Macintosh SE/30

Basics

Macintosh SE/30

Overview

This manual includes complete repair procedures for the Macintosh SE/30, shown at left.
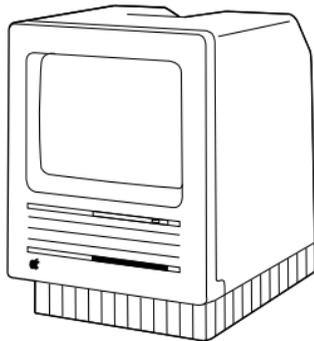

Figure: Macintosh SE/30

Specifications

Macintosh SE/30

Processor

CPU   Motorola 68030 microprocessor
                           15.667 MHz
                           32-bit architecture
                           256-byte instruction and data caches
                           Built-in paged memory management unit (PMMU)

Coprocessor   Motorola 68882 floating-point unit (FPU); follows IEEE
                              standards

Memory

RAM   1 or 4 MB, expandable to 32 MB
                 Upgradeable to 5 MB

ROM   256K

PRAM   256 bytes of user-set parameter memory
                 CMOS custom chip with long-life lithium battery

Disk Storage

Floppy Drive   1.4 MB floppy drive

Hard Drive   Optional 40 or 80 MB hard drive

I/O Interfaces

Expansion   One 030 direct slot supporting full 32-bit address and data lines through 120-pin Euro-DIN connector

SCSI   One 50-pin connector (internal) and one DB-25 connector (external)

Apple Desktop Bus Two Apple Desktop Bus (ADB) ports for communication with keyboard, mouse, and other input devices over low-speed, synchronous serial bus

Serial   Two RS-232/RS-422 serial ports; 230.4 Kbaud maximum

Sound   Stereo sound port for external audio amplifier

I/O Devices

Keyboards   Apple Keyboard
                       Apple Extended Keyboard

Mouse   Mechanical tracking; ADB connector; optical shaft or contact
                       encoding at 3.94 ± 0.39 pulse per mm (100 ± 10 pulses per
                       in.) of travel

Sound and Video

Sound Generator

Apple Sound Chip (ASC) including four-voice, wavetable synthesis and stereo sampling generator capable of driving stereo mini-phone-jack headphones or other stereo equipment

Mixed stereo monophonic sound output through internal speaker

Video Display

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

Color QuickDraw in ROM provides support for grayscale and color video cards installed in the 030 direct slot

Electrical

Line Voltage   120–240 VAC, RMS automatically configured

Frequency   48–62 Hz, single phase

Maximum Power   75 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   21.5 lb. (9.75 kg)

Troubleshooting

Macintosh SE/30

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   Reset PRAM.
4   If mouse was connected to keyboard, connect it to ADB port instead. If mouse works, replace keyboard.
5   If mouse does not work in any ADB port, replace mouse.
6   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.

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.

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)

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.

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,
or thumping sound

1 Verify analog board cable is connected at J12 on logic board.
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
no drive operation

1 Connect power cord.
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   Replace logic board. Retain customer's SIMMs.

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

Replace logic board. Retain customer's SIMMs.

