Macintosh SE

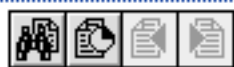# Basic Navigation Within Service Source

Plug-Ins:

Find
Searches the current document only

Search
Searches across all Acrobat documents

Service Source Main Menu

Service Source Help

□ Product Name
▷ □ Basics
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□ Exploded View

When viewing Service Source Acrobat procedures with bookmarks active (the default setting), you can click a chapter title to go directly to that chapter. You can also click the triangle to reveal and directly access topics within the chapters.

When printing pages from Acrobat, use these numbers to specify the page range you wish to print. The page numbers at the top of procedure pages are relative to each chapter, not to the whole document.

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Indicates the end of a topic

Indicates a topic that is two or more pages

□ 13 of 448   🔍 100% ▼   ▥ 6.3

Basics

Macintosh SE

Overview

This manual contains complete repair procedures for the Macintosh SE, shown at left.

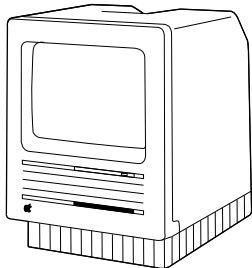**Figure: Macintosh SE**

Specifications

Macintosh SE

Processor

CPU   Motorola 68000 microprocessor
                   7.83 MHz
                   32-bit architecture

Memory

RAM   1 or 2 MB, expandable to 4 MB

ROM   256K

PRAM   256 bytes of memory
                 CMOS custom chip with seven-year lithium battery

Disk Storage

Floppy Drive   1.4 MB floppy drive
                     Optional second internal and external floppy drive

Hard Drive   Optional 20 or 40 MB hard drive
                     Optional external hard drive

I/O Interfaces

Expansion	Macintosh SE expansion slot; uses a 96-pin Euro-DIN connector
SCSI	Uses a 50-pin connector (internal) and a DB-25 connector (external)
Apple Desktop Bus	Two Apple Desktop Bus (ADB) connectors for communication with keyboard, mouse, and other input devices
Serial	Two RS-232/RS-422 serial ports; 230.4 Kbaud maximum; mini DIN-8 connectors
Sound	For external audio amplifier (standard miniature)

I/O Devices

Keyboards

Apple Keyboard: 81 keys, including numeric keypad and cursor keys

Apple Extended Keyboard: 105 keys, including 15 function keys, separate cursor pad, and 10-key numeric keypad

Mouse

Mechanical tracking; optical shaft at 3.94 pulses per mm (100 pulses per in.) of travel; ADB connector

Sound and Video

Sound Generator   Four-voice sound with 8-bit digital/analog conversion using 22-kHz sampling rate

Video Display   9-in. (diagonal) screen; high-resolution, 512 by 342 pixel, bit-mapped display

Electrical

Line Voltage   90–140 VAC; 170–270 VAC

Frequency   47–63 Hz

Maximum Power   100 W

Physical

Dimensions   Height: 13.6 in. (34.5 cm)
Width: 9.6 in. (24.4 cm)
Depth: 10.9 in. (27.6 cm)

Weight   17–21 lb. (7.7–9.5 kg)
Weight varies depending on whether hard drive or second floppy
drive is installed

Troubleshooting

Macintosh SE

General

The Symptom Charts included in this chapter will help you diagnose specific symptoms related to your product. Because cures are listed on the charts in the order of most likely solution, try the first cure first. Verify whether or not the product continues to exhibit the symptom. If the symptom persists, try the next cure. (Note: If you have replaced a module, reinstall the original module before you proceed to the next cure.)

If you are not sure what the problem is, or if the Symptom Charts do not resolve the problem, refer to the Flowchart for the product family.

For additional assistance, contact Apple Technical Support.

Symptom Charts

Video

Screen is dark; audio and drive operate

1 Turn brightness control clockwise.
2 Check video cable connections.
3 Replace analog board.
4 Replace video board.
5 Replace logic board. Retain customer's SIMMs.
6 Replace CRT.

Screen is bright and audio is present, but no video information is visible

1 Replace analog board.
2 Replace video board.
3 Replace logic board. Retain customer's SIMMs.

Video (Continued)

Screen is completely
dark and fan is not
running

1 Replace power supply.
2 Replace analog board.

Single vertical line is
displayed

1 Replace analog board.
2 Replace video board.
3 Replace logic board. Retain customer's SIMMs.
4 Replace CRT.

Single horizontal line
is displayed

1 Replace analog board.
2 Replace video board.
3 Replace logic board. Retain customer's SIMMs.
4 Replace CRT.

Video **(Continued)**

Vertical bars or
stripes are displayed

1 Replace logic board. Retain customer's SIMMs.
2 Replace analog board.

Horizontal bars or
stripes are displayed

1 Replace logic board. Retain customer's SIMMs.
2 Replace analog board.

White dot is displayed
in center of screen

1 Verify that yoke cable is connected.
2 Replace analog board.
3 Replace CRT.

Screen jitters at top
left and/or lower
right

Replace analog board.

Peripheral

Cursor does not move

1. Check mouse connection.
2. Inspect inside of mouse for buildup of dirt and other contaminants. Clean mouse if necessary.
3. If mouse was connected to keyboard, connect it to ADB port instead. If mouse works, replace keyboard.
4. If mouse does not work in any ADB port, replace mouse.
5. Replace logic board. Retain customer's SIMMs.

Cursor moves, but clicking mouse button has no effect

1. Replace mouse.
2. Replace logic board. Retain customer's SIMMs.

No response to any key on keyboard

1. Check keyboard connection to ADB port.
2. Replace keyboard cable.
3. Replace keyboard.
4. Replace logic board. Retain customer's SIMMs.

Peripheral (Continued)

Cannot double-click
to open application,
disk, or server

1 Remove any multiple system files on hard drive.
2 Clear parameter RAM. (System 7: Hold down <Command> <Option> <P> <R> during startup but before "Welcome to Macintosh" appears. System 6: Hold down <Command> <Option> <Shift> keys and select Control Panel from Apple pull-down menu.) Reset mouse controls.
3 If mouse was connected to keyboard, connect it to ADB port instead. If mouse works, replace keyboard.
4 If mouse does not work in any ADB port, replace mouse.
5 Replace logic board. Retain customer's SIMMs.

Peripheral (Continued)

Known-good
LaserWriter does not
print

1 Make sure that Chooser and Control Panel are set correctly.
2 Make sure correct version of system software is being used.
  Make sure software is known-good.
3 Reset PRAM.
4 Refer to Networks and Communications manual.

Known-good
ImageWriter or
ImageWriter II does
not print

1 Make sure that Chooser and Control Panel are set correctly.
2 Make sure correct version of system software is being used.
  Make sure software is known-good.
3 Reset PRAM.
4 Replace printer interface cable.
5 Replace logic board. Retain customer's SIMMs.

Floppy Drive

Audio and video are
present, but one
internal floppy drive
does not operate

1 Replace bad disk.
2 Replace floppy drive data cable.
3 Replace internal floppy drive.
4 Replace logic board. Retain customer's SIMMs.

External floppy drive
does not operate

1 Replace bad disk.
2 Make sure external floppy drive is on right side of Macintosh
   SE/30.
3 Replace external drive.
4 Replace logic board. Retain customer's SIMMs.

Disk ejects; display
shows icon with
blinking "X"

1 Replace disk with known-good system disk.
2 Replace floppy drive.
3 Replace logic board. Retain customer's SIMMs.

Floppy Drive (Continued)

Unable to insert disk all the way

1 Insert opened paper clip into hole beside drive.
2 Switch off system power and hold mouse button down while switching power back on (to complete eject cycle).
3 Replace floppy drive.

Internal floppy drive runs continuously

1 Replace bad disk.
2 Replace floppy drive.
3 Replace logic board. Retain customer's SIMMs.
4 Replace floppy drive data cable.

Does not eject disk

1 Insert opened paper clip into hole beside drive.
2 Switch off system and hold mouse button down while switching system back on (to complete eject cycle).
3 Replace floppy drive.

Floppy Drive (Continued)

Audio and video are present, but neither internal floppy drive operates

1 Replace bad disk.
2 Replace logic board. Retain customer's SIMMs.

Hard Drive

Internal or external
hard drive does not
operate

1   Verify that SCSI loopback card is not attached.
2   Replace hard drive data cable.
3   Replace hard drive.
4   Replace logic board. Retain customer's SIMMs.

Works with internal
or external SCSI
device but not with
both

1   Verify SCSI device switch setting on external device.
2   Replace terminator on external device.
3   Verify that terminator is installed on internal hard drive.
4   Replace hard drive select cable.

Miscellaneous

Clicking, chirping,   1   Verify analog board cable is connected at J12 on logic board.
or thumping sound   2   Replace power supply.
                          3   Replace analog board.
                          4   Replace logic board. Retain customer's SIMMs.

Smoke/odor   1   Replace power supply.
                          2   Replace analog board.

No video, no audio, and   1   Connect power cord.
no drive operation   2   Switch power on.
                          3   Replace power cord.
                          4   Replace power supply.
                          5   Replace analog board.
                          6   Replace logic board. Retain customer's SIMMs.

Miscellaneous (Continued)

"Sad Macintosh" icon

1 Replace bad disk.
2 Replace SIMM(s) if code matches any of those given in "Isolating a Faulty SIMM" in Hardware/Memory.
3 Verify that three-pin jumper on logic board is configured correctly for system RAM. See Hardware/Memory.
4 Replace logic board. Retain customer's SIMMs.

"Sad Macintosh" icon and black vertical line are displayed; screeching sound

1 Verify that three-pin jumper on logic board is configured correctly for system RAM. See Hardware/Memory.
2 Replace logic board. Retain customer's SIMMs.

Take Apart

Macintosh SE
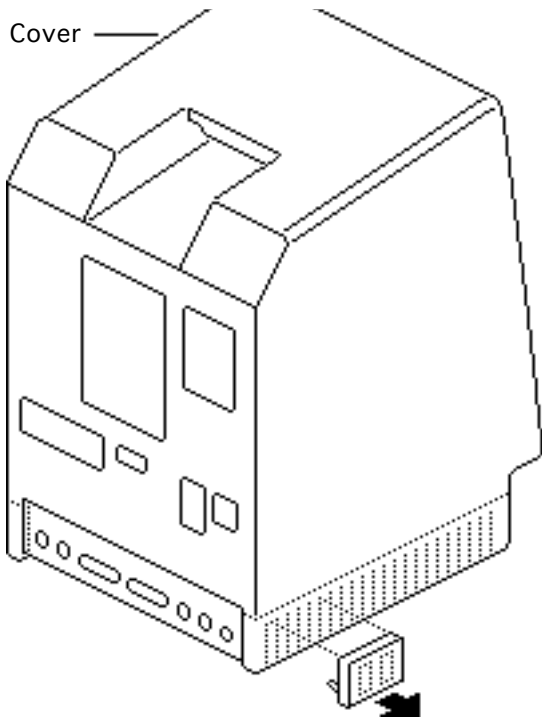
Cover

Cover

No preliminary steps are required before you begin this procedure.

⚠Warning: This product contains high voltage and a high-vacuum picture tube. To prevent serious injury, review CRT safety in Bulletins/Safety.

1 Using a small screwdriver, pry off the reset/interrupt switch (if present).
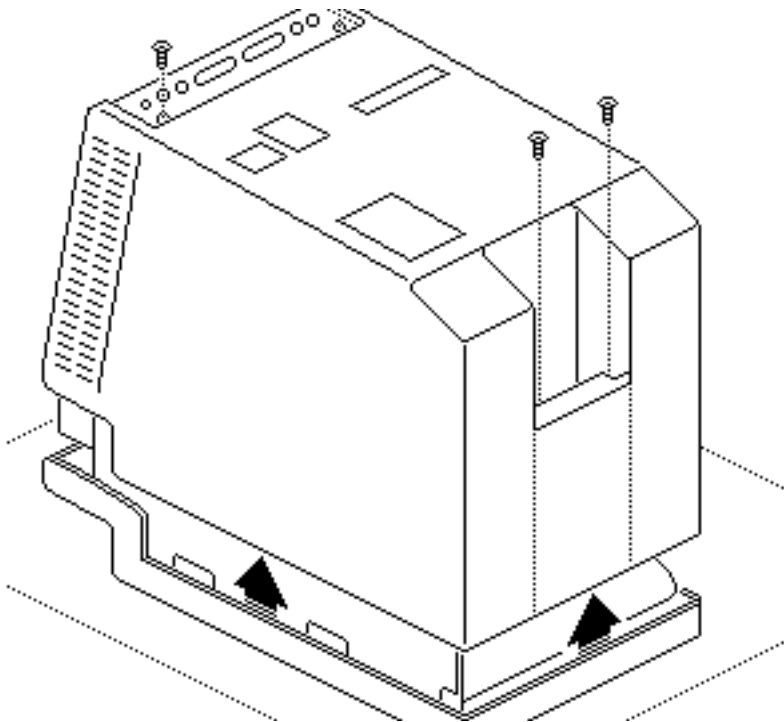
2 Using a Torx screwdriver, remove the four case screws and separate the cover from the chassis with a pull-apart tool.

3 Carefully lift up the cover and set it aside.

4 Remove the paper insulating shroud from the bottom of the computer.

Replacement Note:
Reinstall the two black case screws in the bottom of the cover and the two silver-colored case screws in the top of the cover.
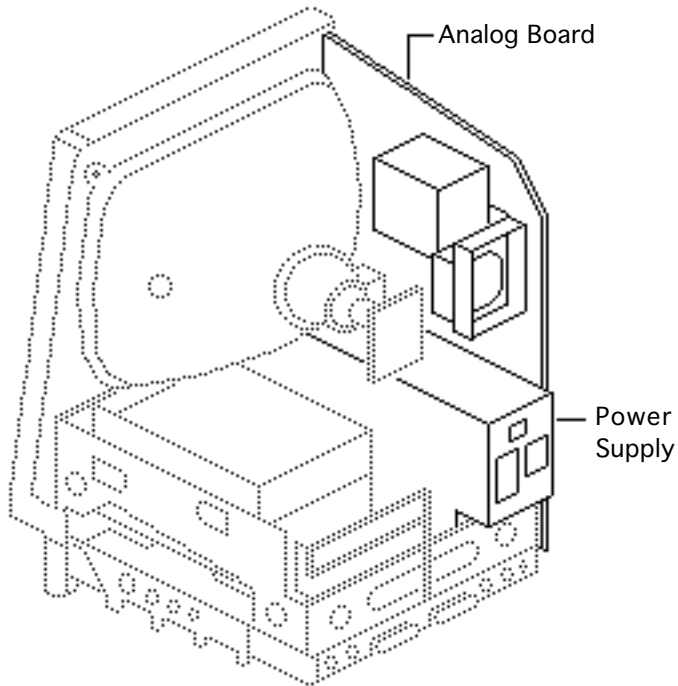
Analog Board & Power Supply

Before you begin,
- Remove the cover
- Discharge the CRT
- Remove the anode cap

Caution: Be sure to discharge the CRT to the ground lug. Failure to do so could damage the logic board or the analog board.

