
Enhance

DEALER INSTALLATION MANUAL



Enhance™

Macintosh to Macintosh Plus Upgrade with 2 to 6.5 Megabytes of Memory

Authorized Dealer Installation Manual

SuperMac Technology

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WARNING:

The Enhance upgrade is to be installed by qualified service technicians at authorized SuperMac dealerships only. The product is not user-installable.

These instructions assume a basic familiarity with the innards of the Macintosh Plus computer. Do not attempt to install the Enhance upgrade if you have never worked inside a Macintosh before.

The operations described in this manual *must* be carried out at an anti-static workstation. Single In-line Memory Modules (SIMMs) are sensitive to static electricity. SuperMac Technology will not be responsible for any damage to the Macintosh CPU or its ROMs, or to Enhance boards, if such damage results from static discharge, mishandling, or installation by other than an authorized SuperMac dealer.

CAUTION:

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.

Introduction to Enhance

Enhance is SuperMac Technology's 2 to 6.5 megabyte Macintosh-to-Macintosh-Plus upgrade. It uses the same SIMMs as the Macintosh Plus for easy expandability with Mbyte SIMMs, includes a fully Macintosh Plus-compatible SCSI port, and clips onto the Macintosh's 68000 microprocessor without modifications to the Apple motherboard. No modification to the Macintosh case is necessary. The SCSI connector replaces the battery compartment cover without restricting access to the battery itself.

Enhance does not work with the 128K Macintosh.

Enhance is specifically designed for either the Macintosh 512e, or the Macintosh 512 with the Apple 128K ROM/800K disk upgrade. It will not work with the 64K ROMs of the original Macintosh. On the 128K Apple ROMs, the HI ROM number is 342-0341, and the LO ROM number is 342-0342.

There are two versions of Apple's 128K ROMs, an old version and a newer one. There is a minor difference in SCSI performance between the old and newer versions of the ROMs. The old 128K ROMs freeze the screen whenever they encounter an indeterminate state on the SCSI port, such as when there is a SCSI device on the line that is not turned on. The newer ROMs correct this problem by ignoring the SCSI bus when it is in an indeterminate condition.

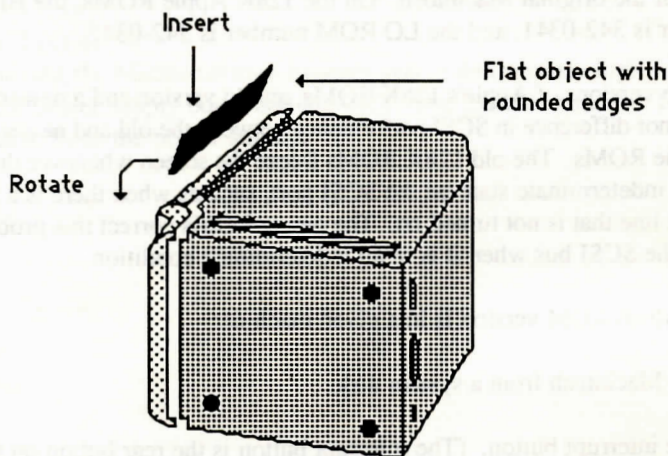
To find out which ROM version is in a given machine:

1. Boot the Macintosh from a system disk.
2. Press the interrupt button. (The interrupt button is the rear button on the programmer's switch, which is located toward the back of the left side of the Macintosh.)
3. If you get a system error dialog box, the machine has the 64K ROMs. You will need to upgrade the Macintosh with the 128K ROM/800K disk upgrade before you continue with the Enhance installation.
4. If you get a dialog box with a ">" symbol, type "DM 400000". A table of figures should appear. This is a hexadecimal dump of the ROM code.
5. Check the top row, third column, of the table of figures. If you see the letter configurations EExx or EAxx you have the first or second version of the 128K ROMs, respectively.
6. Type "G" to return to the Finder.