Take Apart

Macintosh SE/30
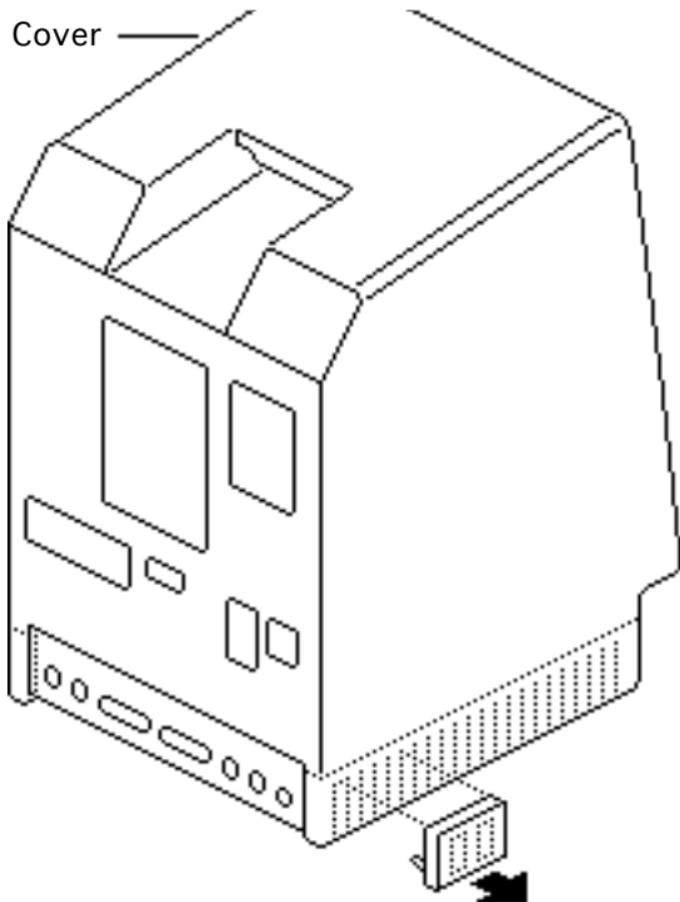
Cover ———

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).
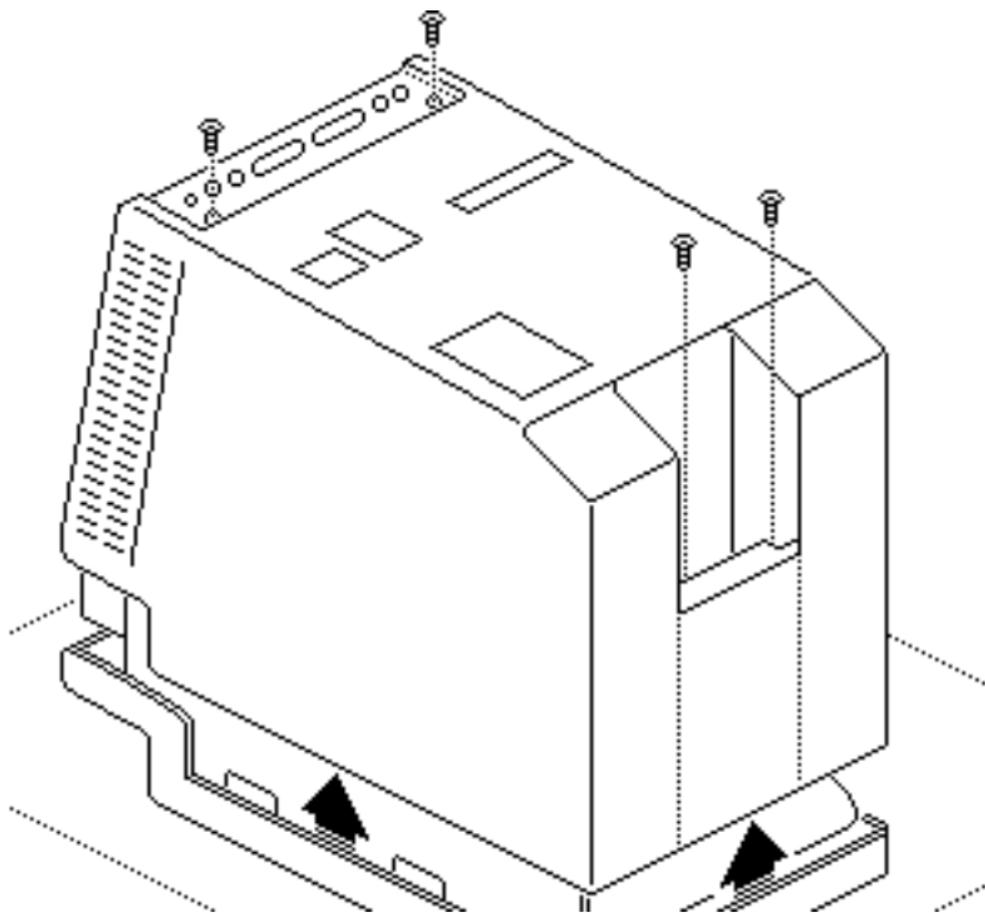
2 Using a Torx screwdriver, remove the four case screws and separate the cover from the chassis with a pull-apart tool.

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
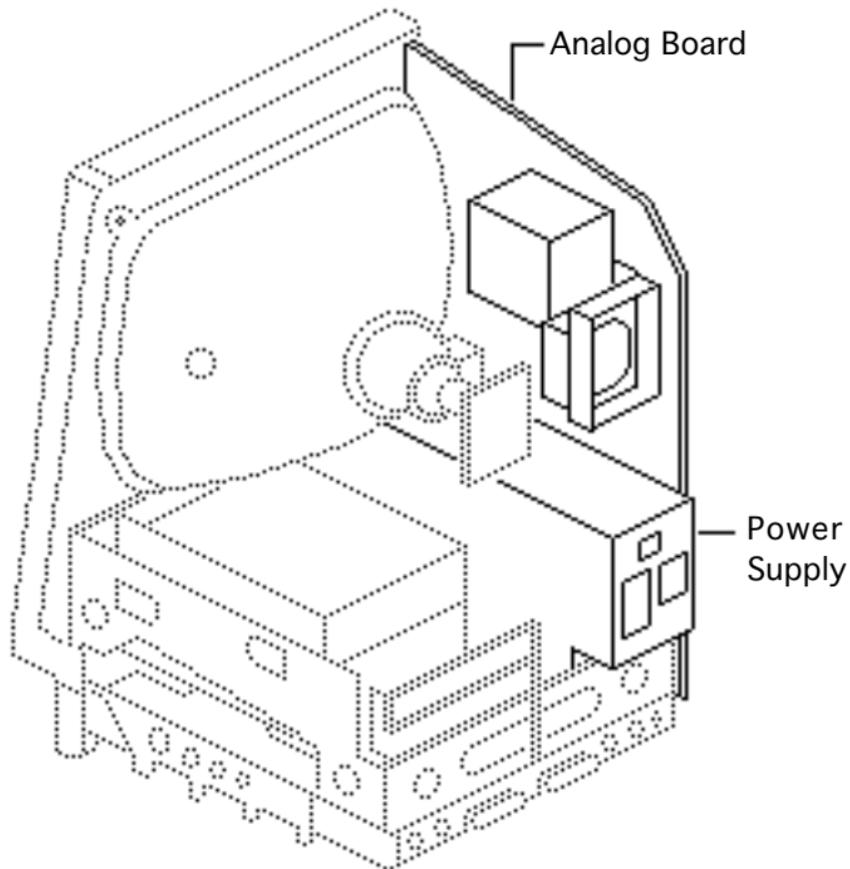
Power Supply

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.