**Caution:** Never use a grounding wriststrap until after discharging the CRT.

Analog Board
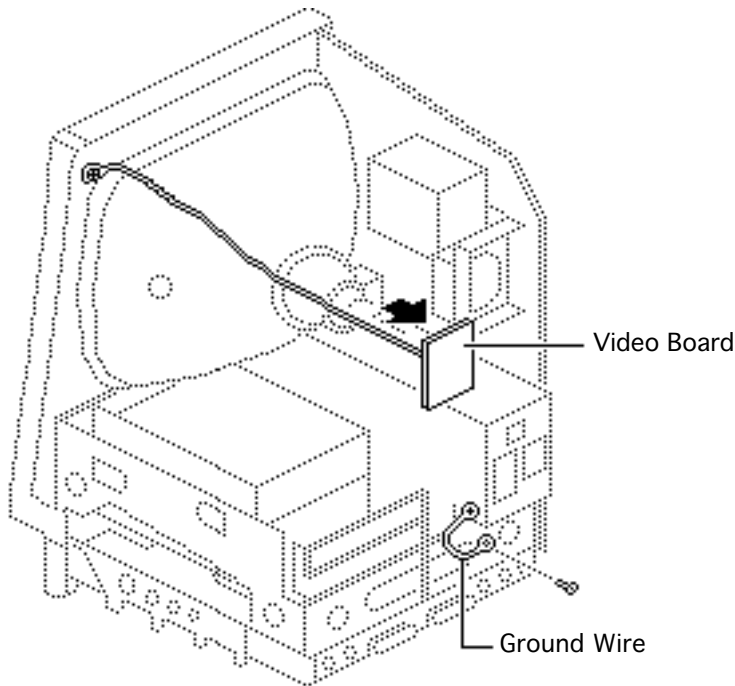
Power Supply

1 Carefully pull the video board straight off the neck of the CRT.

2 Remove the screw that secures the power supply ground wire to the chassis.

Video Board

Ground Wire

Yoke Cable

Video Board Cable

Hard Drive Power Cable
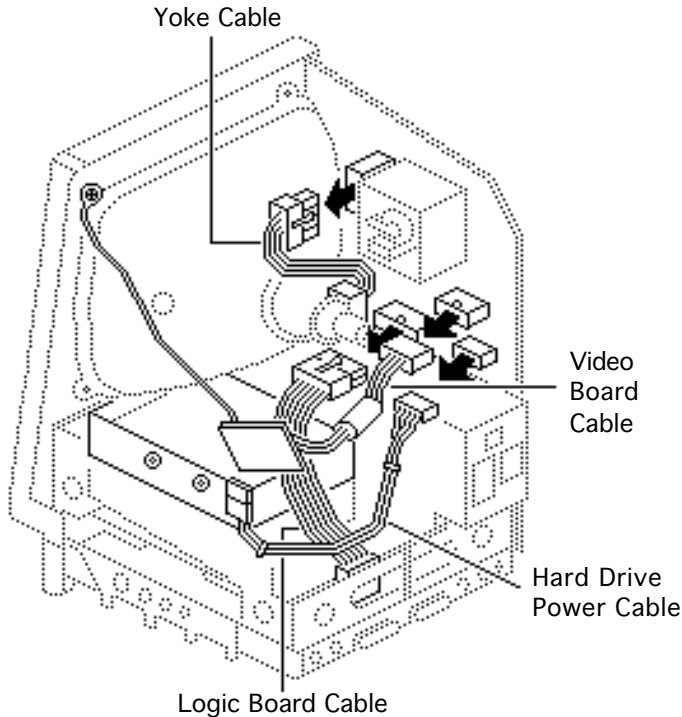
Logic Board Cable

3 Disconnect these cable connectors from the analog board:
  - Yoke cable (First depress the tab.)
  - Logic board cable
  - Video board cable
  - Hard drive power cable
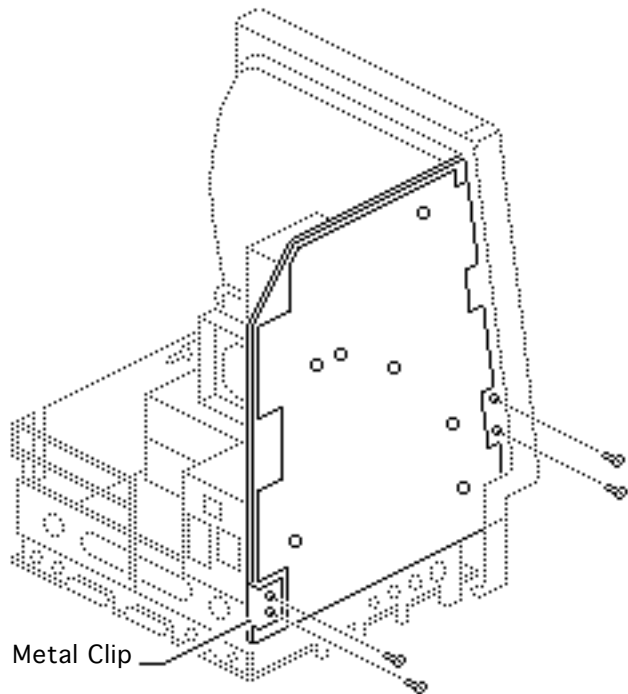
Metal Clip

4   Remove the four screws that secure the analog board to the chassis.

5   Remove the metal clip from the corner of the board.
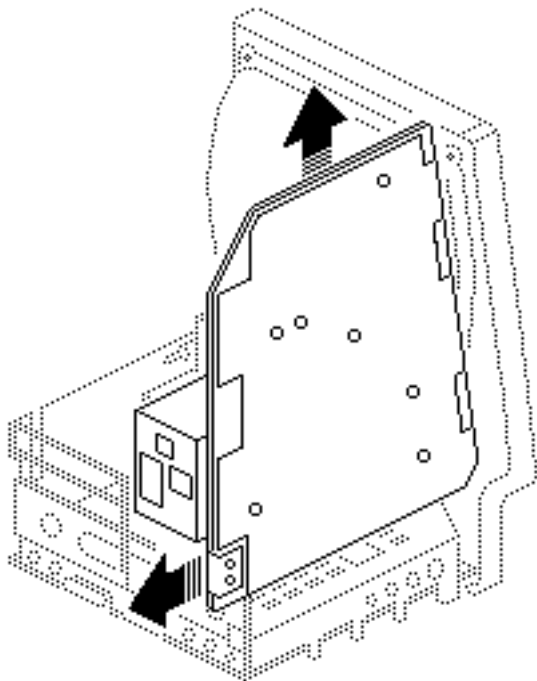
6 **Caution:** When removing the analog board, be careful not to catch the brightness control knob on the chassis and not to bump the neck of the CRT.

Grasp the analog board by its edges and pull the board up and out of the chassis.
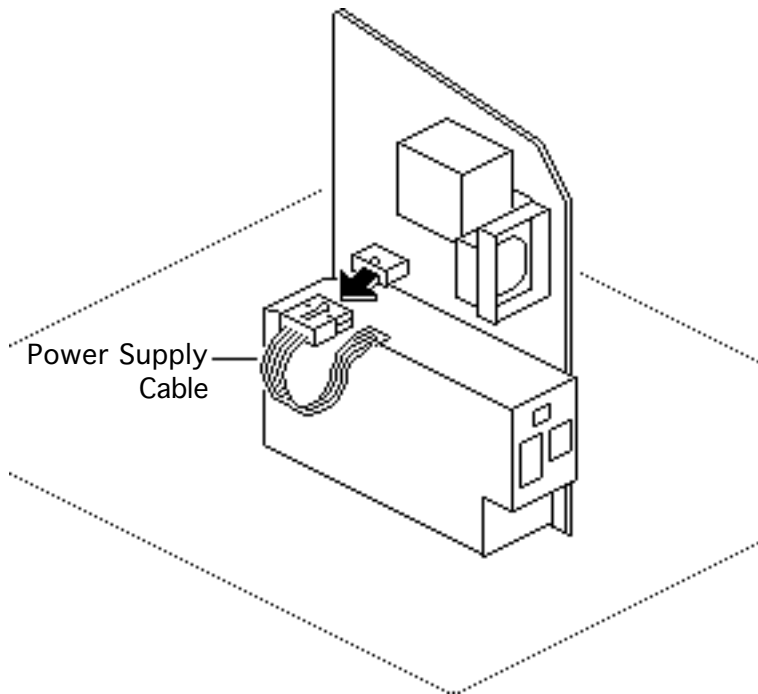
7   Place the analog board on a protective pad and disconnect the power supply cable.

Power Supply Cable

Brightness
Control Knob
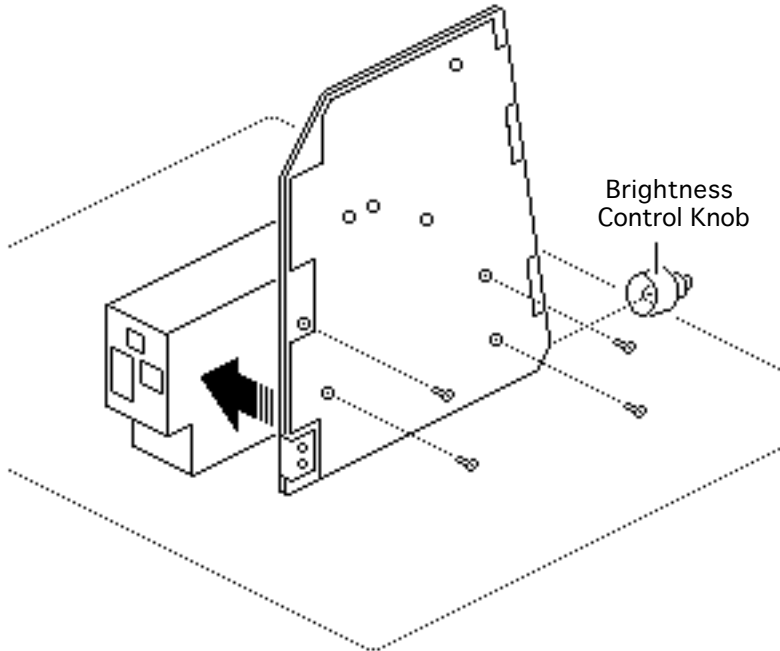
8 Remove the four screws and separate the power supply from the analog board.

Replacement Note: If you are replacing a defective analog board, remove and keep the brightness control knob.
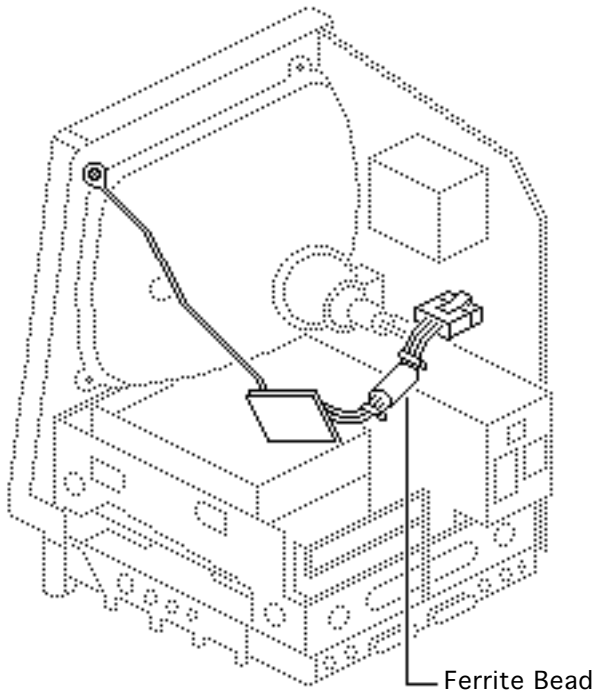
Ferrite Bead

Replacement Note: If you receive a replacement analog board that is packaged with a ferrite bead, and if the customer's video cable does not have a ferrite bead attached, install the packaged ferrite bead on the video cable as shown. Secure the ferrite bead to the cable with a tie-wrap.

Replacement Note: If you replace the analog or power supply, perform the video adjustment procedure. See "Video" in Adjustments.

Logic Board

Logic Board

Before you begin,
- Remove the cover
- Discharge the CRT

Caution: Be sure to discharge the CRT to the ground lug. Failure to do so could damage the logic board or the analog board.

Warning: Never use a grounding wriststrap until after discharging the CRT.

Power Supply Cable

Floppy Drive Cable

Hard Drive
Data Cable
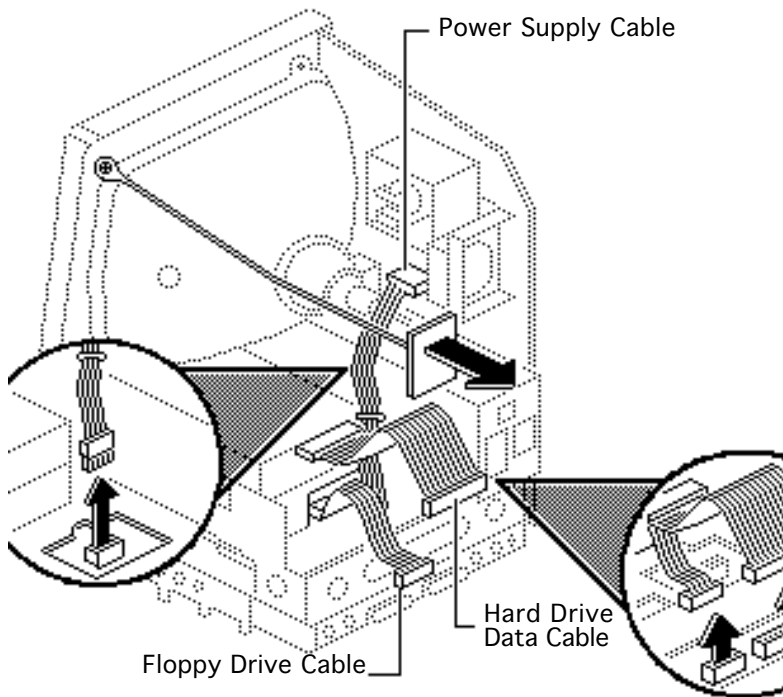
1 Carefully pull the video
   board straight off the
   neck of the CRT.

2 Disconnect these cable
   connectors from the
   logic board:
   • Hard drive data cable
     (if present)
   • Internal floppy drive
     cable(s)
   • Power supply cable

   Note: You must first
   depress the holding clip
   to remove the power
   supply cable.
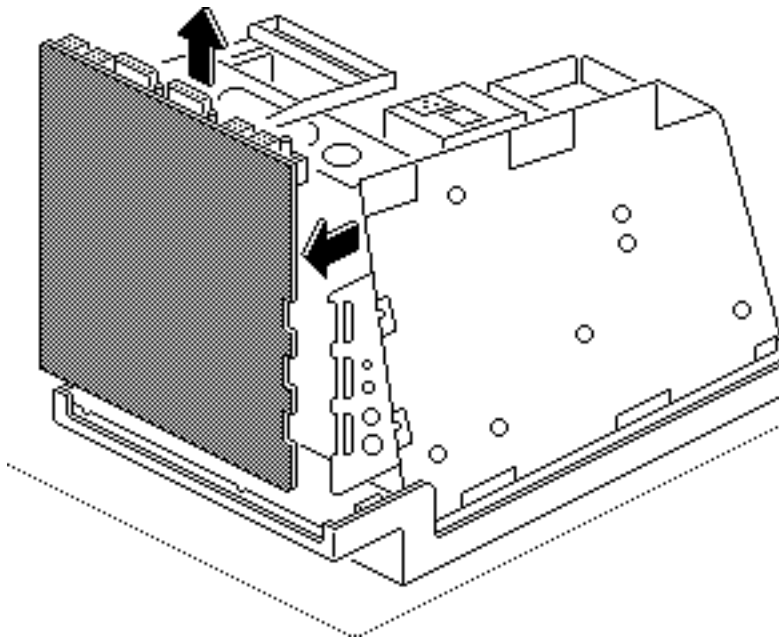
3   Slide up the logic board
    until its tabs are aligned
    with the notches in the
    chassis. Swing out the
    right side of the board
    and remove it from the
    chassis.
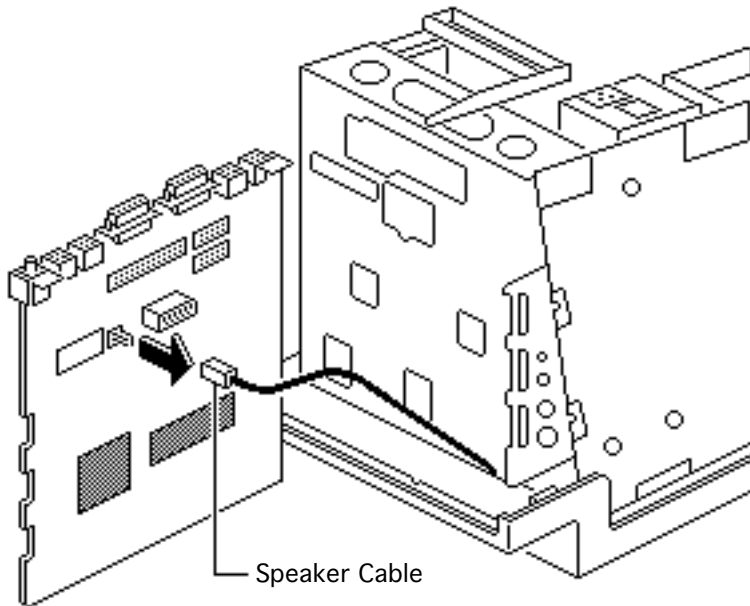
Speaker Cable

4 Disconnect the speaker cable from the logic board.

Replacement Note: If you are replacing a defective logic board, you must use an exchange logic board that is configured the same as the customer's original board. See "Identifying SE Logic Boards" in the Additional Procedures chapter for more information.
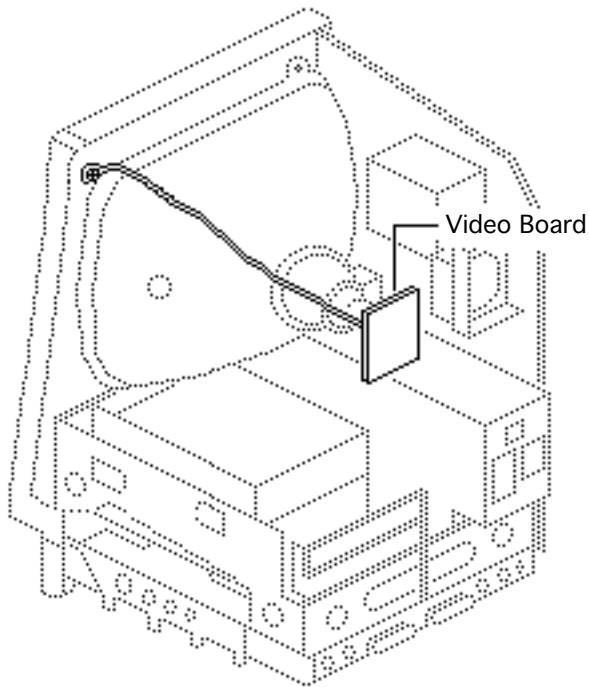
Video Board

Video Board

Before you begin,
- Remove the cover
- Discharge the CRT

Caution: Be sure to discharge the CRT to the ground lug. Failure to do so could damage the logic board or the analog board.