Preparing the Macintosh for Enhance Installation

For this part of the procedure, you will need a Torx screwdriver and a chassis opener.

1. Remove the rear cover of the Macintosh by unscrewing the five Torx screws that hold it in place, then use the chassis opener to pry it off. If you are not an Apple dealer, SuperMac sells a tool kit for opening the Macintosh; or you may use any thin, flat, firm object without sharp edges to carefully separate the cover from the chassis. Be gentle to avoid scarring the cabinet. An example of an object *not* to use for this purpose is a metal screwdriver (sharp edges, insufficient load area). A better choice would be a small PC board or a plastic ruler (no sharp edges, sufficient load area). See the illustration below for an idea.



Removing the Rear Cover of the Macintosh

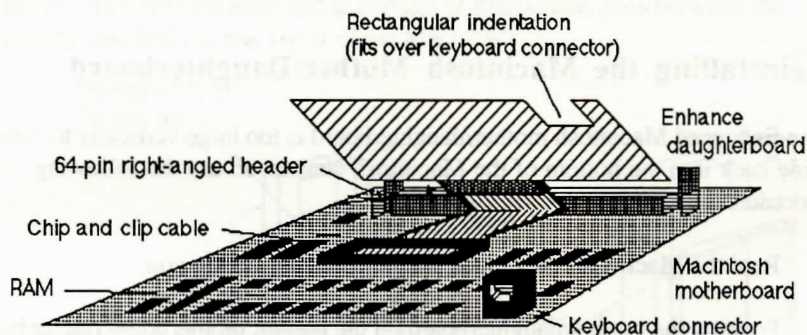
2. There are two cables attached to the Macintosh motherboard. One is the ribbon cable that connects to the internal drive (the floppy disk cable). The other is the power supply/video cable assembly. Disconnect the ribbon cable at the motherboard end and remove the power supply/video cable completely.
3. Slide the motherboard out of the chassis.
4. Check to see whether the 68000 processor chip is plastic or ceramic. The plastic casing is black. The ceramic casing is a pale purplish color.
5. If the 68000 processor chip casing is ceramic, you *must* replace the motherboard with one that has a black plastic casing for its processor chip.

The ceramic casings are too wide for the 68000 processor chip clip that attaches Enhance to the motherboard.

Installing the Enhance Daughterboard

Before proceeding with the installation, inspect the Enhance daughterboard for physical damage.

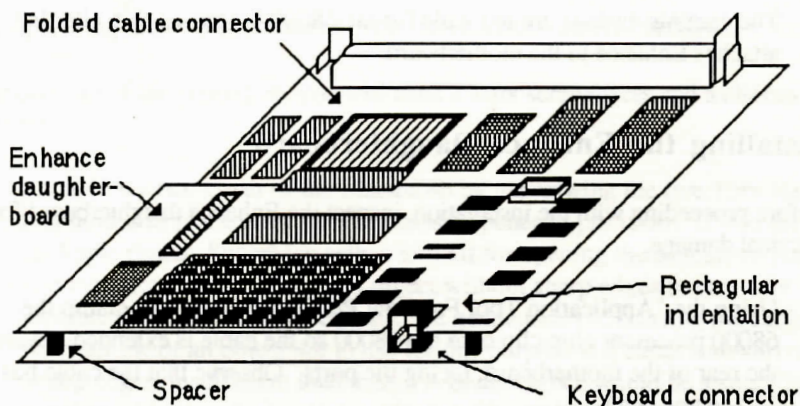
1. Using the "Application Tool For Low Profile Connection", clamp the 68000 processor chip clip onto the 68000 so the cable is extended toward the rear of the motherboard, facing the ports. Observe that the cable has a 180 degree bend.
2. Attach the folded connector cable to the 64-pin right-angled header on the Enhance daughterboard. Make sure to press the cable firmly into place. The results of steps 1 and 2 are represented by the figure below.