Warning: Never use a grounding wriststrap until after discharging the CRT.
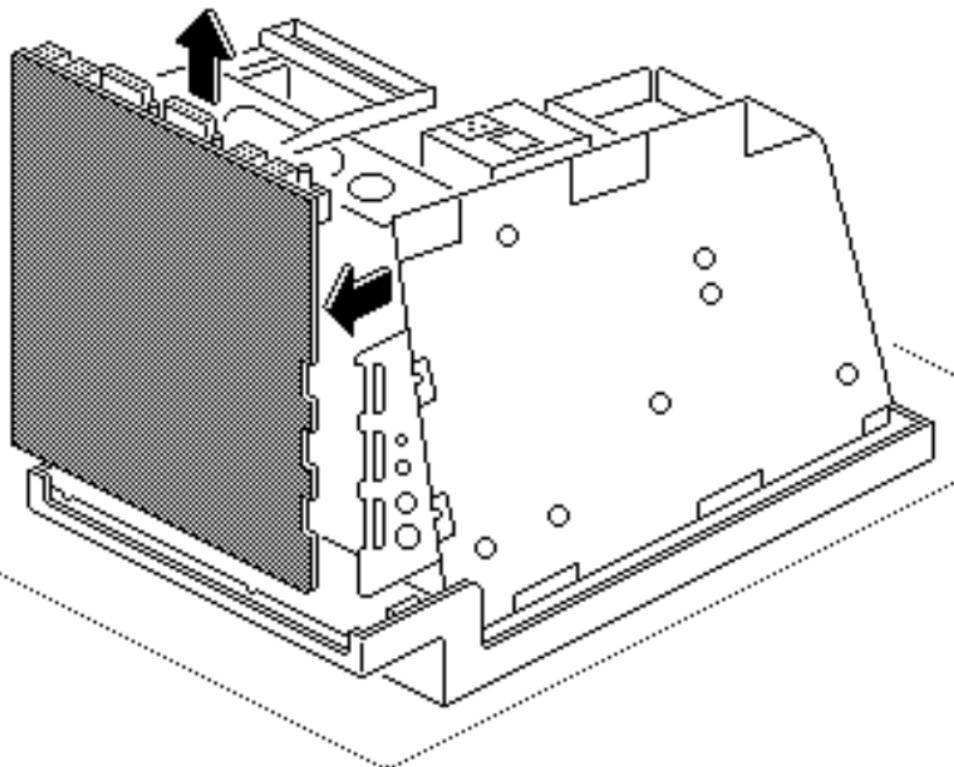
Video Board
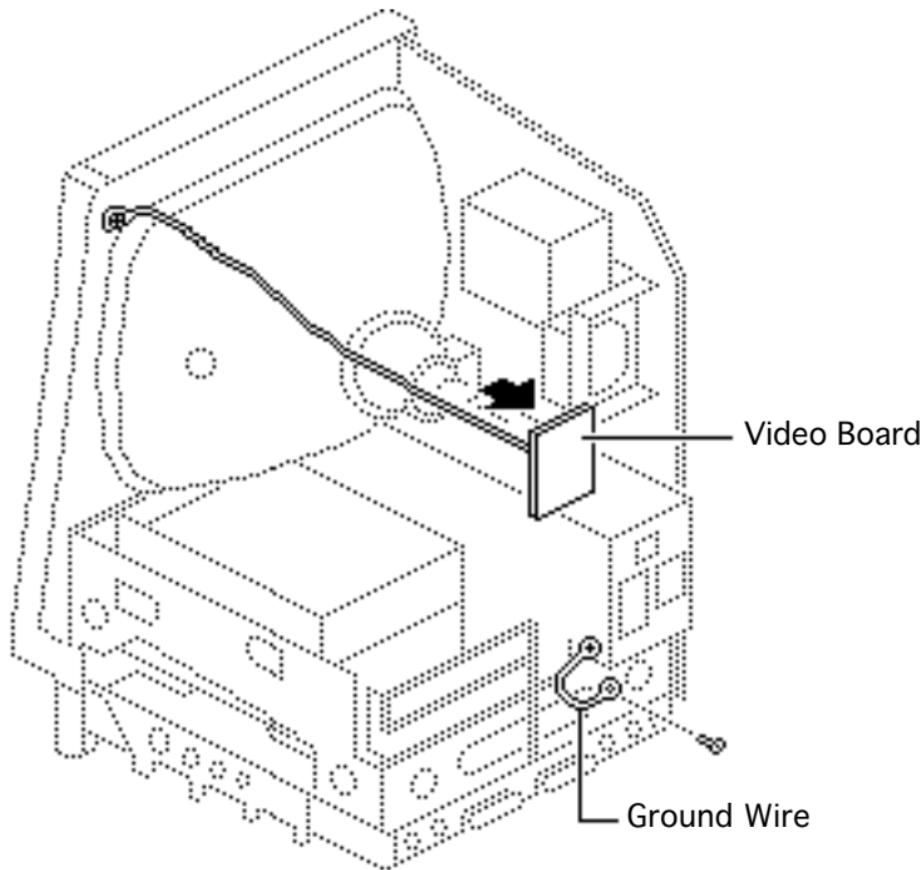
Ground Wire

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.

Yoke Cable

Video
Board
Cable

Hard Drive
Power Cable
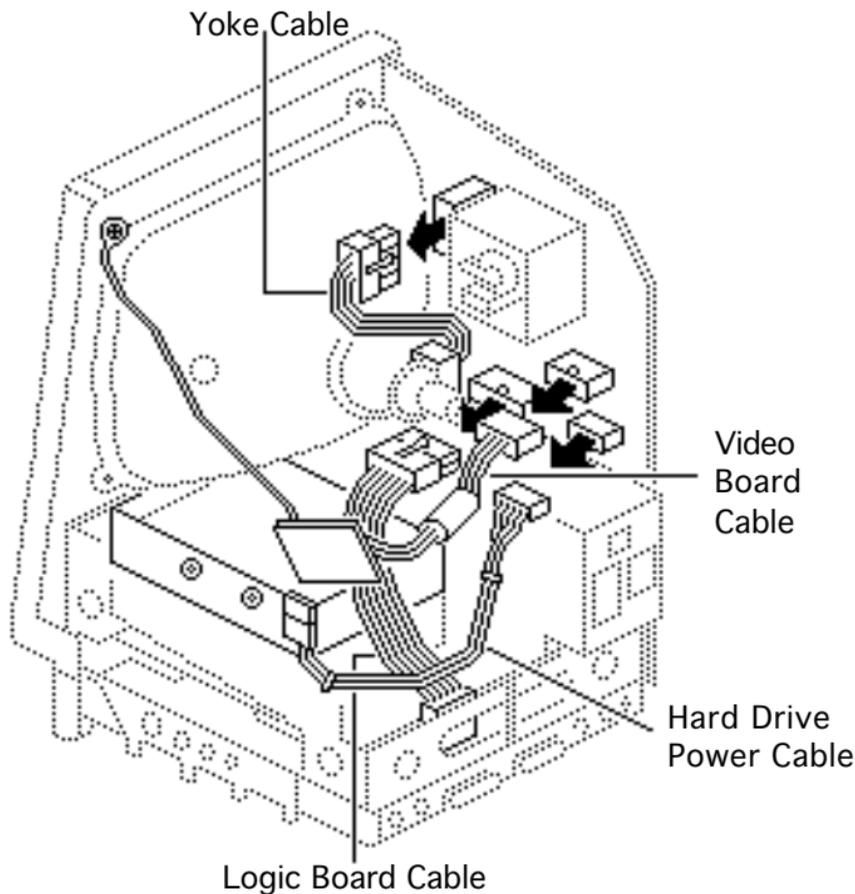
Logic Board Cable