Warning: Never use a grounding wriststrap until after discharging the CRT.
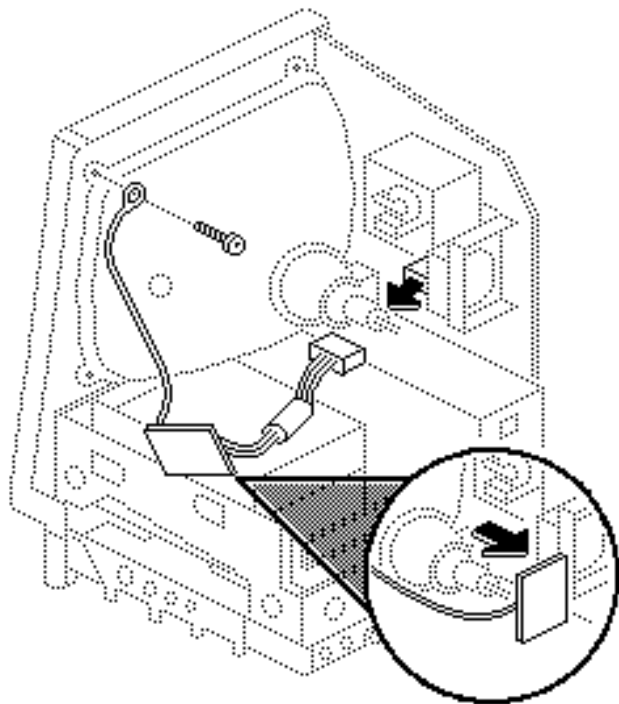
1   Carefully pull the video board straight off the neck of the CRT.

2   Disconnect the video board connector from the analog board.

3   Remove the Torx screw and video ground wire from the upper-left CRT mounting bracket.

Replacement Note: If you replace the video board, perform the video adjustment procedure. See "Video" in Adjustments.

Replacement Note:
Replacement video boards are installed vertically on the CRT. The vertically-mounted video board requires using the axial (round) fan.
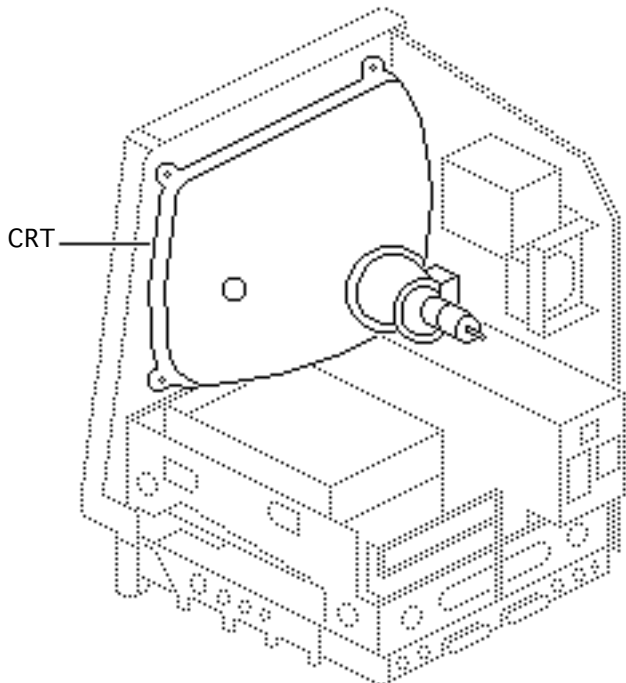
CRT

Before you begin,
- Remove the cover
- Discharge the CRT
- Remove the anode cap
- Remove the video board
- Remove the analog board (only)

CRT
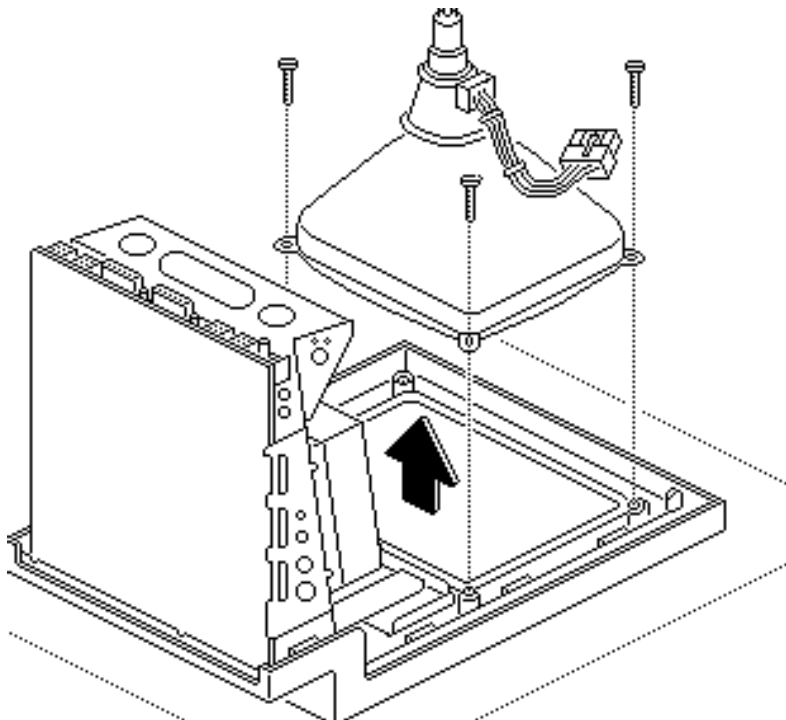
1. With the CRT face-down on a protective pad, use a Torx screwdriver to remove the three remaining CRT mounting screws.

2. Lift the CRT off the bezel.

Replacement Note: If you replace the CRT, perform the video and yoke adjustment procedures. See "Video" and "Yoke" in the Adjustments chapter.

Hard Drive

Before you begin,

- Remove the cover
- Discharge the CRT
- Remove the video board

Hard Drive

Hard Drive Power Cable

Hard Drive Data Cable
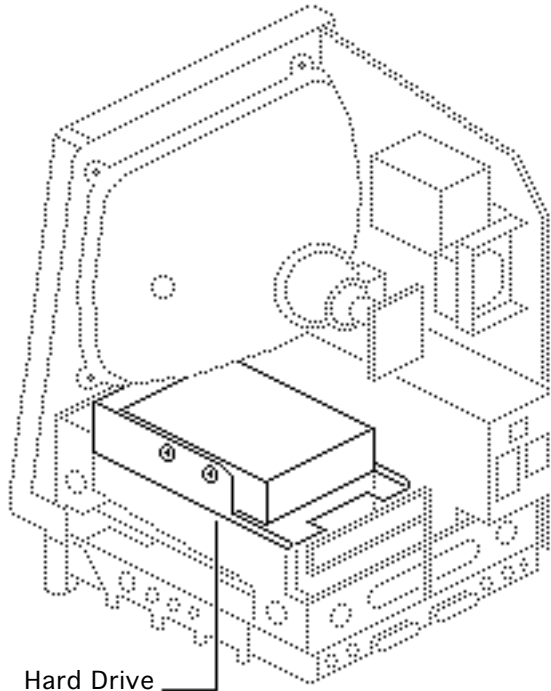
Warning: Never use a grounding wriststrap until after discharging the CRT.

1 Disconnect the hard drive data cable from the hard drive and the logic board. Keep the cable.

2 Disconnect the hard drive power cable from the analog board.
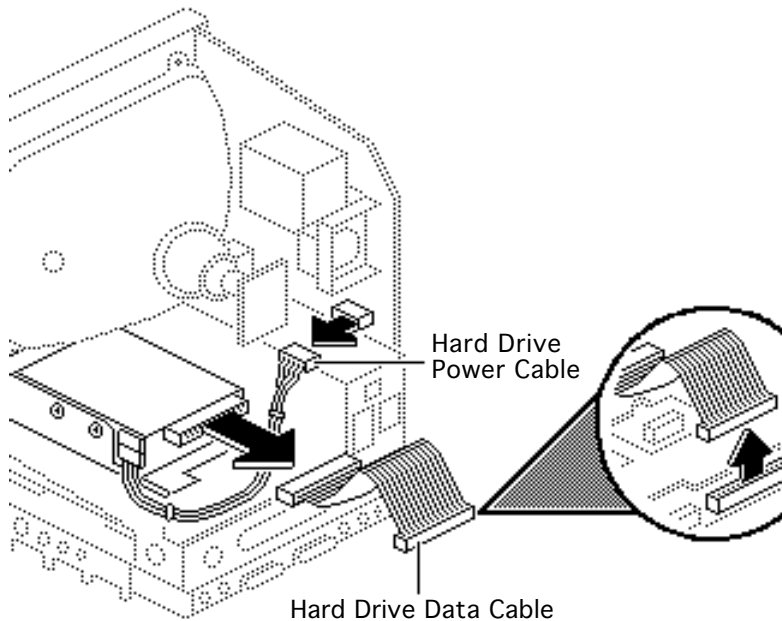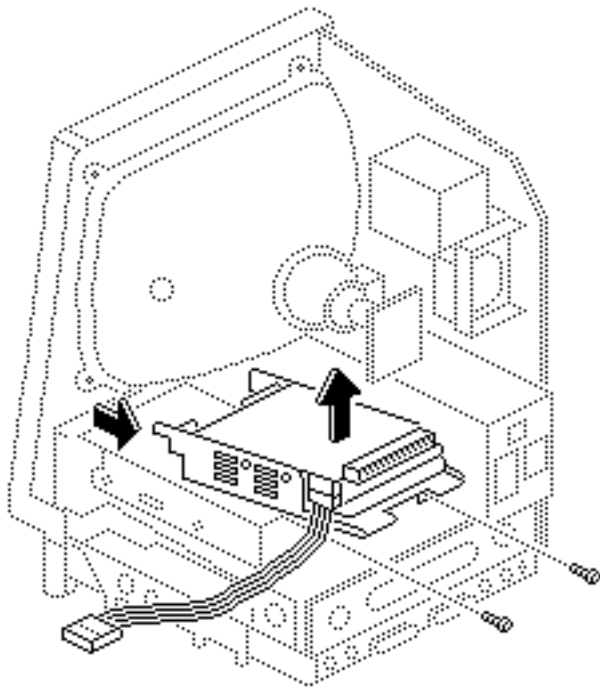
3 Remove the two mounting screws and lift out the hard drive with carrier attached.

Replacement Note: For information on removing the hard drive from the carrier and returning drives, cables, and carriers to Apple, refer to "Additional Procedures" in the Hard Drives manual.

Revision A
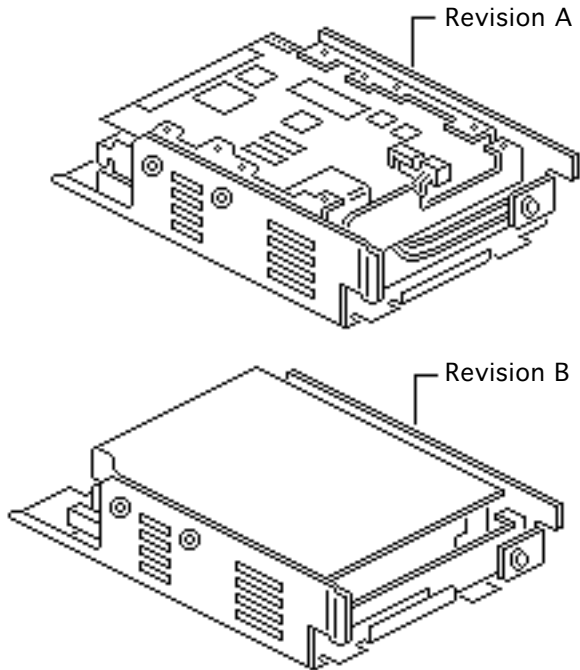
Revision B

Replacement Note: If you are replacing a defective Hard Disk 20SC, be aware that Apple currently ships Revision A and Revision B versions of this hard drive and each version must be replaced like-for-like. To differentiate between drive versions, check their circuit boards. For Revision A drives, the component side of the board is up; for Revision B drives, the solder side of the board is up. For part numbers, refer to the Service Source parts database.

LED Cable Assembly

Before you begin,
- Remove the cover
- Discharge the CRT
- Remove the hard drive
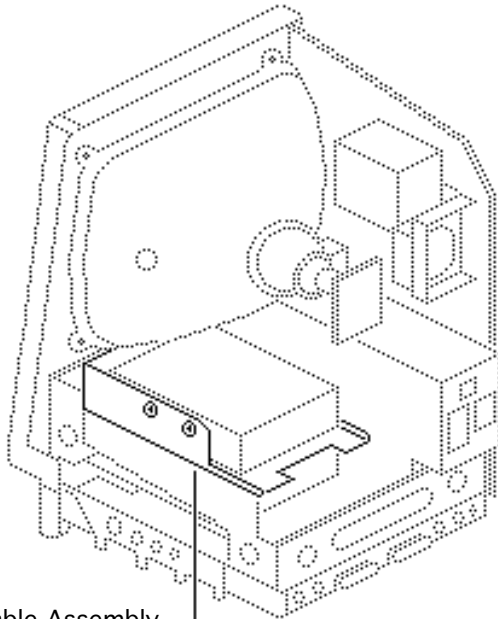
LED Cable Assembly
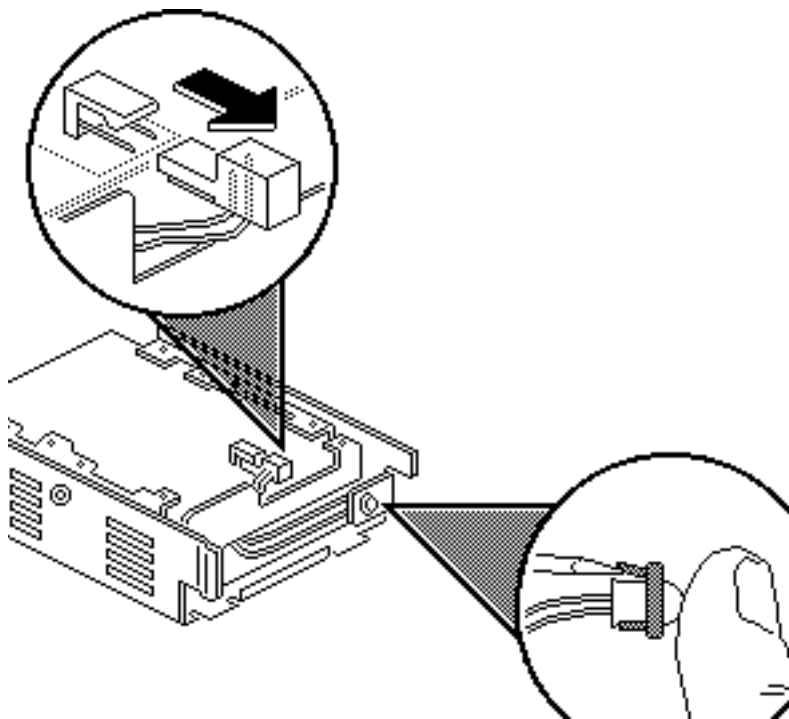
1. Disconnect the LED connector from the hard drive.