Attaching the Folded Connector Cable to the Enhance Daughterboard

3. Place the Enhance daughterboard over the chip clip so that:
 - a. The 64-pin right-angled header faces the rear of the motherboard, toward the ports
 - b. The rectangular indentation at the right front of the daughterboard fits over the keyboard connector

The results of steps 3a and 3b are shown below.



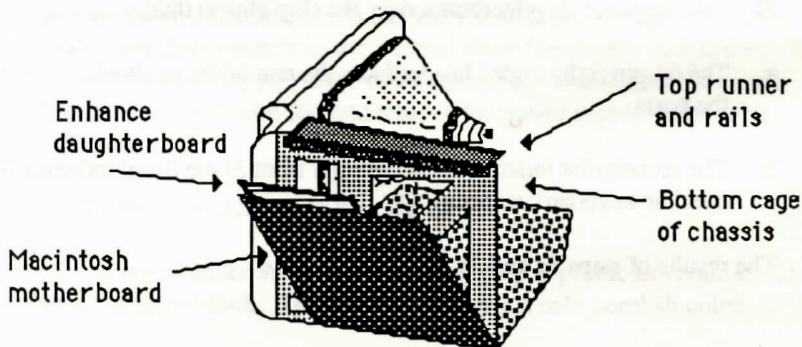
Attaching and Securing the Enhance Daughterboard

4. Using the two spacers provided, screw the daughterboard to the motherboard. Make sure to screw both the Macintosh *and* Enhance boards to the spacers. (That is, screw in from both ends of the spacers.)

Reinstalling the Macintosh Mother/Daughterboard

The Enhanced Macintosh mother/daughterboard is too large vertically to simply slide back into the bottom of the Macintosh chassis, so use the following procedure:

1. Rest the Macintosh on its side with the bottom facing you.
2. Position the mother/daughterboard on the bottom motherboard runner by inserting it into the rails about 1/2 inch to the rear of where it will be when the Macintosh is closed. The result is shown below.



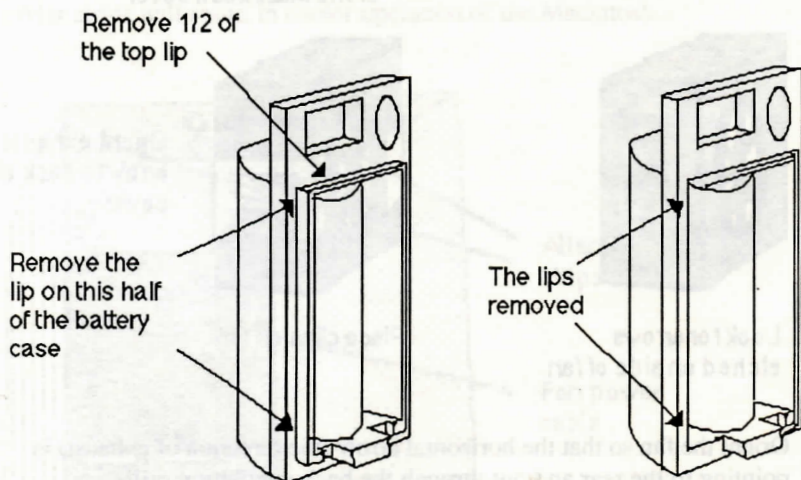
Reinstalling the Macintosh Mother/Daughterboard

3. Using a flat blade screwdriver, gently pry up the top motherboard runner and seat the mother/daughterboard in the rail.
4. The Enhanced Macintosh mother/daughterboard should now be seated firmly in the runners of the Macintosh chassis. Push it forward until the front of the board is seated firmly against the front of the Macintosh, and the motherboard locks into the slots at the rear of the Macintosh frame.