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
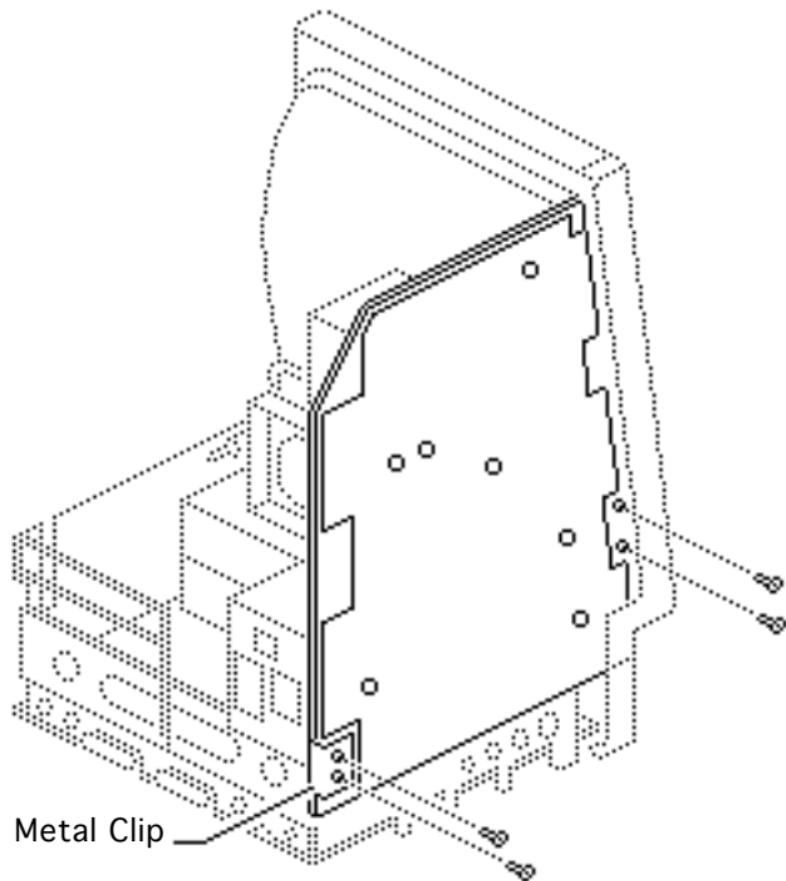
Metal Clip

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

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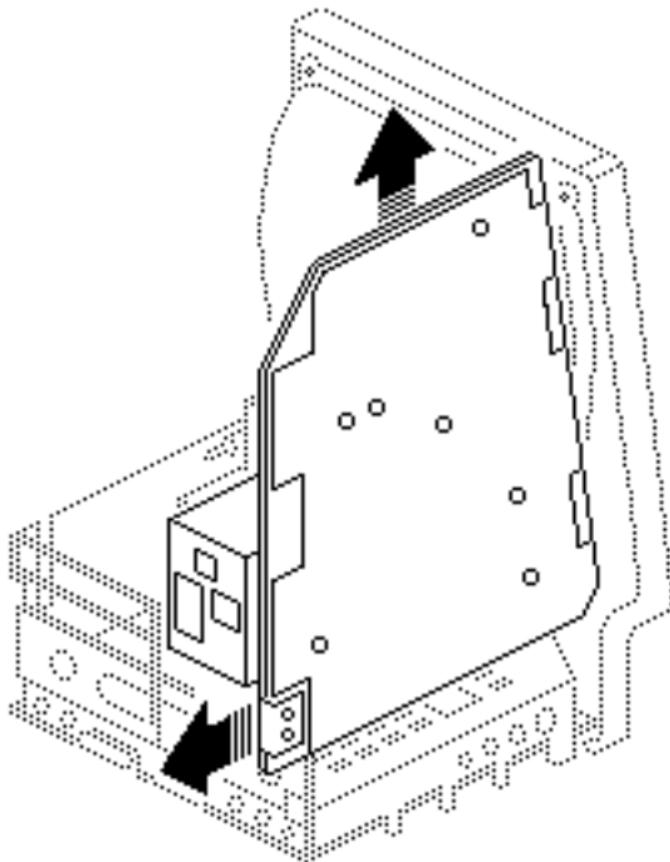
6 **Caution:** When removing the analog board, be careful not to catch the brightness control knob on the chassis and not to bump the neck of the CRT.

