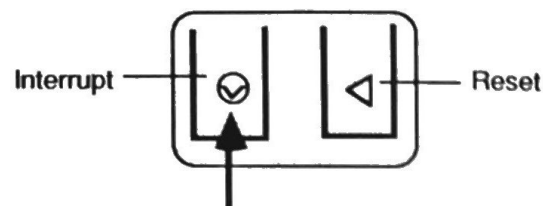
2. As soon as the the Macintosh makes the familiar "bing" sound, press and hold the Interrupt switch.



3. Press the Reset switch



4. Release the Reset switch. The Macintosh should make the familiar "bing" sound again.



5. Release the Interrupt switch and wait a few moments. The Macintosh should start up without the SpeedCard. The SpeedCard Control Panel file will not be available when running in standard 68000 mode.

If the SpeedCard identification screen is displayed, return to step #1 and repeat the process.

The Macintosh will automatically start up in SpeedCard mode again when you select Reset, turn off the Macintosh, or if there is a system crash.

Note: If an application crashes, first turn off the cache in the SpeedCard Control Panel, select Restart and try the application again. If it still does not launch, turn off the 68881 math coprocessor (if you have this option), select Restart, and try again. If the application still fails, switch to standard 68000 hardware mode. If the application launches in standard mode, there is a good chance this application suffers from a poorly implemented copy protection scheme. Ask the program's developer for an upgraded version that is compatible with the SpeedCard.

Technical Support

If you have questions, contact your authorized SuperMac dealer or call SuperMac technical support at 415/964-9660 for assistance. You can call Monday through Friday from 7:00 a.m. to 5:00 p.m. (Pacific time).

SuperMac also maintains a bulletin board with the latest information about SuperMac products and software updates. You are invited to post questions about SuperMac software and hardware products, and

pass along tips and shortcuts you've found while using our products. The bulletin board supports 300/1200/2400 baud, and is on-line 24 hours a day. The number to call is (415) 962-1618. Your modem should be set to 8 data bits, no parity, 1 stop bit, and full duplex (8-N-1-FULL).



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