Adding a SCSI Port to the Battery Port

Converting the battery port to a SCSI port is the only part of the Enhance installation that requires any physical modification of the Macintosh. Be sure you follow these instructions exactly. *Do not straighten out the internal cable during the installation procedure.*

1. Examine the rear of the battery pack that is attached to the power supply board. You will cut away the thin ridge of plastic that goes between the battery case and the rear cover of the Macintosh.



Battery Pack Before and After Cutting Ridge

The cutting should be done with a set of sharp wire cutters or a sharp Exacto knife. (When using an Exacto knife, make sure to cut from the bottom to the top, keeping your fingers below the blade, to avoid cutting yourself if the knife slips). Starting at the lower left edge of the battery case, trim away the thin ridge all the way to the top of the case. Make sure to trim or

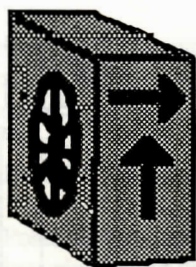
file away any jagged edges, as they could potentially damage the port's cable by stripping away its insulation.

Installing the Cooling Fan

1. Attach the clips provided with the kit to the sides of the fan, as shown in the below illustration. The clips come with an adhesive pad attached to them, which will hold the clips to the fan.

If the fan already has clips on different sides than those shown in the illustration below, just check to make sure that the logical orientations are the same as in the illustration (i.e., the prongs should point in the opposite direction from the exhaust arrow.)

The arrow that points from one face of the fan to the other indicates the direction of exhaust. This is important. The other arrow indicates the direction of fan rotation.



Look for arrows
etched on side of fan

Orient the top of
the fan to the top
of the Macintosh cover

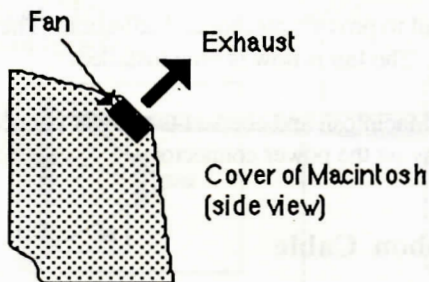


Place clips on fan

Orient exhaust
arrow to back of
cover

2. Orient the fan so that the horizontal arrow (the direction of exhaust) is pointing to the rear and out through the back ventilation grill.

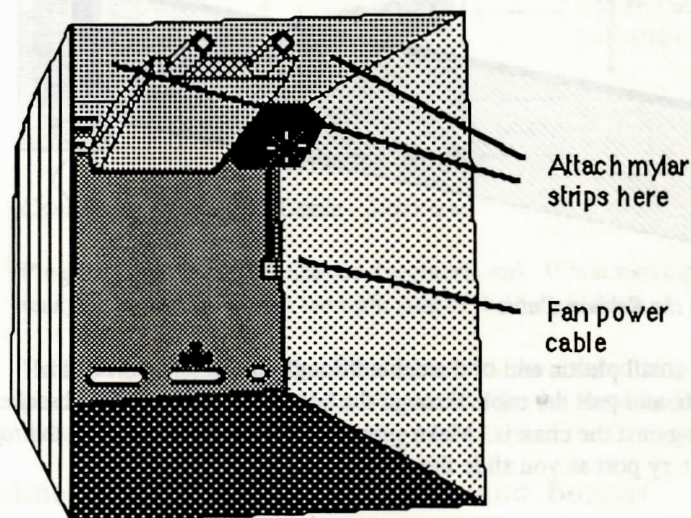
The two prongs on each clip will be pointing toward the front of the casing.



Place fan inside Macintosh as shown with exhaust blowing out

3. Place the Macintosh's cover on its back. Peel the backing off the adhesive strips. Install the mylar adhesive strips over the vents inside the *top* of the Macintosh case. Do not cover either of the vents at the *rear* of the machine. See the diagram on the next page.

The mylar strips will cause air to be pulled in from two locations: the slots at the base of the machine, and the vent near the power supply. The fan and mylar strips will result in cooler operation of the Macintosh.