2. Pull open the release tab at the back of the LED and push the LED through the carrier bracket.

Upper Floppy Drive

Before you begin,

- Remove the cover
- Discharge the CRT
- Remove the video board
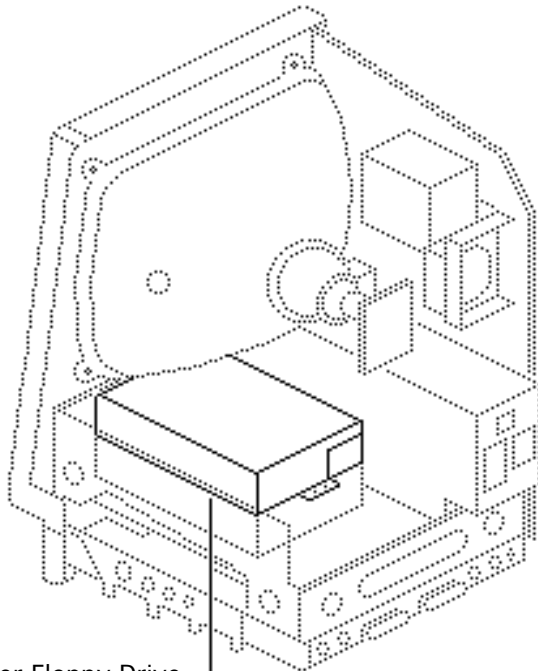
Upper Floppy Drive
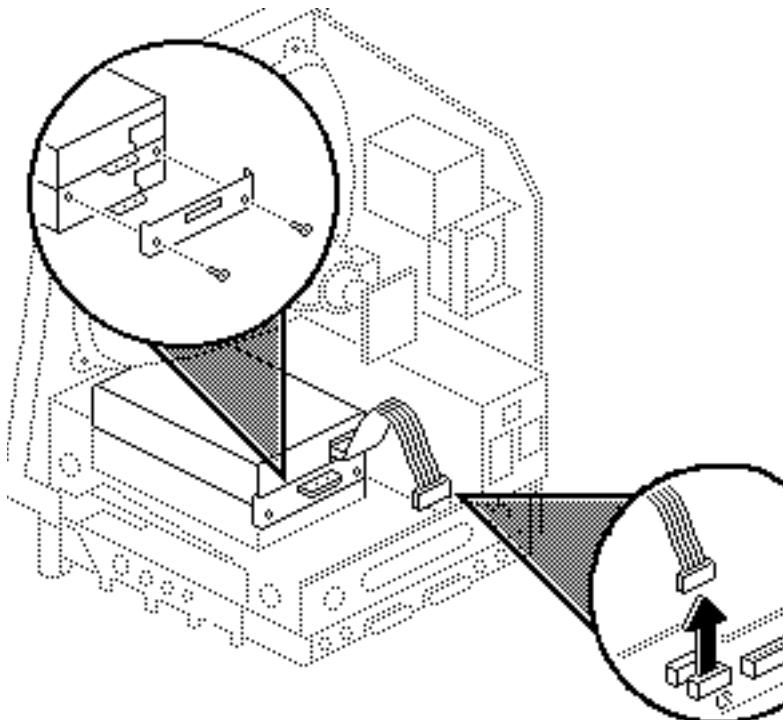
1   Disconnect the upper floppy drive cable from logic board connector J7.

2   Remove two mounting screws and the metal bracket that connects the upper and lower floppy drives.
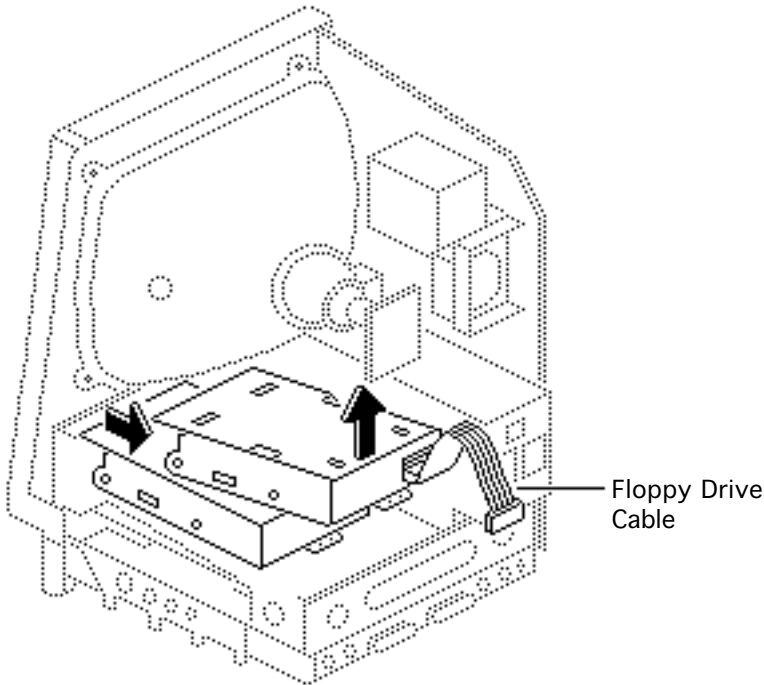
Floppy Drive Cable

3 Lift and slide out the upper floppy drive. Disconnect and keep the floppy drive cable.

Replacement Note: Apple recommends using dust shields on all 1.4 MB floppy drives. All 1.4 MB replacement drives ship with the dust shield installed. If you plan to install a dust shield on an existing 1.4 MB drive, you must first clean the drive (see the Hard Drives manual).
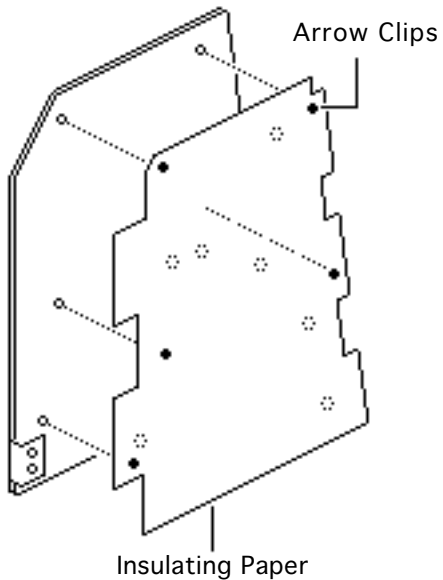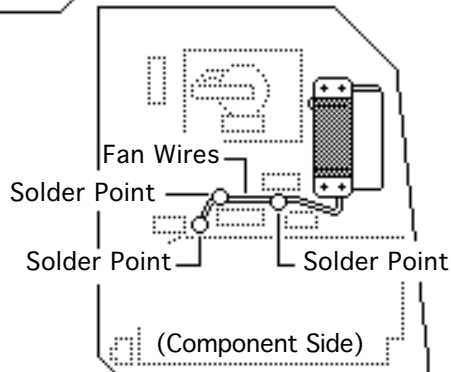
Lower Floppy Drive

Lower Floppy Drive

Before you begin,

- Remove the cover
- Discharge the CRT
- Remove the video board
- Remove the upper drive
- Remove the logic board
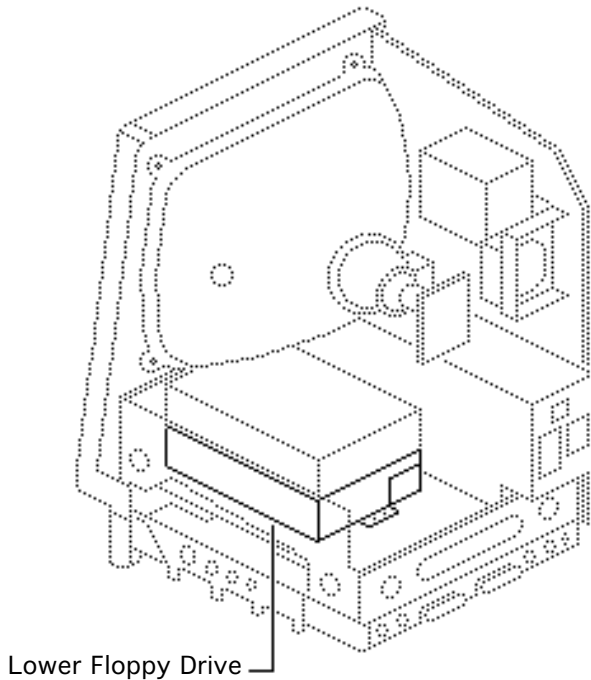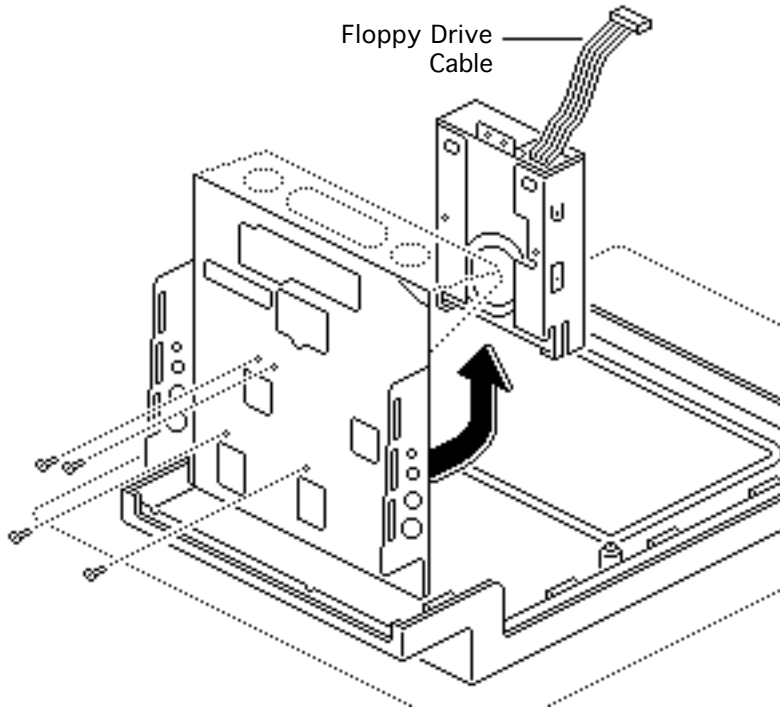
Floppy Drive Cable

Remove the four mounting screws and lift out the lower floppy drive. Disconnect and keep the floppy drive cable.

Replacement Note: Apple recommends using dust shields on all 1.4 MB floppy drives. All 1.4 MB replacement drives ship with the dust shield installed. If you plan to install a dust shield on an existing 1.4 MB drive, you must first clean the drive (see the Hard Drives manual).

Fan Assembly

Fan Assembly

Before you begin,

- Remove the cover
- Discharge the CRT
- Remove the video board
- Remove the analog board and power supply.
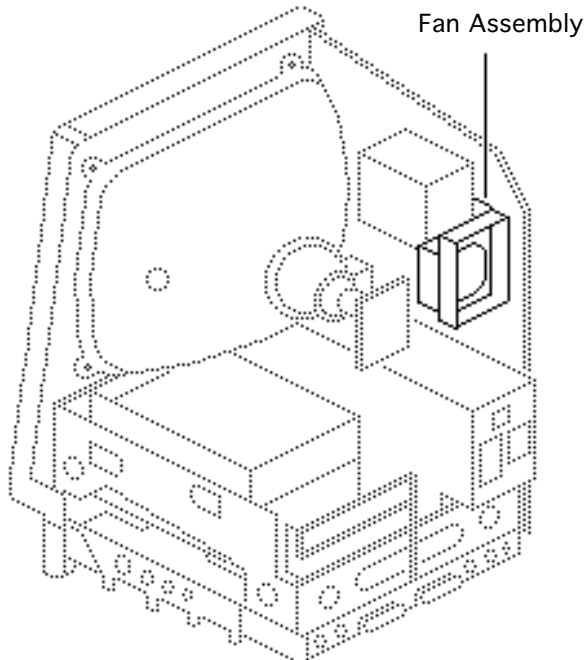
1 Compress the arrow
   clips and remove the
   insulating paper from
   the analog board.

Arrow Clips

Insulating Paper

Solder Point

Solder Point

Solder Point

(Solder Side)

Fan Wires

Solder Point

Solder Point

Solder Point

(Component Side)
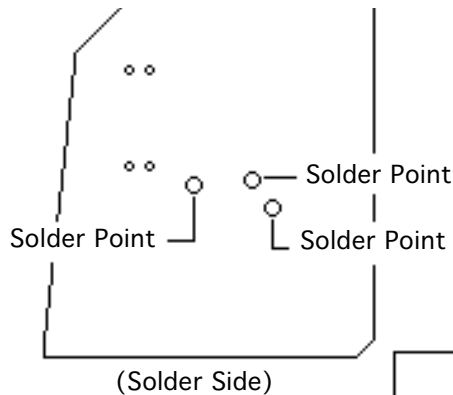
2 Check the front and back of the analog board for wires connecting the fan to the board. Desolder these wires at their solder points at the back of the analog board. Using a matte knife, cut away any excess solder.

(Solder Side)
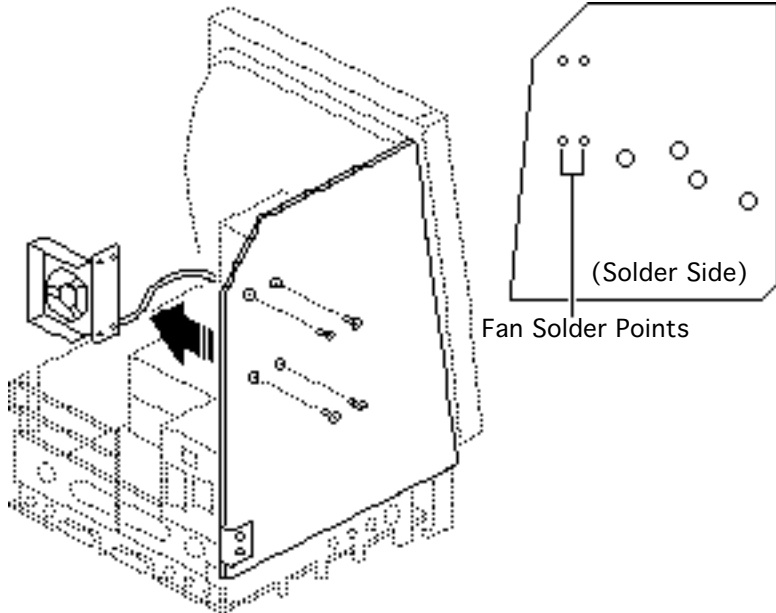
Fan Solder Points

3 Remove the four mounting screws and lockwashers and remove the fan assembly from the analog board.

Note: On earlier versions of the analog board you may have to desolder the fan itself from the analog board at the solder points shown.

Replacement Caution: If you are replacing the fan with the newer axial (round) fan, make sure your customer's system has the redesigned, vertically-mounted video board installed on the CRT. The axial fan does not allow adequate vibration clearance with the old, horizontally-mounted video board.
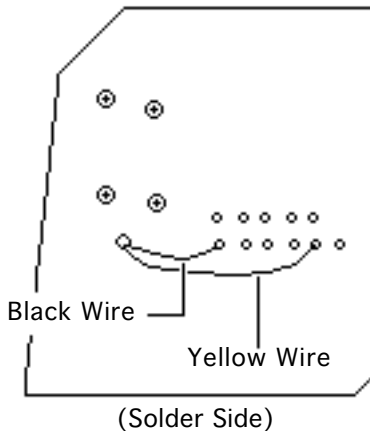
Replacement Note: Some replacement fans have a black wire and a yellow wire that must be soldered to the back side of the analog board. Insert these wires through the arrow clip hole in the board and solder them to the points shown.