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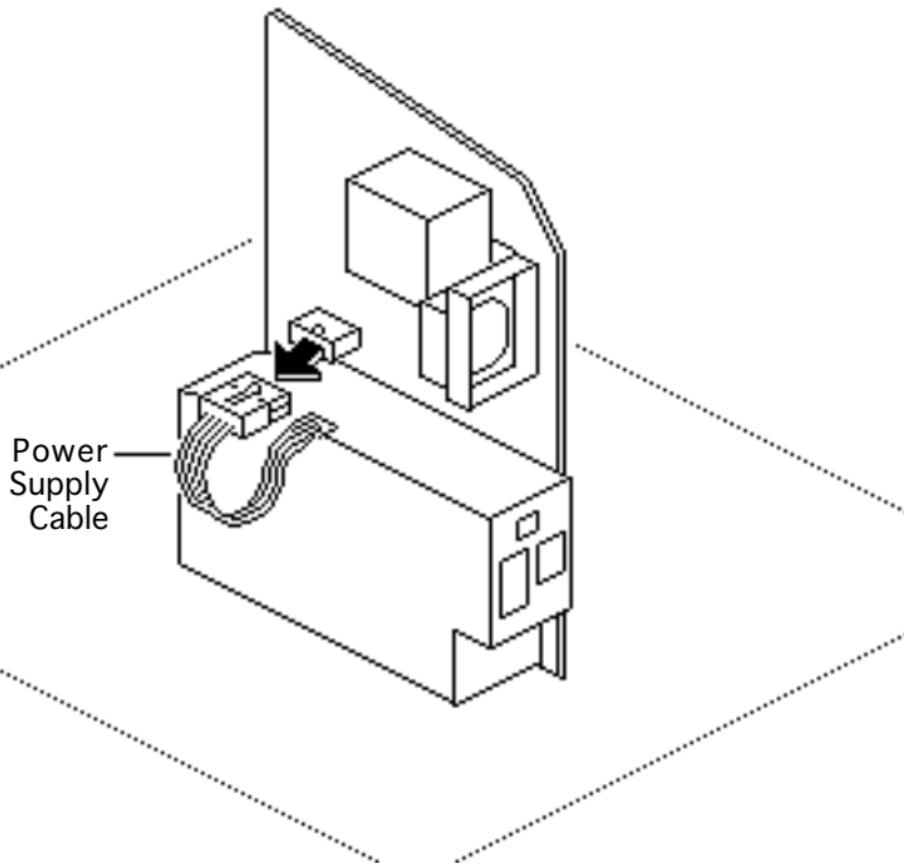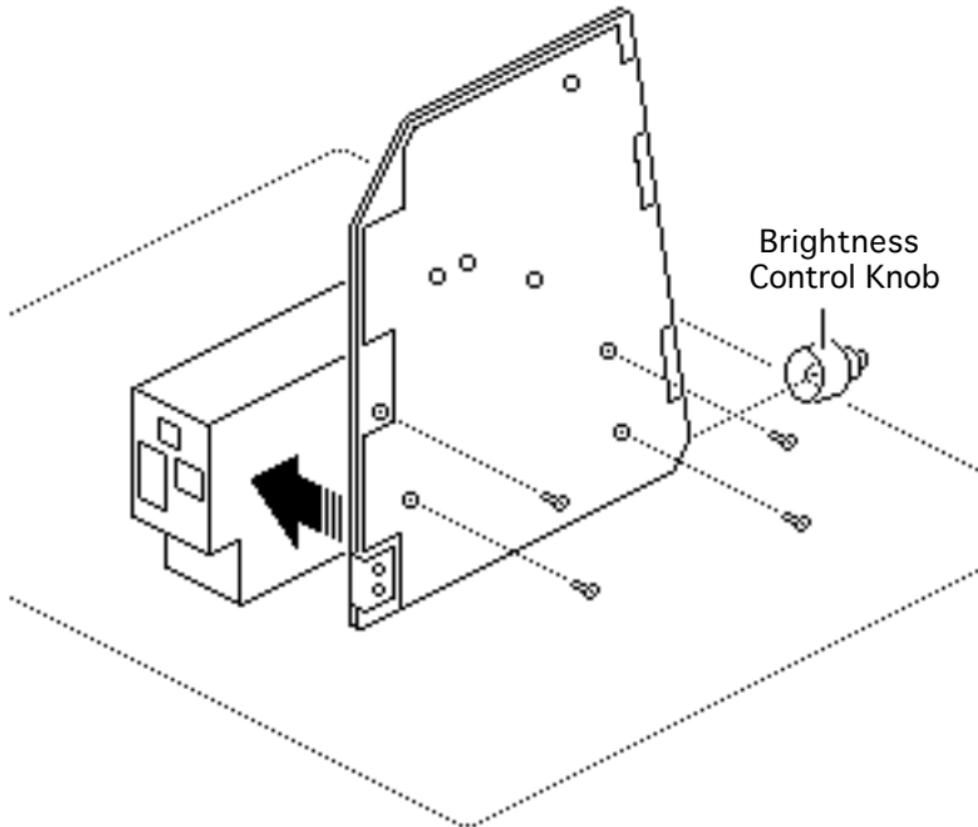
8   Remove the four screws
    and separate the power
    supply from the analog
    board.

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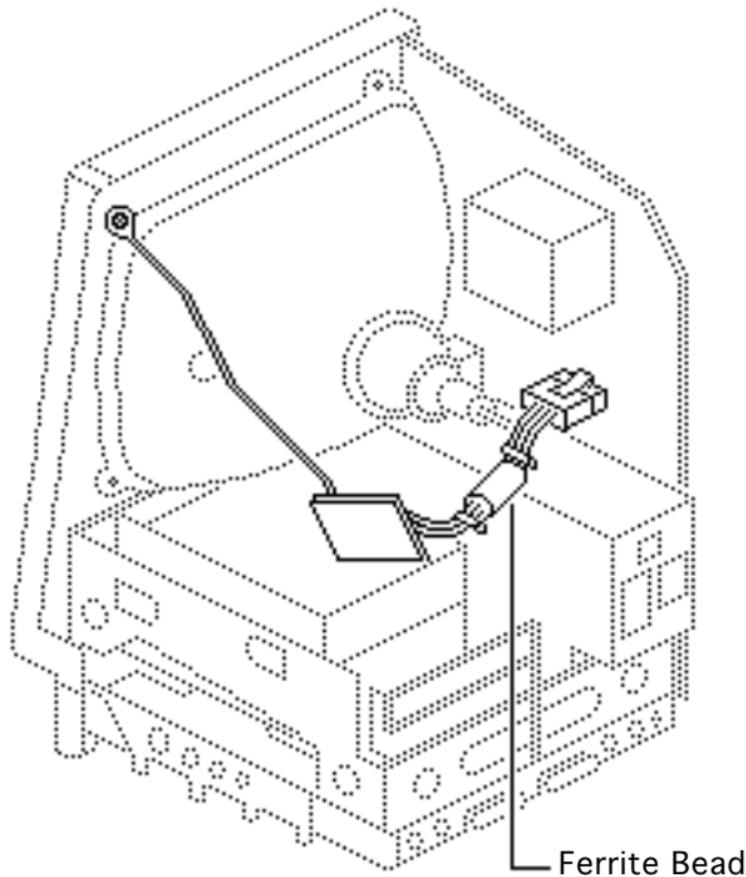
Ferrite Bead