Attaching the Mylar Strips

4. Push the fan in so it fits snugly into the space between the top of the right wall and the depression for the handle of the Macintosh. The prongs will

dig into the plastic of the wall to provide mechanical adhesion. The power cord will be dangling down. The fan is now installed.

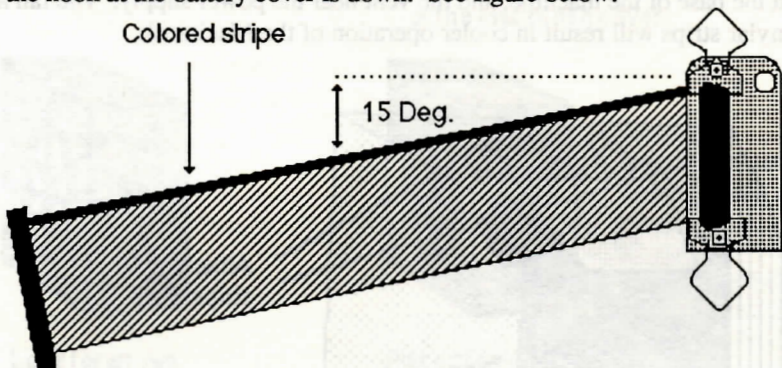
5. Bring the cover close to the Macintosh and connect the power connector from the fan to the breakaway on the power connector.

Installing the SCSI Ribbon Cable

WARNING:

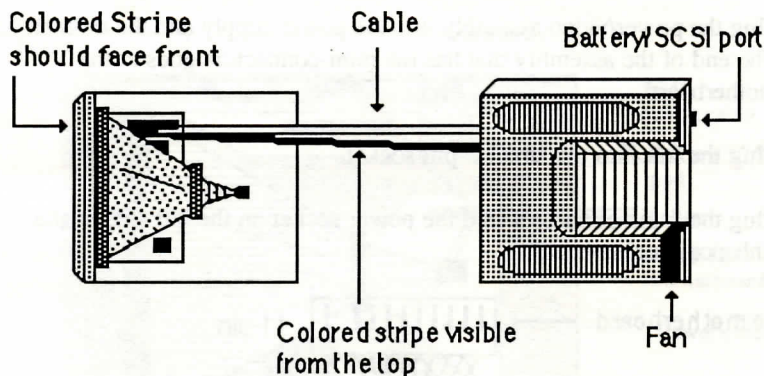
Do not straighten out the SCSI ribbon cable during the installation procedure. The 15-degree angle near the Centronics connector is there to help the cable clear the battery case.

1. Place the Macintosh and its cover on a table. Put the foil radio frequency interference shield back onto the motherboard. Put the rear cover of the Macintosh against the rear of the machine, without sliding it on.
2. Orient the cable so that the colored stripe at one edge of the cable is up and the hook at the battery cover is down. See figure below.



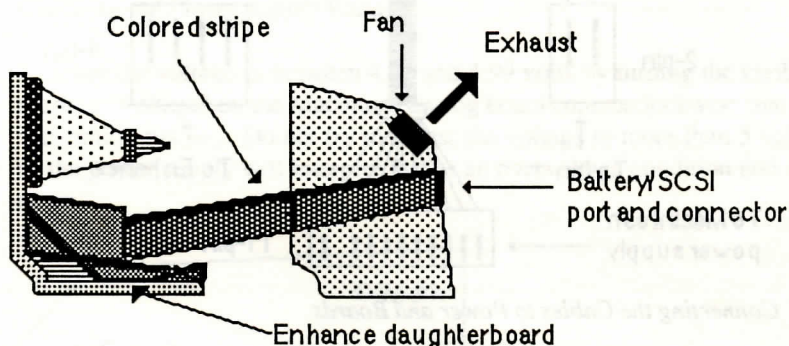
Orienting the Ribbon Cable

3. Insert the small plastic end of the cable through the battery port of the Macintosh, and pull the cable through the hole until the mounting bracket is firmly against the chassis. Make sure the colored stripe is facing the *top* of the battery port as you slide the cable through.