Black Wire

Yellow Wire

(Solder Side)

Speaker,
Bezel, &
Slot Cover
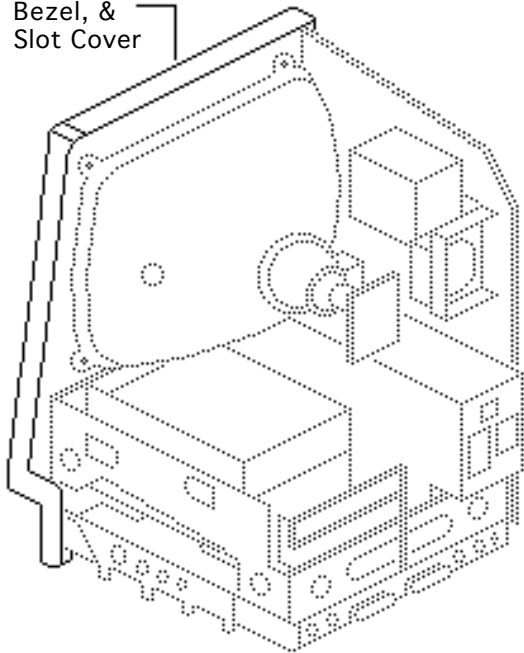
Speaker, Bezel, & Slot Cover

Before you begin,

- Remove the cover
- Discharge the CRT
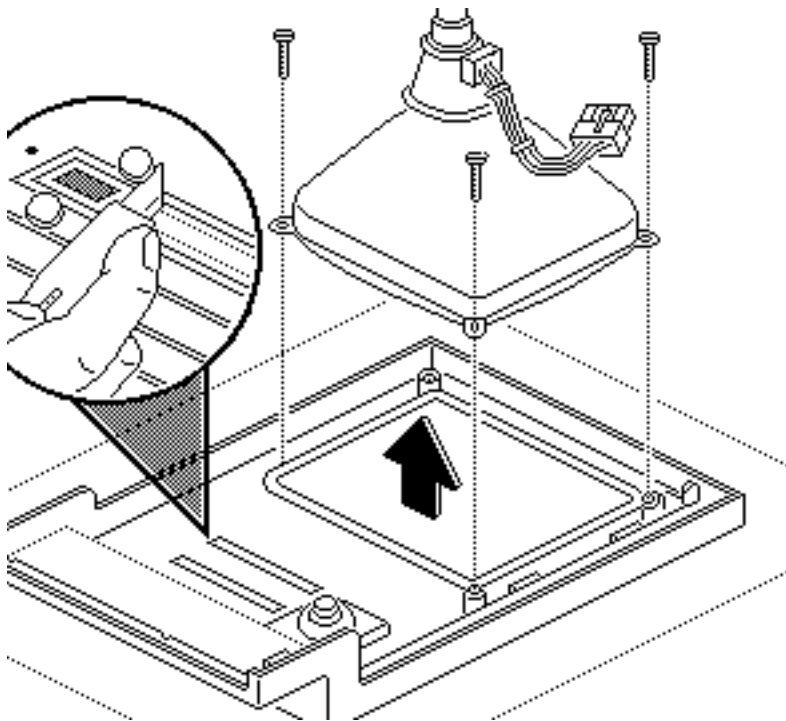- Remove the video board
- Remove the analog board (only)
- Remove the logic board
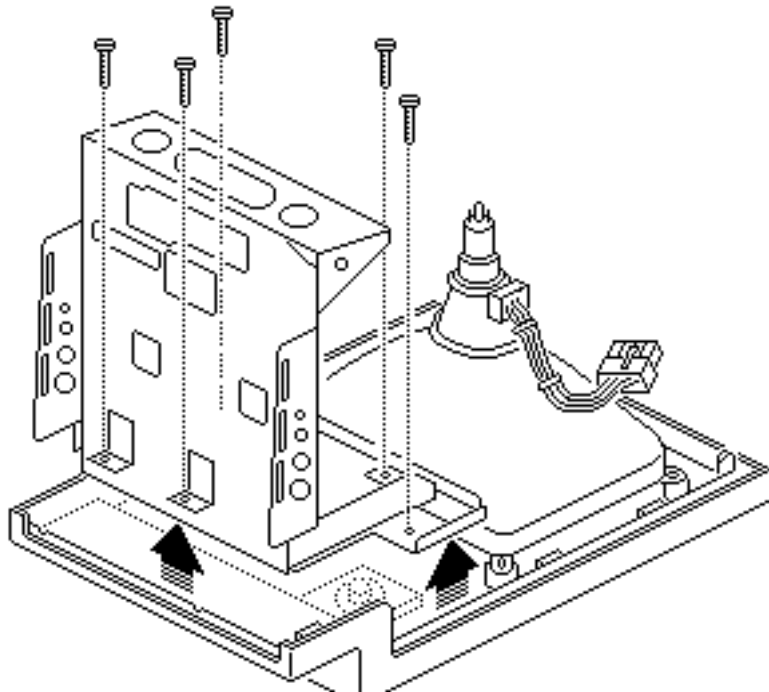
1 Remove the five Torx screws and lift the chassis (with attached drives) off the front bezel.
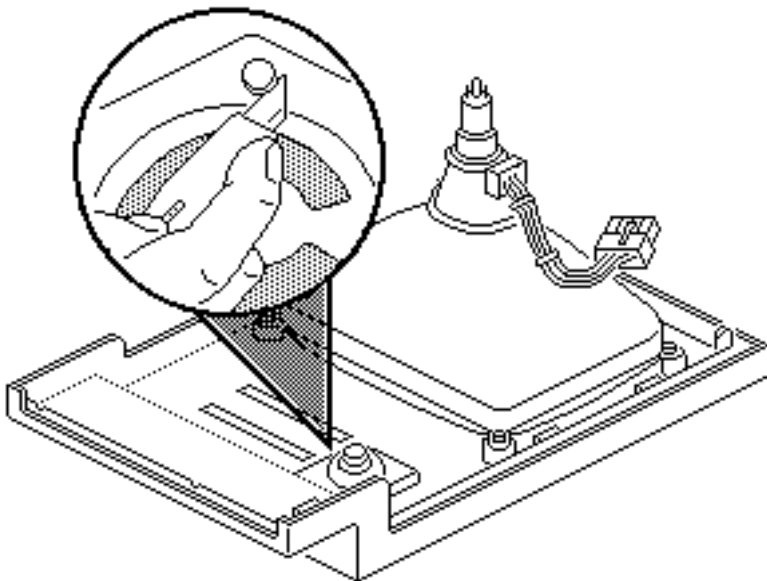
2 To remove the speaker, cut away (with a matte knife) the melted plastic that secures the speaker to the inside of the front bezel.

3 Lift out the speaker.

4   To remove the slot cover, cut away (with an art knife) the melted plastic that secures the slot cover to the inside of the front bezel.

5   To remove the front bezel, remove the CRT. (See "CRT" in Take Apart).

Upgrades

Macintosh SE

Memory Upgrade

Before you begin,
- Remove the cover
- Discharge the CRT
- Remove the logic board

⚠️**Warning:** This product contains high voltage and a high-vacuum picture tube. To prevent serious injury, review CRT safety in Bulletins/Safety.

⚠️**Warning:** Never use a grounding wriststrap until after discharging the CRT.

Logic Board

Slot 1
Slot 3
Resistor/Jumper
Slot 2
Slot 4
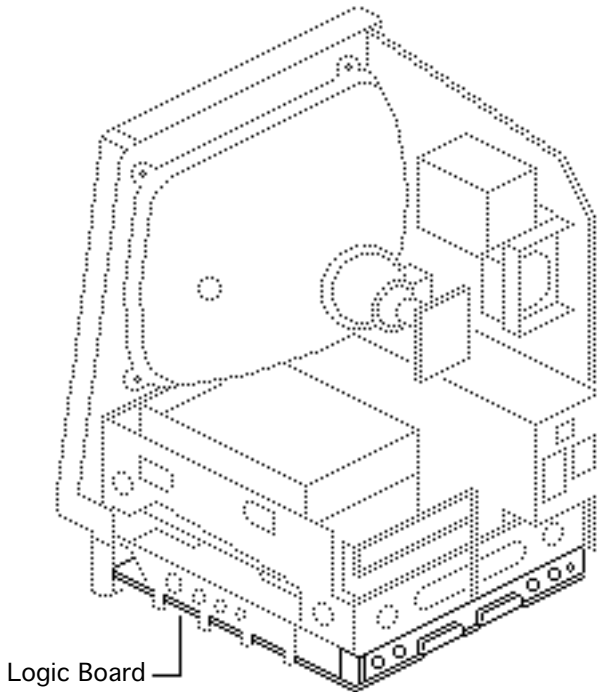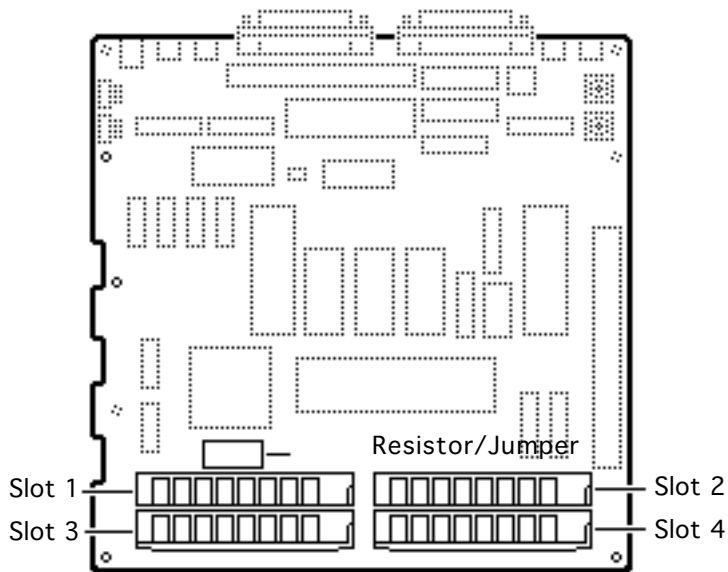
Note: Two logic boards are available for the Macintosh SE. The original board uses a solder-type resistor to identify system memory configurations; a resistor is installed in R35 for 1 MB and in R36 for 2 MB. The revised logic board uses a jumper to identify system memory.

Note: The Macintosh SE requires 150-ns (or faster) SIMMs. RAM speed is indicated by the -xx number after the manufacturer's part number (-15 indicates a 150-ns SIMM).
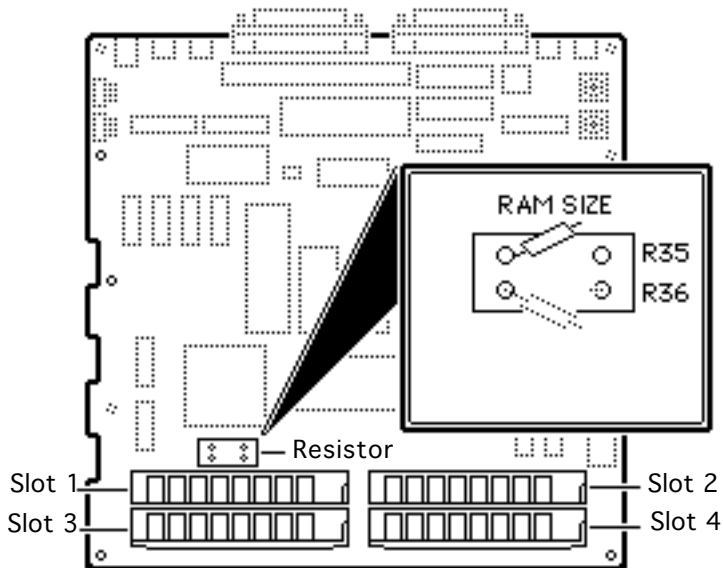
Logic Board with Resistor

Clip one end of resistor R35 or R36 and move the resistor away from the clipped lead.

Replacement Note:
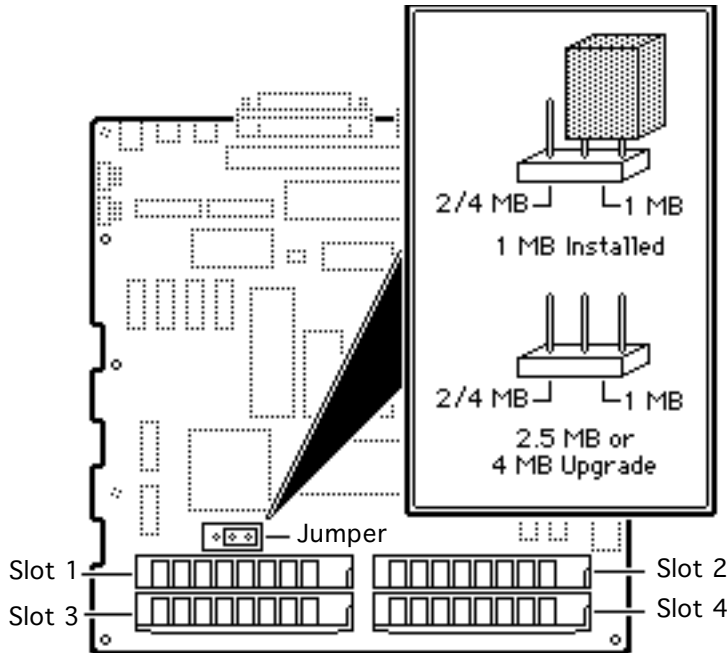Clipping the resistor and moving it away will allow you to retack the resistor in the future.

2.5 MB Upgrade

Install two 1 MB SIMMs in slots 1 and 2 and install two 256K SIMMs in slots 3 and 4.

4 MB Upgrade

Install four 1 MB SIMMs in slots 1 through 4.

Logic Board with Jumper

1 MB to 2.5 MB

Remove the two 256K SIMMs from slots 3 and 4. Install two 1 MB SIMMs in slots 3 and 4. Remove the jumper permanently.
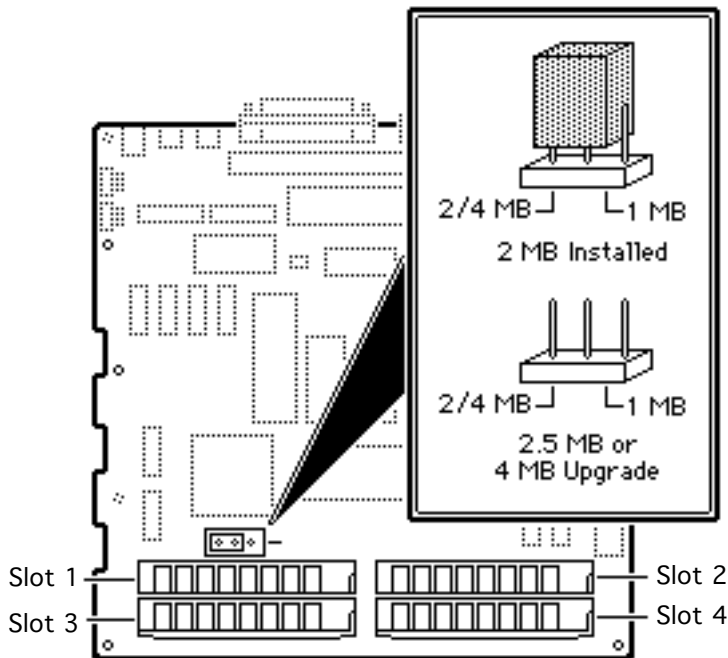
1 MB to 4 MB

Remove all four 256K SIMMs. Install four 1 MB SIMMs. Remove the jumper permanently.

**Note:** Disregard the jumper label "2/4 M" on the logic board. A 4 MB upgrade requires the removal of the jumper.

2 MB to 2.5 MB

Install two 256K SIMMs in slots 1 and 2. Remove the jumper permanently.

2 MB to 4 MB

Install two 1 MB SIMMs in slots 1 and 2. Remove the jumper permanently.

Note: Disregard the jumper label "2/4 M" on the logic board. A 4 MB upgrade requires the removal of the jumper.

Logic Board Upgrade

Before you begin,
- Remove the cover
- Discharge the CRT
- Remove the video board
- Remove the logic board
- Remove the analog board (only)
- Remove the upper drive
- Remove the CRT
- Remove the bezel
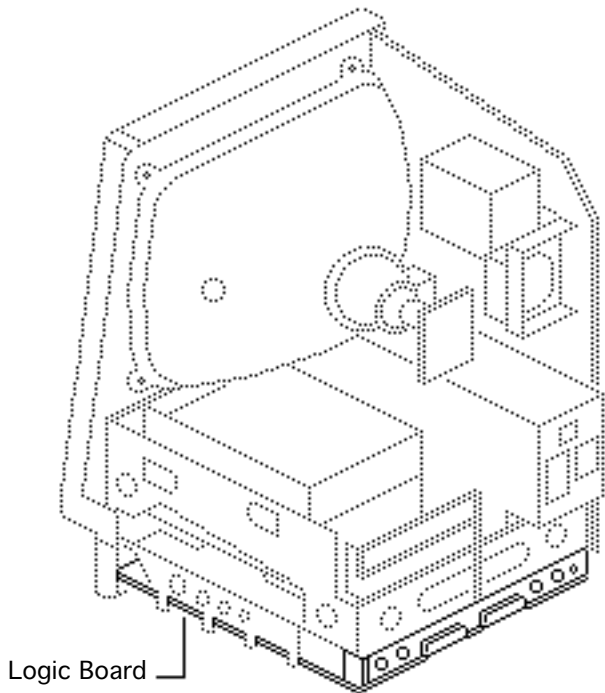
Logic Board

⚠ Warning: This product contains high voltage and a high-vacuum picture tube. To prevent serious injury, review CRT safety in Bulletins/Safety.

Caution: After discharging the CRT, wear a grounding wriststrap to prevent ESD damage to components.