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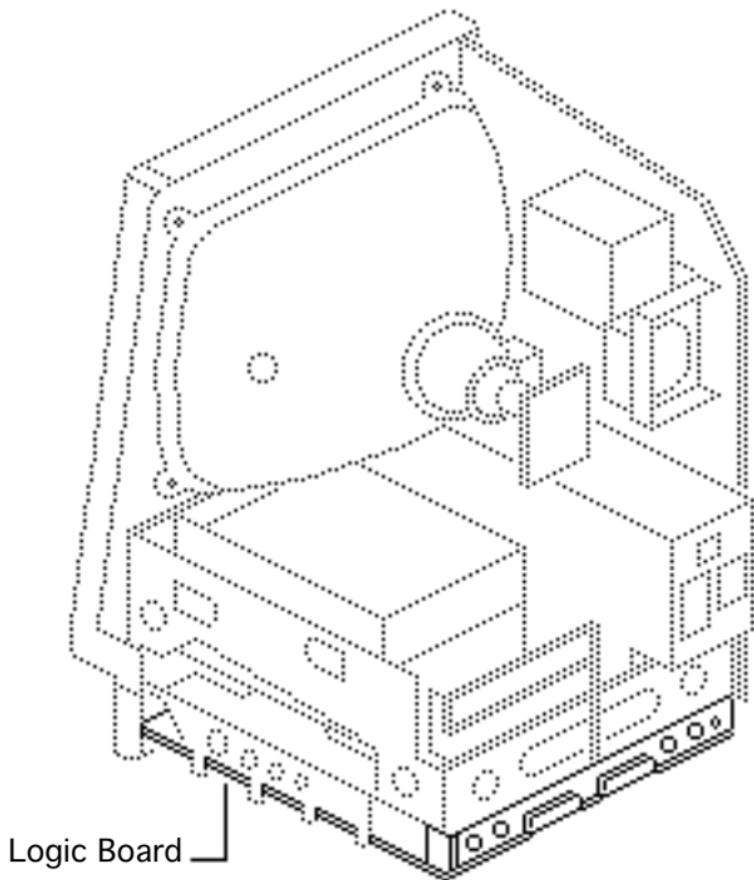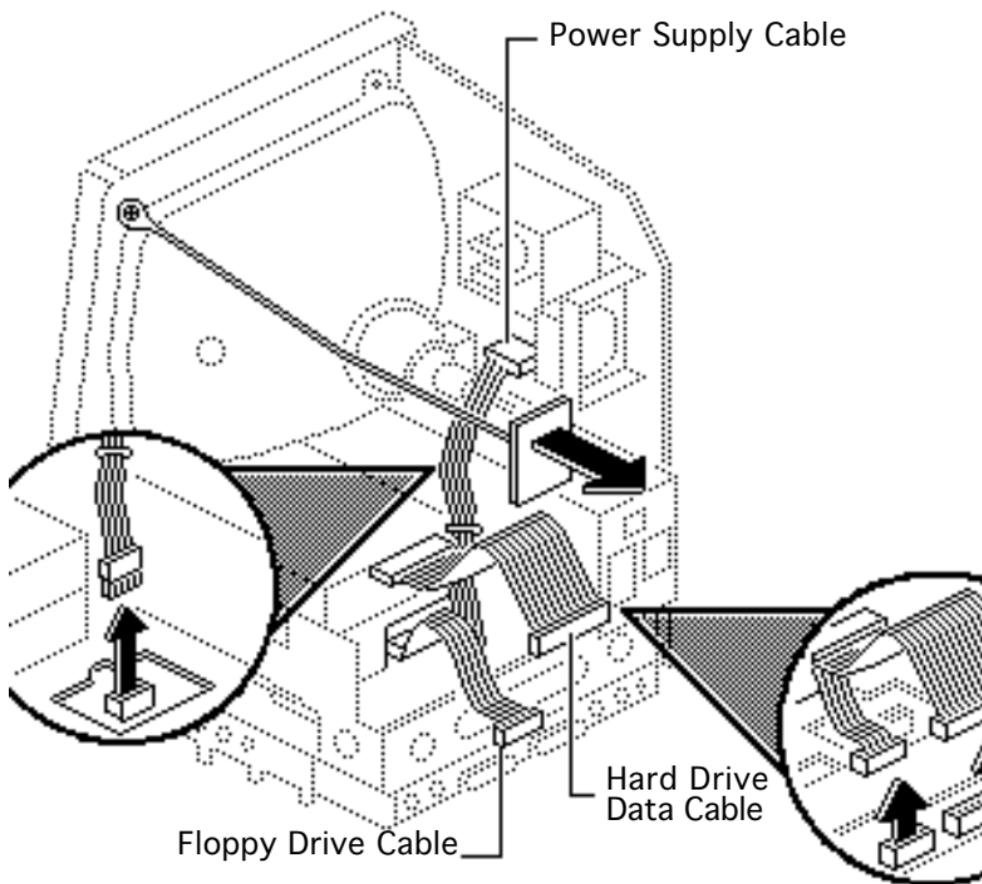
1. Carefully pull the video board straight off the neck of the CRT.

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.