Connecting the Ribbon Cable - Top View

The cable must be properly situated with the colored stripe facing toward the front of the Enhance daughterboard to plug the cable in.



Connecting the Ribbon Cable - Side View

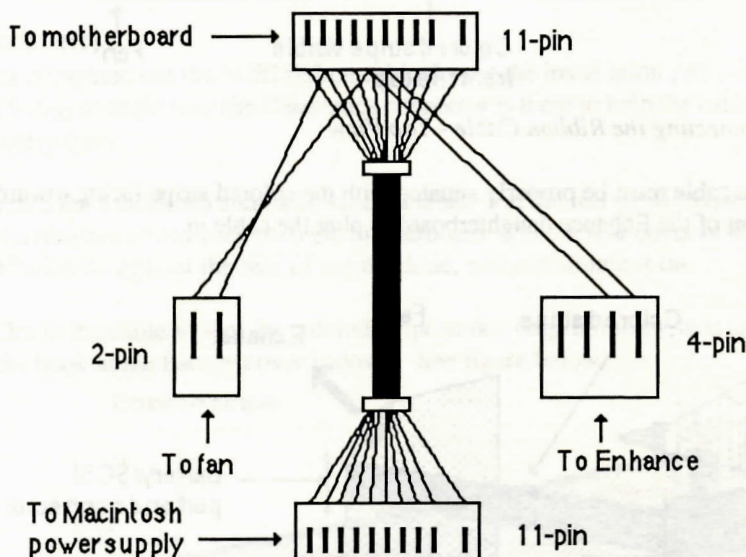
4. Plug the cable into the Enhance daughterboard. When looking from the rear, the connection is on the right side of the daughterboard.

IMPORTANT: The side of the cable with the colored stripe *must* be placed closer to the front of the Macintosh than the unmarked side (see illustration above).

Connecting the Cables to Power and Boards

You are now ready to install the modified power/video cable assembly that comes with the Enhance kit.

1. Plug the power/video assembly into the power supply and the motherboard. The end of the assembly that has the mini-connectors goes to the motherboard.
2. Plug the fan into the small 2-pin socket.
3. Plug the 4-pin connector into the power socket on the left side of the Enhance daughterboard.