Note: The Logic Board Upgrade Kit for the Macintosh SE includes the SE/30 logic board, a new bezel, a ferrite bead and tie-wrap for EMI protection, a new chassis and bracket, a new RFI shroud, two labels, and a return sheet that you must fill out and return to Apple with the SE logic board.
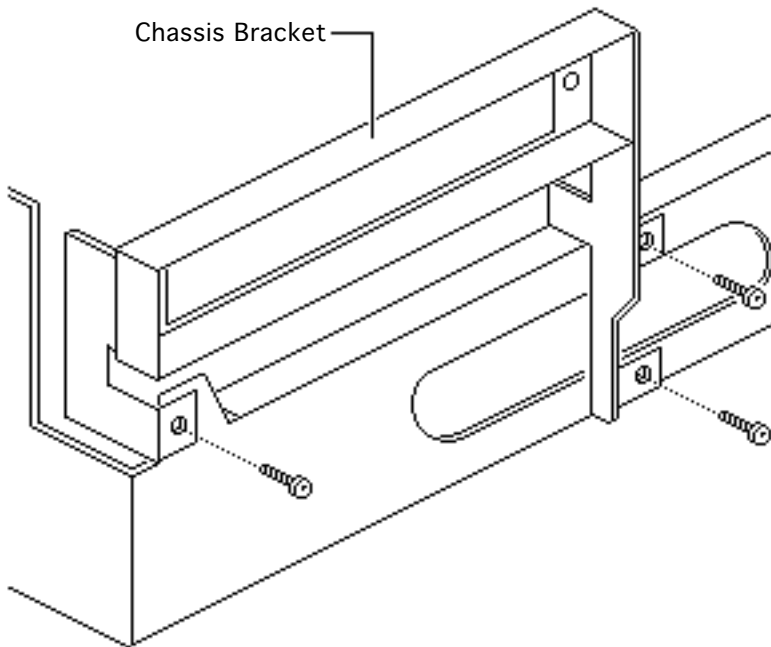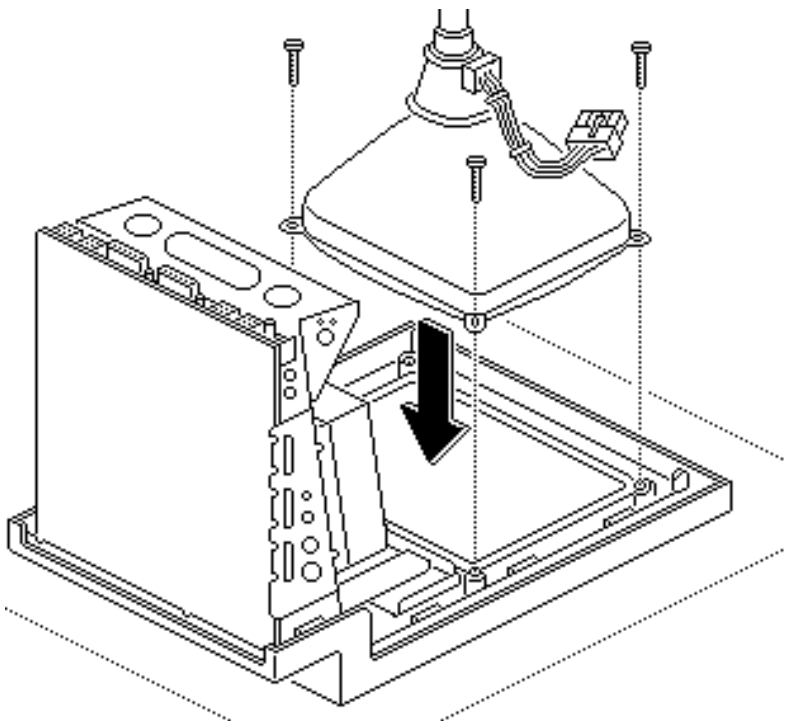
Chassis Bracket

Note: The SE/30 logic board requires a minimum of four identical RAM SIMMs. Customers whose Macintosh SE systems have 2.5 MB or less of RAM must purchase additional RAM SIMMs.

Note: The new chassis comes in two pieces (a chassis and a bracket) that you must assemble before installation.
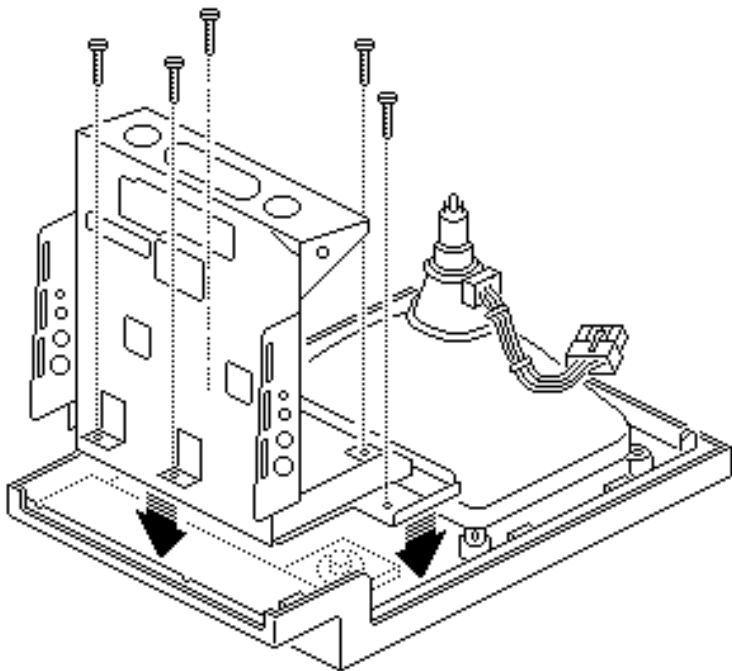
1   Install the bracket on the chassis with three mounting screws.

2 Install the CRT on the new bezel with three Torx screws.

3 Remove the lower floppy drive from the old chassis and install it on the new chassis. Refer to "Lower Floppy Drive" in Take Apart.

4 Install the new chassis on the new bezel with five Torx screws.

5 Install the hard drive or upper floppy drive on the new chassis. Refer to "Hard Drive" or "Upper Floppy Drive" in Take Apart.

6 Replace the analog board. Refer to "Analog Board" in Take Apart.

7 Install the new SE/30 logic board. Refer to "Logic Board" in Take Apart.

Tie-Wrap
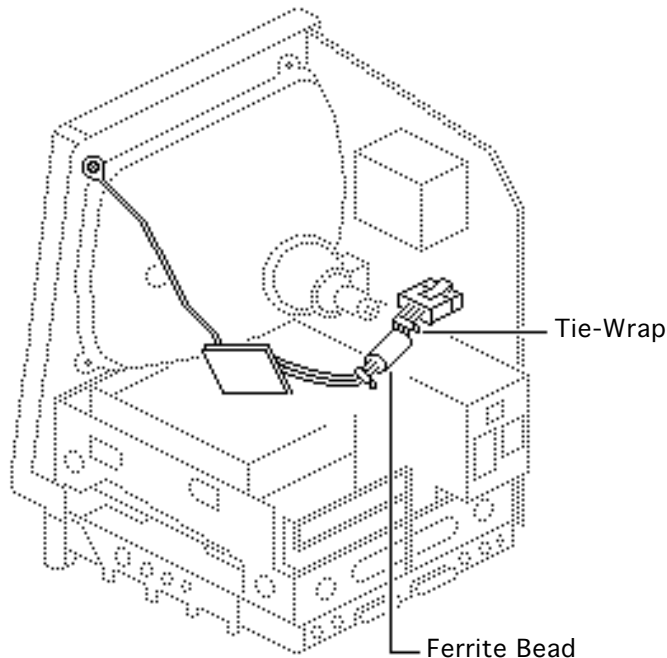
Ferrite Bead

8 Clasp the clip-on ferrite bead around the video board cable as near the video board connector as possible. Secure the ferrite bead near the connector with tie-wraps.

9 Replace the video board. Refer to "Video Board" in Take Apart.

10 Install the new insulating shroud over the bottom of the SE and replace the cover. Refer to "Cover" in Take Apart.

Agency Approval Label

Drive Labels

BDDK

FDHD

Macintosh SE
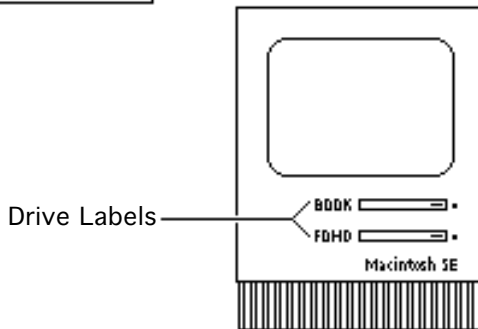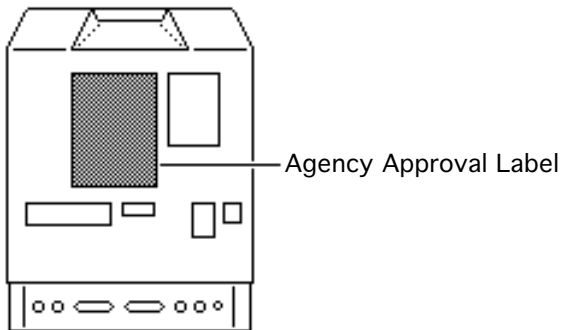
11 Attach the agency approval label over the previous agency label on the back of the cover.

12 Attach the appropriate drive label in the groove to the left of the disk drive slot on the new bezel.

13 Install system software (6.03 or later) and run diagnostics on the upgraded unit.
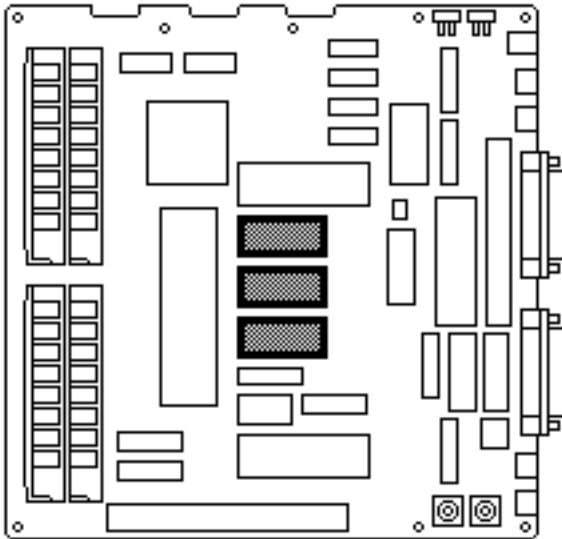
1.4 MB Drive Upgrade

Before you begin,

- Remove the cover
- Discharge the CRT
- Remove the video board
- Remove the hard drive or upper floppy drive
- Remove the logic board
- Remove the lower floppy drive

⚠️ Warning: This product contains high voltage and a high-vacuum picture tube. To prevent serious injury, review CRT safety in Bulletins/Safety.
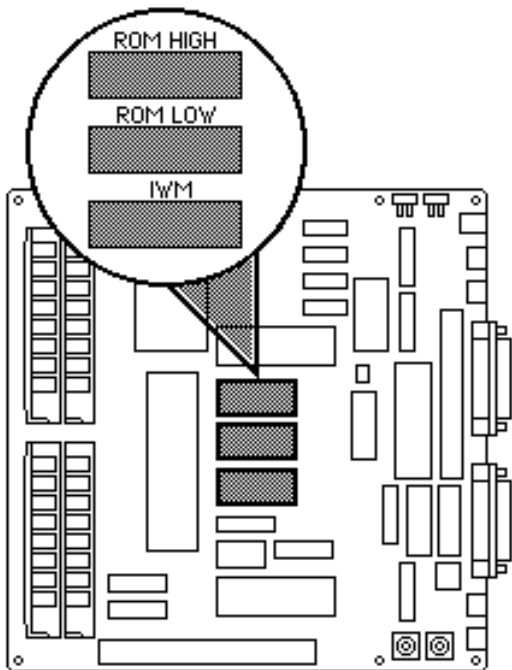
⚠️ Warning: Never use a grounding wriststrap until after discharging the CRT.

Note: The 1.4 MB SuperDrive Upgrade Kit available for the Macintosh SE includes two new ROMs, a SWIM disk controller chip, an audio extension cable for reducing EMI interference, the new 1.4 MB SuperDrive, system software, two labels, and an Apple product return form.
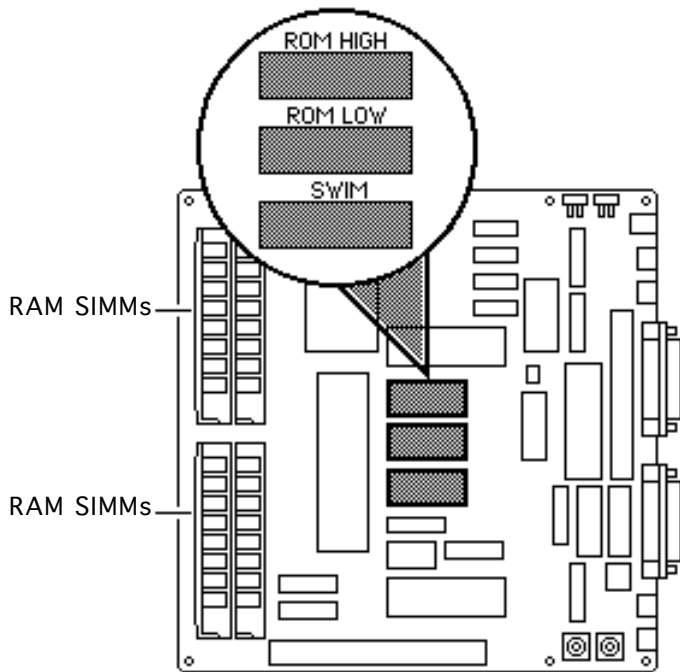
Note: The 1.4 MB SuperDrive must be used with system software version 6.0.3 or higher or the Macintosh SE mistakes the high-density drive for an 800K mechanism.

1. Using an IC extractor, remove the IWM chip and two ROM chips from the logic board.

ROM HIGH

ROM LOW

SWIM

RAM SIMMs

RAM SIMMs

2 Install the SWIM chip
and two new ROM chips
on the logic board as
follows:
- SWIM (344–0062)
  at D8
- High ROM (342–
  0701) at D6
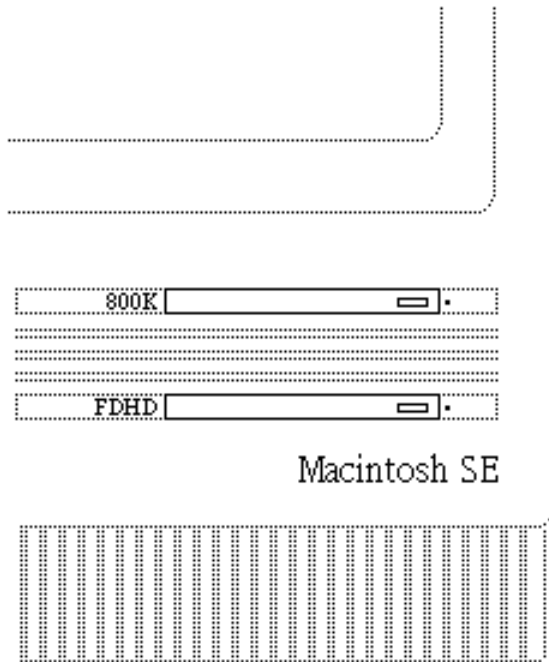- Low ROM (342–
  0702) at D7

Note: The notch at one
end of the SWIM chip and
each ROM chip must face
toward the RAM SIMMs.

3   Install the lower floppy
    drive (the new 1.4 MB
    drive). Refer to "Lower
    Floppy Drive" in Take
    Apart.

4   Replace the logic board.
    Refer to "Logic Board"
    in Take Apart.

800K

FDHD

Macintosh SE

5 Replace the hard drive or upper floppy drive. Refer to "Hard Drive" or "Upper Floppy Drive" in Take Apart.

6 Replace the video board and the cover. Refer to "Video Board" and "Cover" in Take Apart.

7 Place the high density drive label in the groove next to the lower drive slot. If appropriate, place a second floppy drive label next to the upper drive slot.
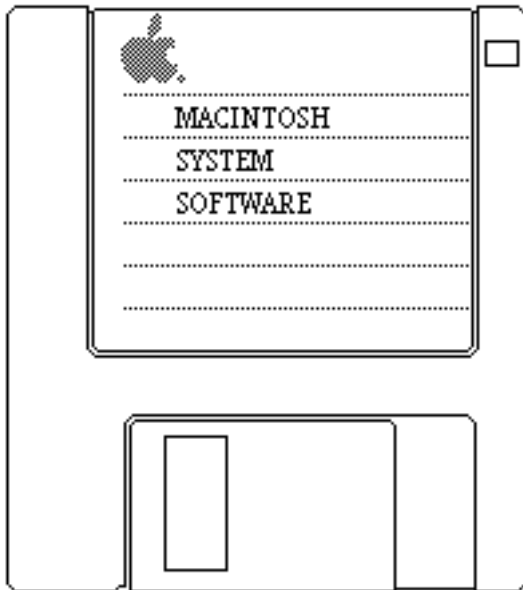
Note: The high density drive label may read "FDHD," "1.4 MB," or "SuperDrive."