4 Disconnect the speaker cable from the logic board.

Speaker Cable
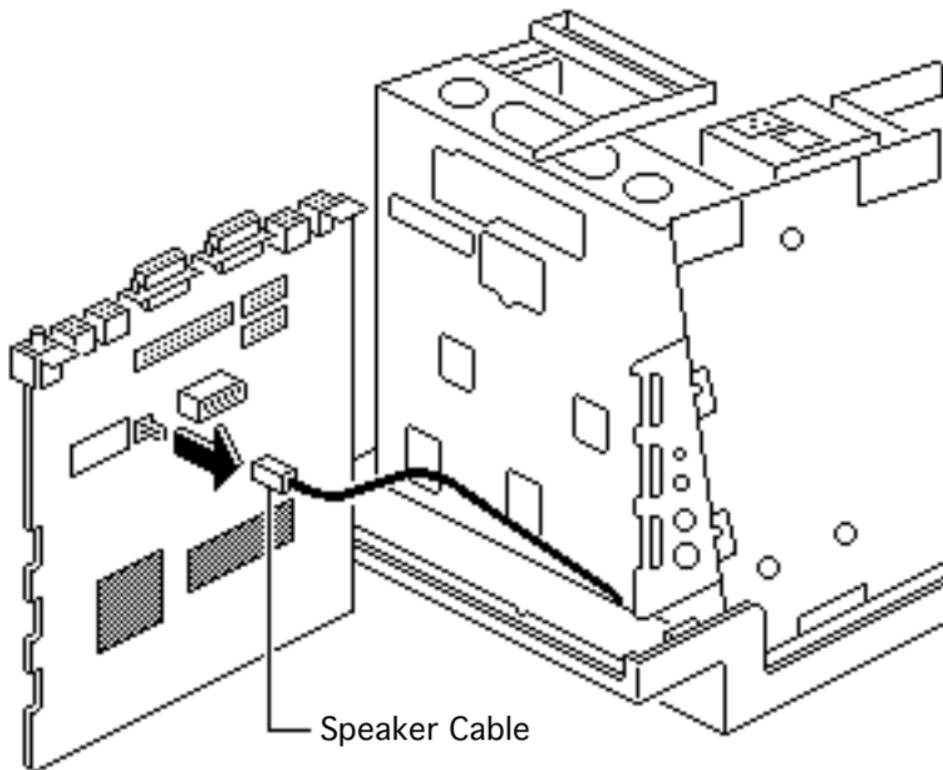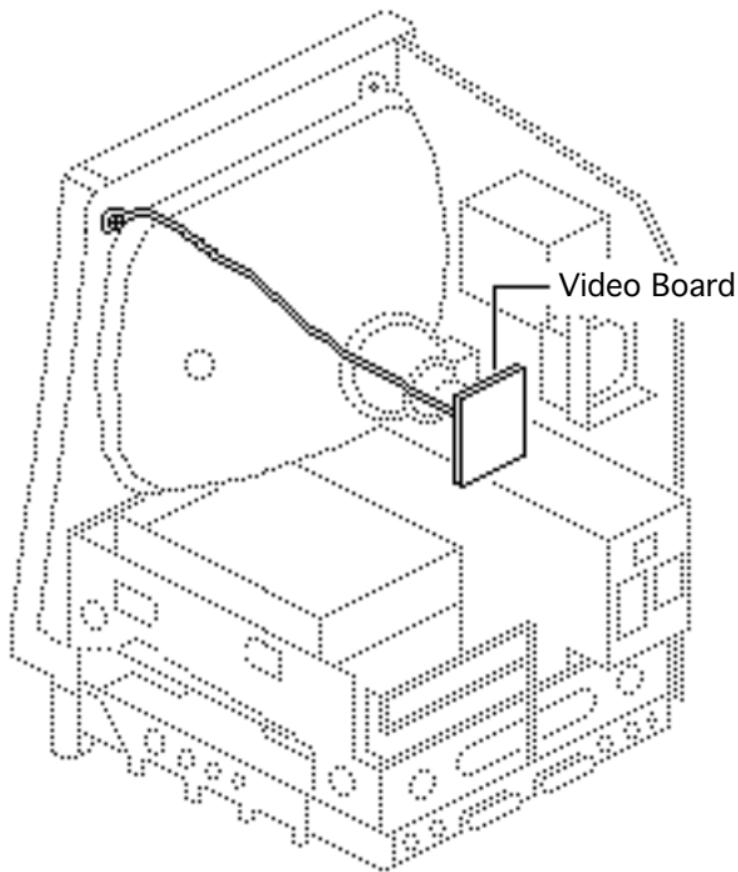
Video Board

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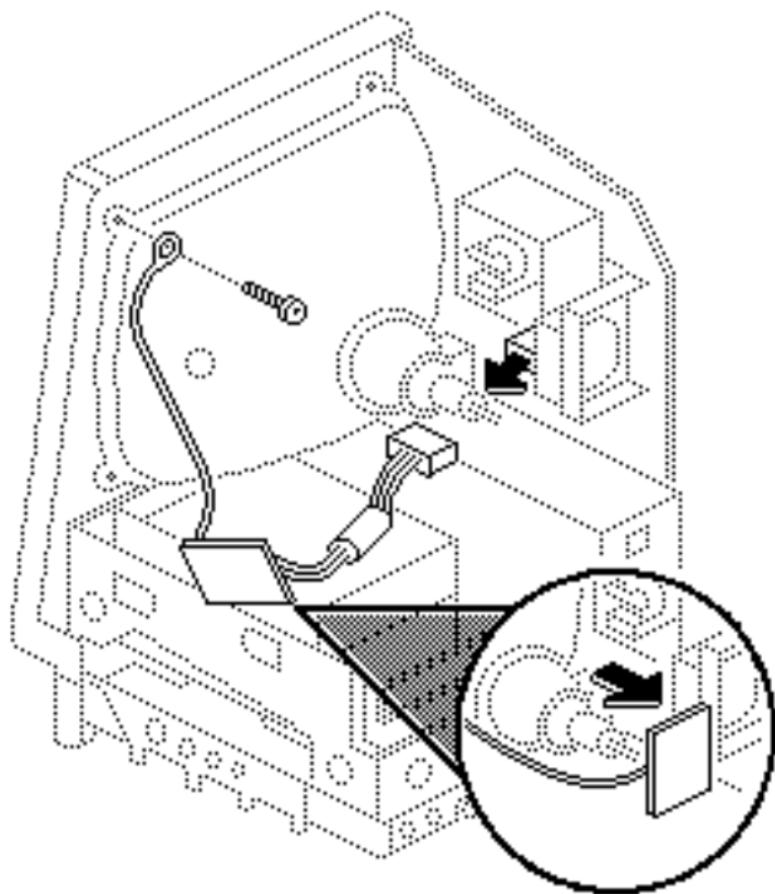
1   Carefully pull the video board straight off the neck of the CRT.