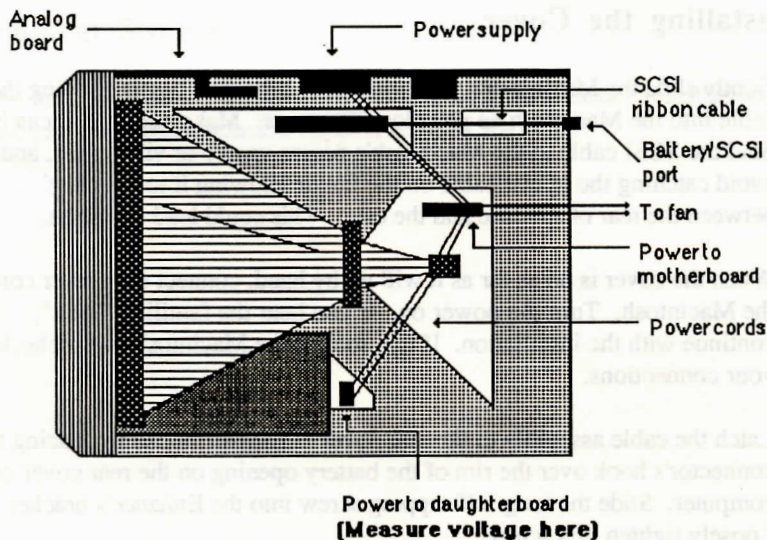


Connecting the Cables to Power and Boards

Checking the Voltage

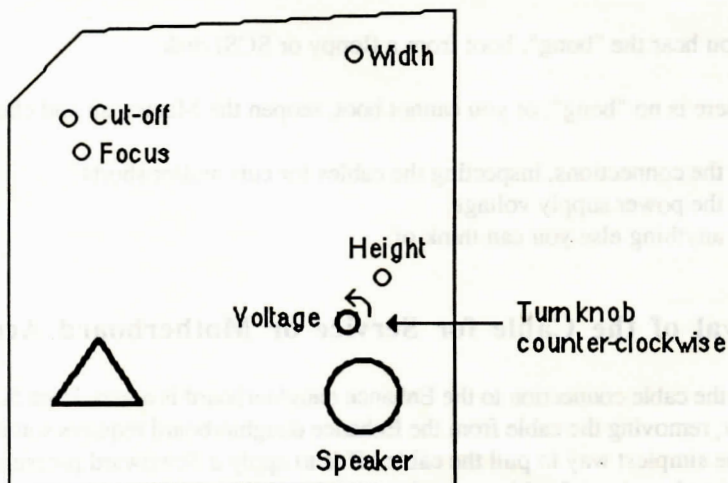
To ensure proper operation of the Macintosh computer, it is important to check the +5 volt power supply after installation of the Enhance daughterboard. The voltage should be adjusted to 4.95 to 4.99 volts.

1. Check the +5 volt power supply on the Macintosh digital board by testing across the power connector on the Enhance (see illustration below). A typical voltage reading after an Enhance upgrade is 4.80 volts. Be sure to use a reasonably accurate meter, preferably a digital voltmeter, to perform the test. Be careful not to short any of the pins with the test probes.



Checking the Power Supply Voltage

2. Increase the voltage to between 4.95 and 4.99 volts by turning the knob marked "Voltage" on the Macintosh analog board counterclockwise (see illustration below). Do not try to adjust the voltage to more than 5 volts, as the power supply will interpret this as an overvoltage condition and shut down.



Adjusting the Voltage on the Macintosh Analog Board

3. If you ever remove the Enhance daughterboard from the Macintosh motherboard, reset the power supply voltage on the Macintosh analog board.

Reinstalling the Cover

1. Gently slide the Macintosh's rear cover back onto the chassis, feeding the cable into the Macintosh as you close the cover. Make sure not to catch or bind the SCSI cable to the Macintosh's power supply or video tube, and avoid catching the power cable on the fan or allowing it to get caught between the rear of the case and the cage. This could lead to a short.
2. When the cover is on as far as it will go by hand, connect the power cord to the Macintosh. Turn the power on. If you hear the familiar "bong", continue with the installation. If not, reopen the Macintosh and recheck your connections.
3. Latch the cable assembly to the rear cover of the Macintosh by placing the connector's hook over the rim of the battery opening on the rear cover of the computer. Slide the long self-tapping screw into the Enhance's bracket. Loosely tighten this screw.
4. Tighten all the screws on the machine. Gently tighten the Enhance's screw last.

Testing Enhance

1. Turn on the Macintosh.
2. If you hear the "bong", boot from a floppy or SCSI disk.
3. If there is no "bong", or you cannot boot, reopen the Macintosh and check:
 - a. the connections, inspecting the cables for cuts and/or shorts;
 - b. the power supply voltage;
 - c. anything else you can think of.

Removal of the Cable for Service or Motherboard Access

Because the cable connection to the Enhance daughterboard is a very large 50-pin assembly, removing the cable from the Enhance daughterboard requires some care. The simplest way to pull the cable off is to apply a downward pressure to the Enhance board, preferably at a point near the cable, while gently pulling up first on one side of the cable and then the other with a gentle rocking motion.

Technical Support

If you have any questions about or problems with the Enhance installation, please call SuperMac technical support at (415) 964-8884.