8 If necessary, install system software (6.03 or higher) and run diagnostics.

9 Fill out the Apple product return form and return it to Apple with the two ROM chips and the IWM chip.

Note: Give the customer the audio extension cable and explain its use. To reduce EMI interference, the customer must install the audio extension cable with the ferrite bead between the audio cable and the audio jack at the rear of the computer.
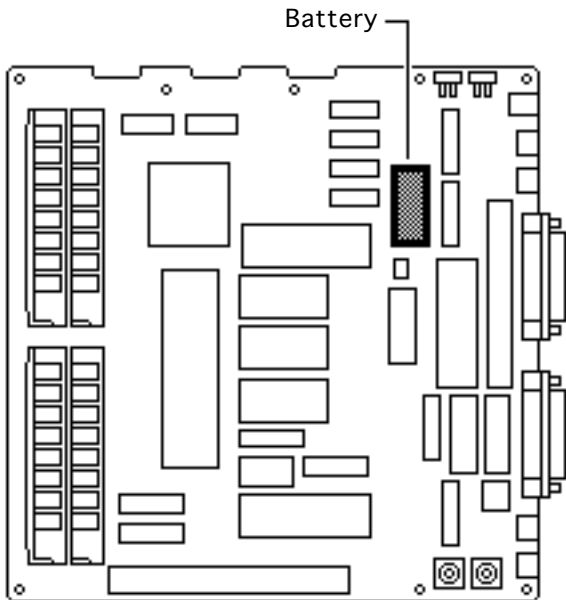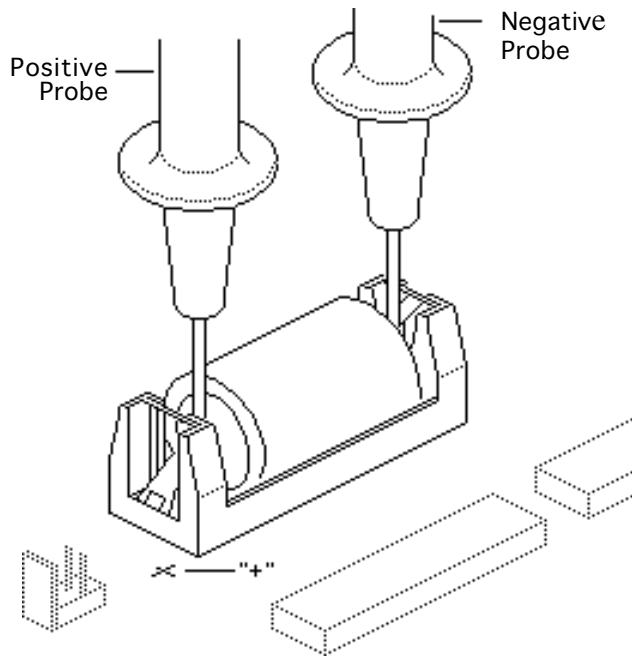
Additional Procedures

Macintosh SE

Battery

Battery Verification

Before you begin,
- Remove the cover
- Discharge the CRT
- Remove the logic board

Warning: If handled or discarded improperly, the lithium battery in the Macintosh SE/30 could explode. Review battery handling and disposal instructions in Bulletins/ Safety.

Warning: Never use a grounding wriststrap until after discharging the CRT.

1 Set the voltmeter to the 10 volts DC scale.

2 Hold the positive probe of the voltmeter to the positive end of the battery and the negative probe to the negative end of the battery.

3 If the battery voltage is below 2.8 volts, replace the battery. Refer to "Battery Replacement" in this chapter.
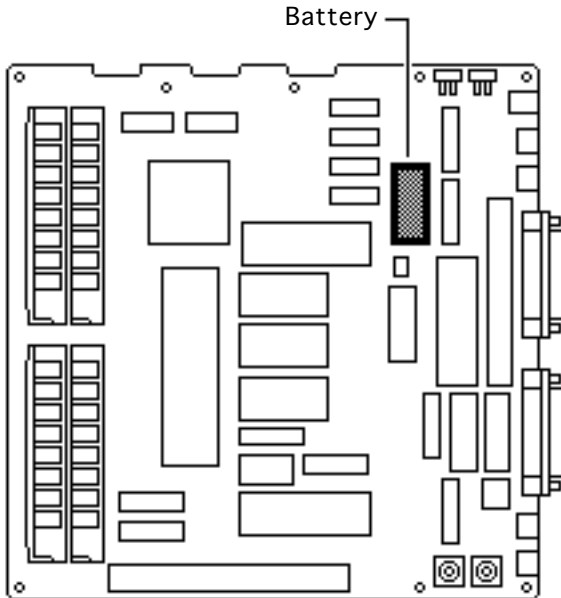
Battery

Battery Replacement

Before you begin,
- Remove the cover
- Discharge the CRT
- Remove the logic board

Warning: If handled or discarded improperly, the lithium battery in the Macintosh SE/30 could explode. Review battery handling and disposal instructions in Bulletins/Safety.

Caution: Never use a grounding wriststrap until after discharging the CRT.

Soldered Battery

1 Using wire clippers, cut the battery leads at both ends of the battery. Cut the leads as close to the logic board as you can without touching the board.

2 Return the battery to Apple for proper disposal. For battery packaging and labeling information, refer to the instructions in Bulletins/Safety.
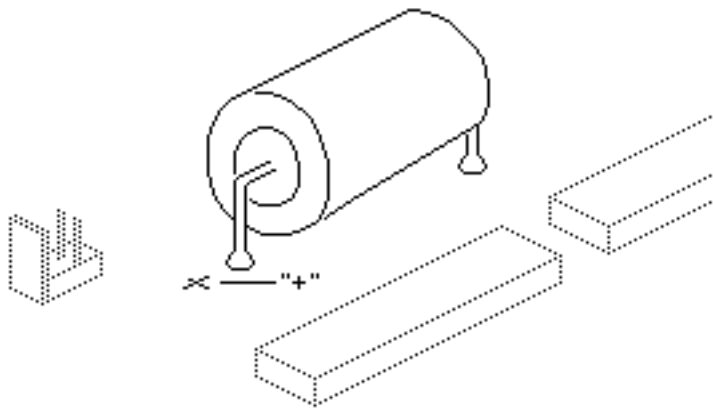
Battery in a Battery Holder

1 Pull the battery out of the battery holder.

2 Return the battery to Apple for proper disposal. For battery packaging and labeling information, refer to the instructions in Bulletins/Safety.
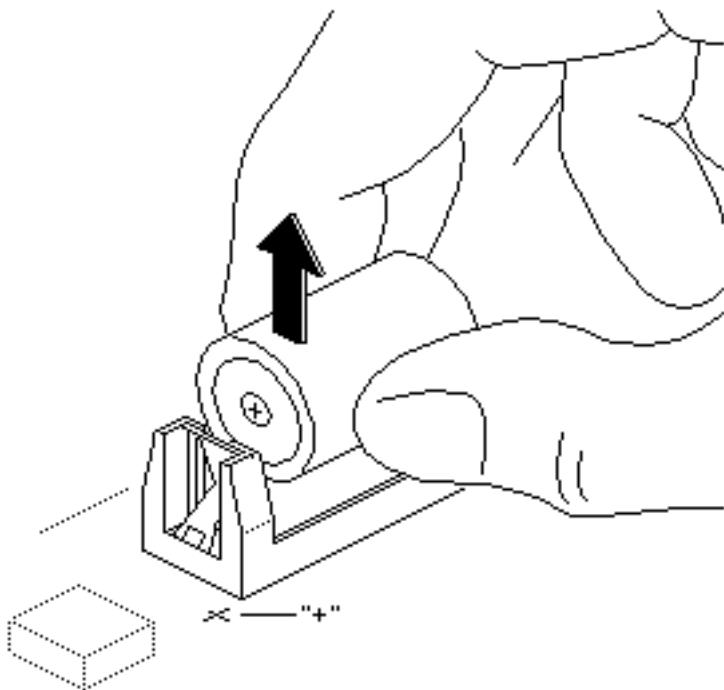
Replacement Note: When replacing the new battery, orient it so that the end marked "+" matches the "+" on the logic board.

Replacement Note: On solder-type logic boards, insert the leads of the new battery into the extra set of mounting holes just inside the original mounting holes.
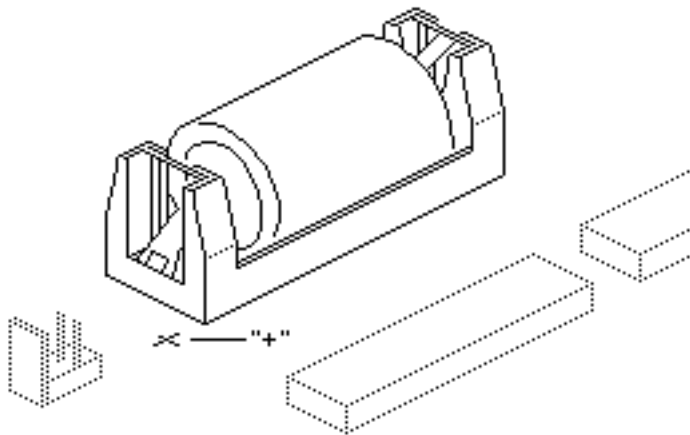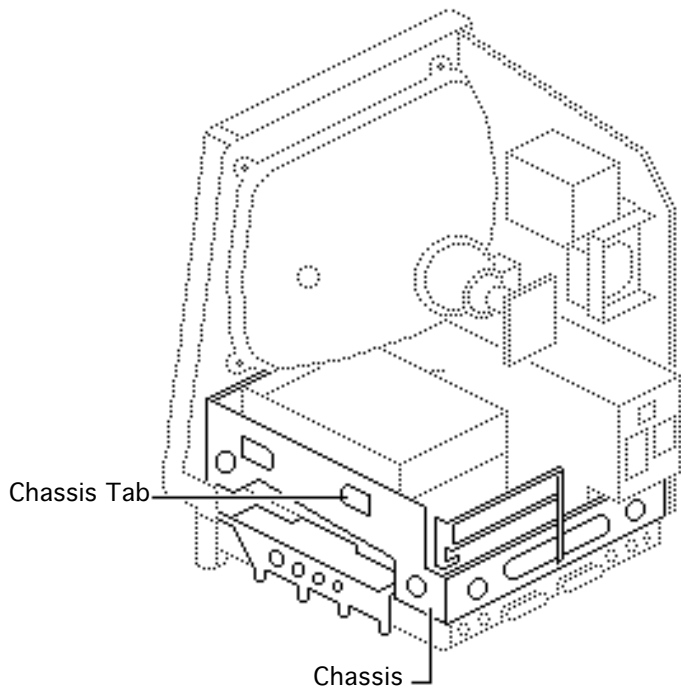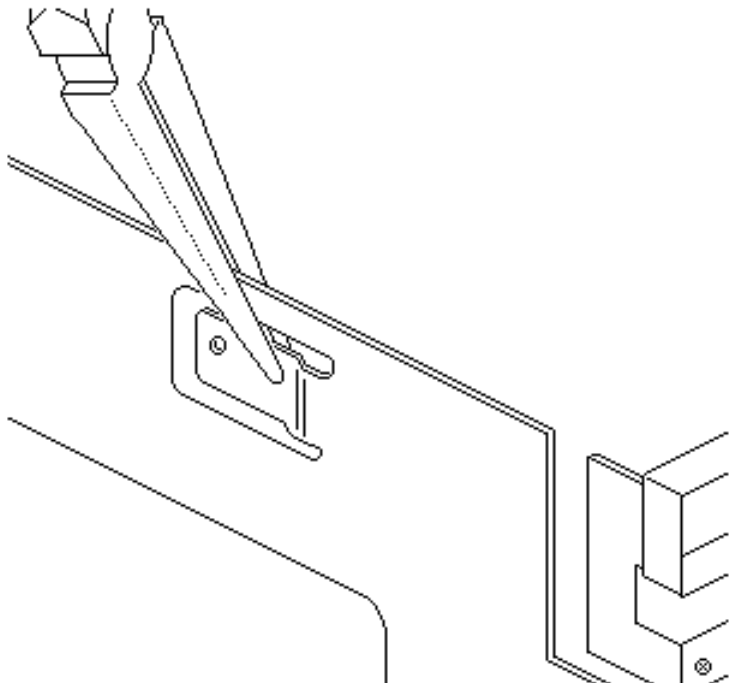
Chassis Tab Modification
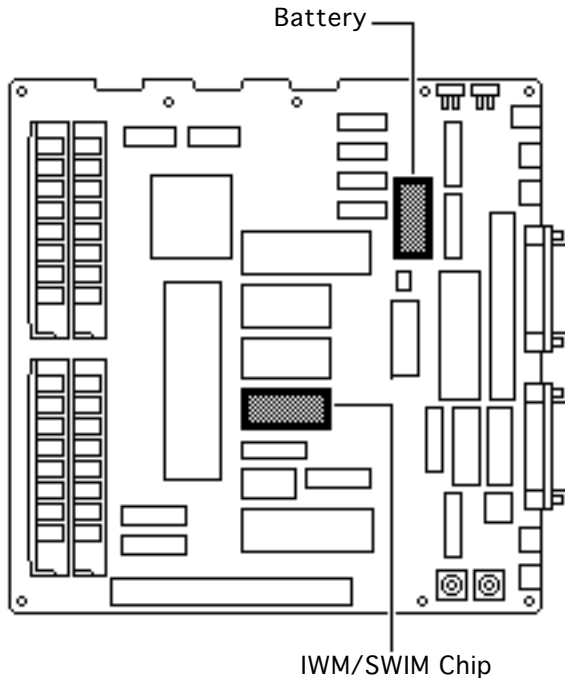
Before you begin, remove the cover.

Note: The chassis on some Macintosh SE computers has protruding tabs that may interfere with the installation of some third-party cards. If you encounter this problem, perform the chassis tab modification procedure.

Chassis Tab

Chassis

Using pliers, bend the tab nearest the rear of the chassis until the tab is flush with the side panel.

Battery

IWM/SWIM Chip

Identifying SE Logic Boards

Before you begin,

- Remove the cover
- Discharge the CRT
- Remove the logic board

Two logic boards are available as exchange modules for the Macintosh SE. If you are replacing the logic board of an SE that was originally shipped with a 1.4 MB SuperDrive, use logic board 661-0536. If you are replacing the logic board of an SE that was originally shipped with an 800K floppy drive, or an SE that has been upgraded to use a 1.4 MB SuperDrive, use replacement logic board 661-0526.
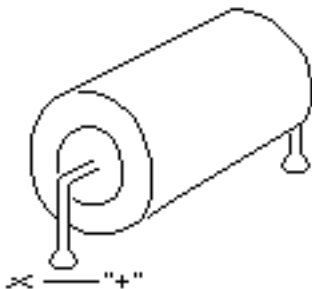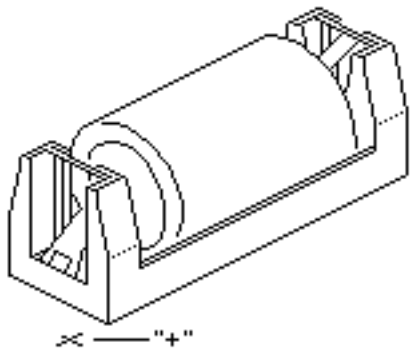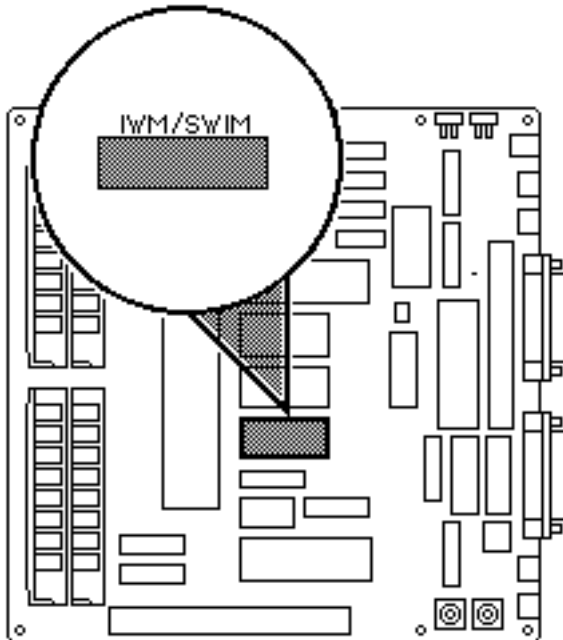
Follow these guidelines to help identify the correct exchange module:

- If the customer's battery is installed in a battery holder, use replacement logic board 661-0536.
- If the customer's battery is soldered to the logic board, check the part number on the customer's disk controller chip. (See the following procedure.)

- If the disk controller is an IWM chip (the part number is not 344-0062), use replacement logic board 661-0526.
- If the disk controller is a SWIM chip (part number 344-0062), use replacement logic board 661-0526 and swap the customer's SWIM chip and ROM chips for the IWM chip and ROM chips on the replacement board. (See the following procedure.)
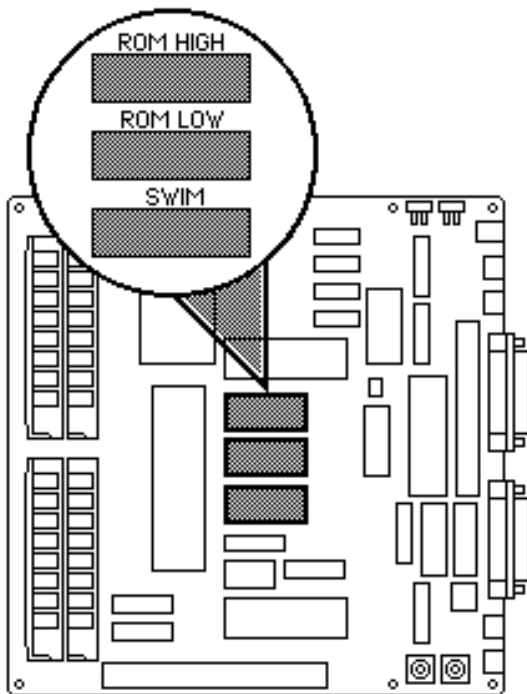
Note: Failure to transfer the customer's SWIM chip and upgraded ROM chips to the replacement logic board will prevent a 1.4 MB SuperDrive from using high-density media.

1 Using an IC extractor, remove these chips from the customer's logic board and install them on the replacement logic board:
   • SWIM (344-0062) at D8
   • High ROM (342-0701) at D6

• Low ROM (342-0702) at D7

Note: The notch at one end of the SWIM chip and each ROM chip must face toward the RAM SIMMs.

2 Return the ROMs and IWM chip to Apple on the faulty logic board.

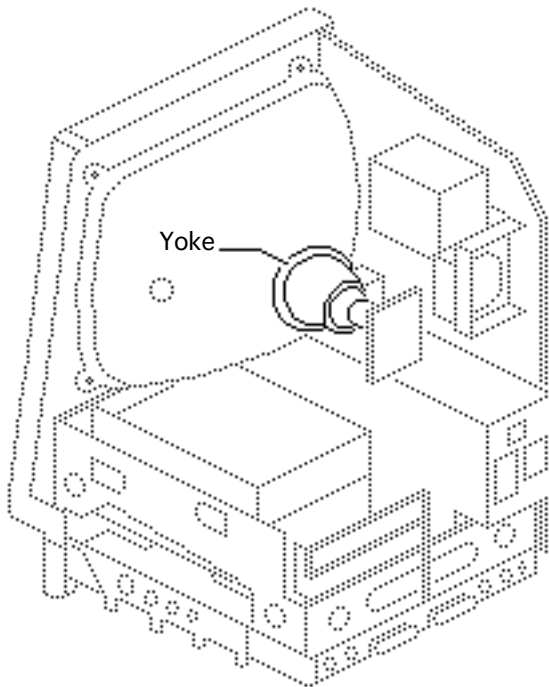# Adjustments

Macintosh SE

Yoke

Yoke

Before you begin,
- Remove the cover
- Discharge the CRT

⚠**Warning:** This product contains high voltage and a high-vacuum picture tube. To prevent serious injury, review CRT safety in Bulletins/Safety.

Warning: Because you must make yoke adjustments from the rear of the computer, use a mirror to view the computer screen. Do not reach around the computer to adjust collars and rings.
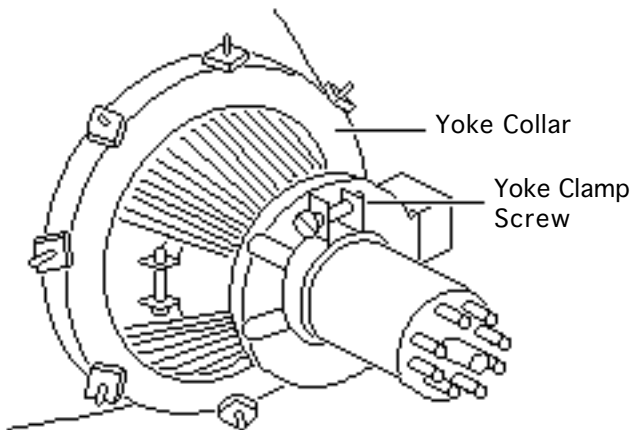
Note: If you replace the CRT, you will probably need to adjust the yoke.
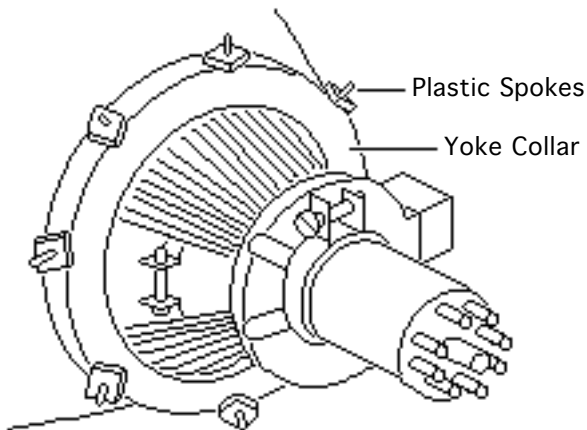
Yoke Collar

Yoke Clamp
Screw

Tilt Adjustment

Note: If glue is holding the yoke collar in place, cut through the glue using an art knife.

1   Loosen the yoke clamp screw two or three turns.

2   Switch on the computer.

Plastic Spokes

Yoke Collar

3   With one hand, grasp the plastic spokes of the yoke collar, and rotate the yoke collar until the top and bottom edges of the picture are parallel with the top and bottom of the bezel.

Yoke Collar
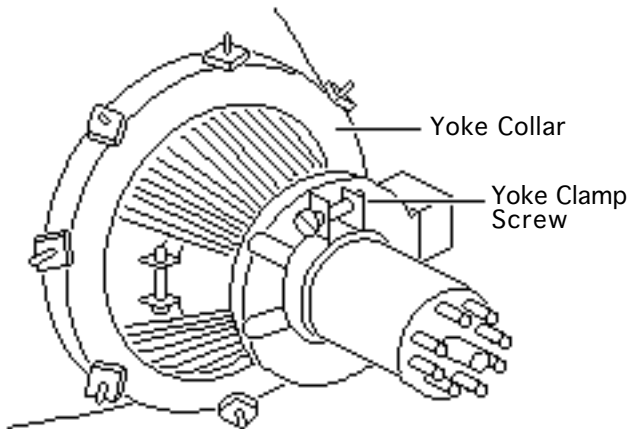
Yoke Clamp Screw

4 Switch off and unplug the computer.

5 Discharge the CRT.

6 Hold the plastic collar in position and carefully tighten the yoke clamp screw so that the collar cannot slip. Do not overtighten the screw.

7 Replace the cover and switch on the computer. Make sure the top and bottom edges of the picture are parallel with the top and bottom of the bezel.
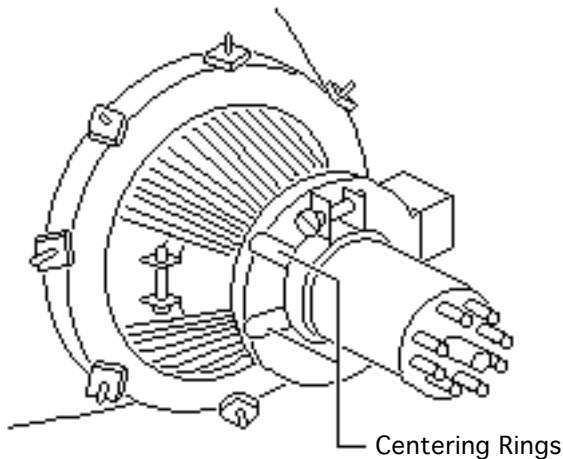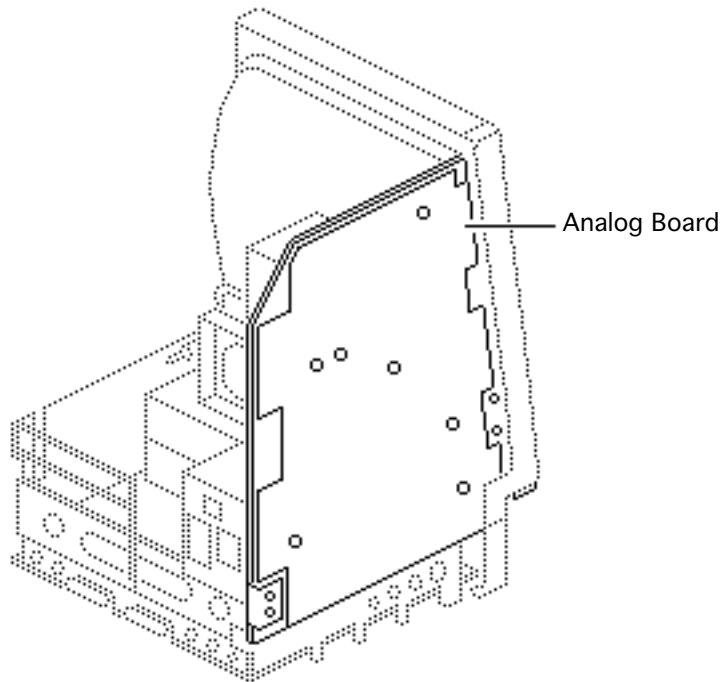
Centering Rings

Centering Ring Adjustment

Note: If glue holds the yoke collar in place, use an art knife to cut through the glue.

1   Switch on the computer.

2   To center the picture within the bezel: Hold the front centering ring steady and move the rear ring; then hold the rear centering ring steady and move the front ring.

Analog Board

Video

Before you begin, remove the cover.

⚠️**Warning:** This product contains high voltage and a high-vacuum picture tube. To prevent serious personal injury or equipment damage, review the CRT safety instructions in Bulletins/Safety.

Warning: Because you must make video adjustments from the rear of the computer, use a mirror to view the computer screen. Do not reach around the computer to adjust the controls.

Note: You may need to perform video adjustments after you replace the CRT, analog board, video board, or power supply. The video adjustment controls are located on the analog board.

Brightness Control

External Contrast Control

Brightness and Contrast

1 Turn the external contrast control fully clockwise.

2 Using the plastic alignment tool, adjust the brightness control counterclockwise so that white lines are visible on the screen. Turn the brightness control clockwise until the white lines just disappear.
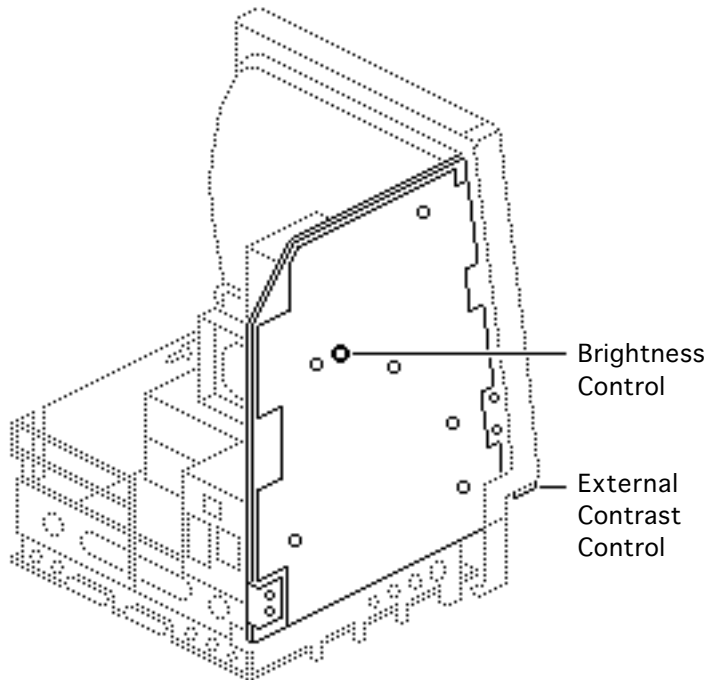
3 Turn the brightness
control
counterclockwise
slightly.

Width
Control
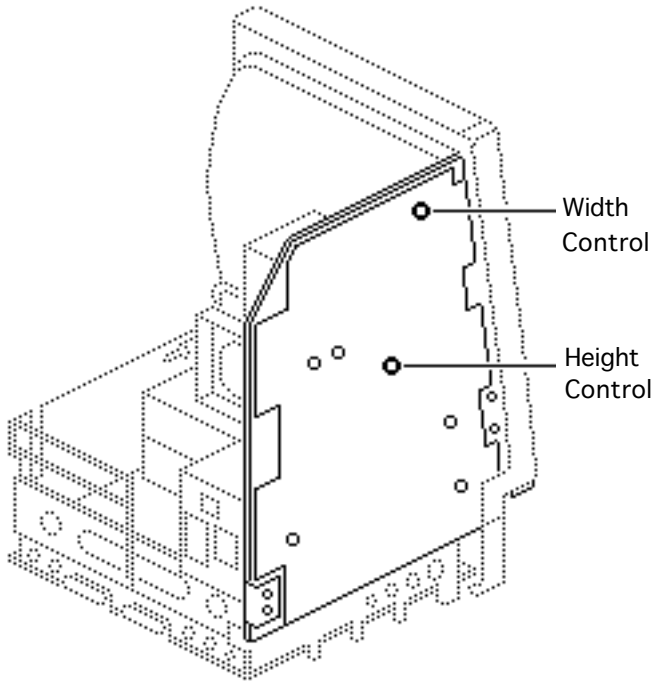
Height
Control

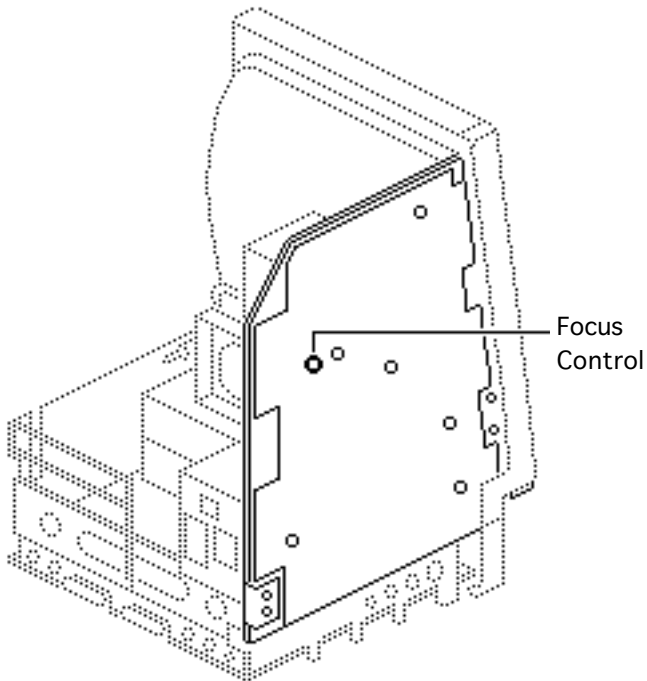## Size Adjustments

1   Using the plastic hex alignment tool, adjust width until the raster is 7 inches wide.

2   Using the plastic hex alignment tool, adjust the height until the raster is 4.7 inches high.

Focus
Control

Focus

Turn the focus control fully clockwise, then turn the focus control counter-clockwise one-eighth of a turn.

Exploded View

Macintosh SE

Exploded View

Hard Drive
661-0216 (40 MB)

Dust Shield
076-0439

CRT and Yoke
Assembly
076-0103

Floppy Drive
661-0345 (800K)
661-0474 (1.4 MB)

Front
Bezel
810-0399
810-0422
(for SuperDrive)

Insulator
Shield
725-0020

Analog
Board
661-0371

470-2101

Speaker
600-0393

Power
Supply
661-0370

426-1001

Video
Board
982-0024

470-2101

462-4100

Chassis
805-0938

Logic
Board
6i61-0530

Rear
Housing
630-5271

RFI
Shroud
805-5060

426-1007

Power
Cable
590-0380

435-5002