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
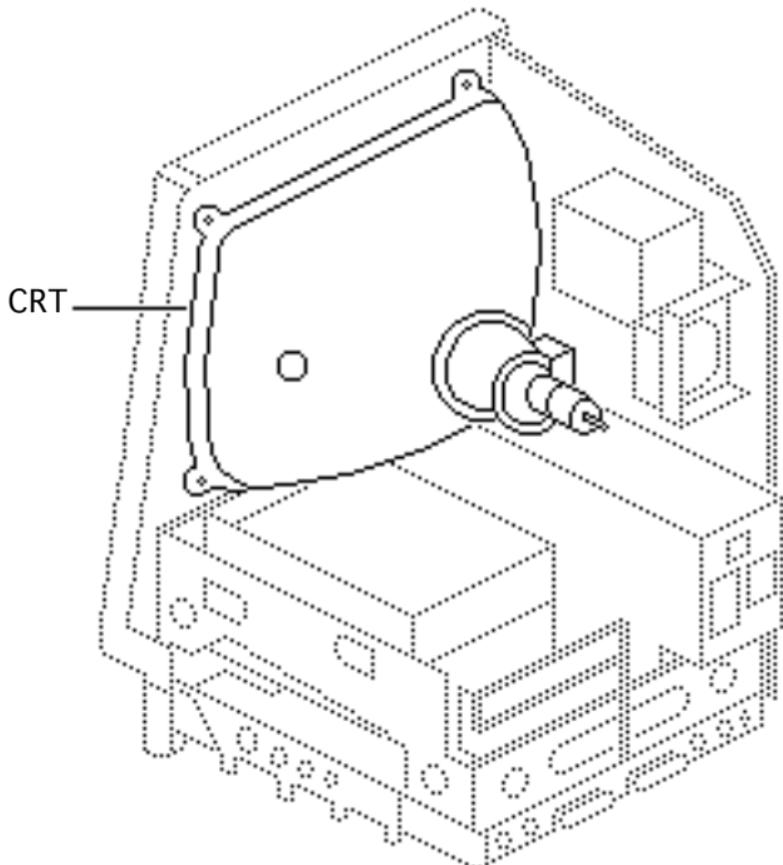
CRT

Before you begin,
- Remove the cover
- Discharge the CRT
- Remove the anode cap
- Remove the video board
- Remove the analog board
  (only)
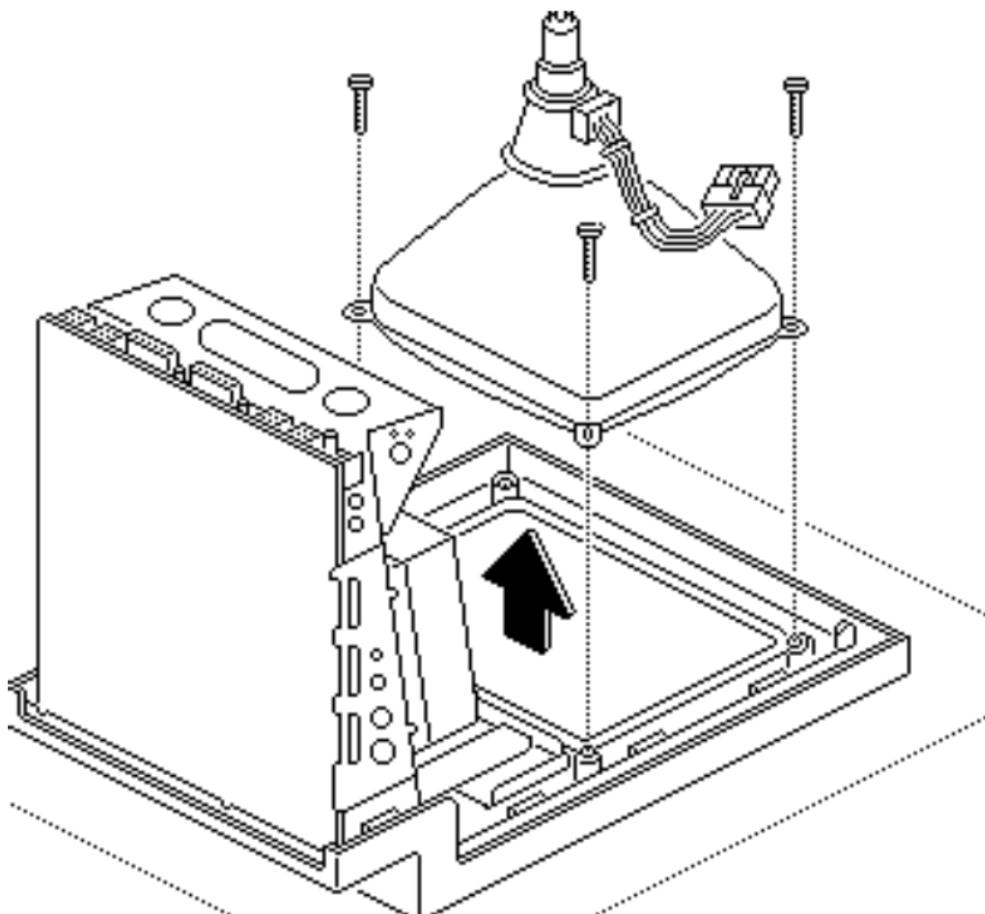
1 With the CRT face-down on a protective pad, use a Torx screwdriver to remove the three remaining CRT mounting screws.

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
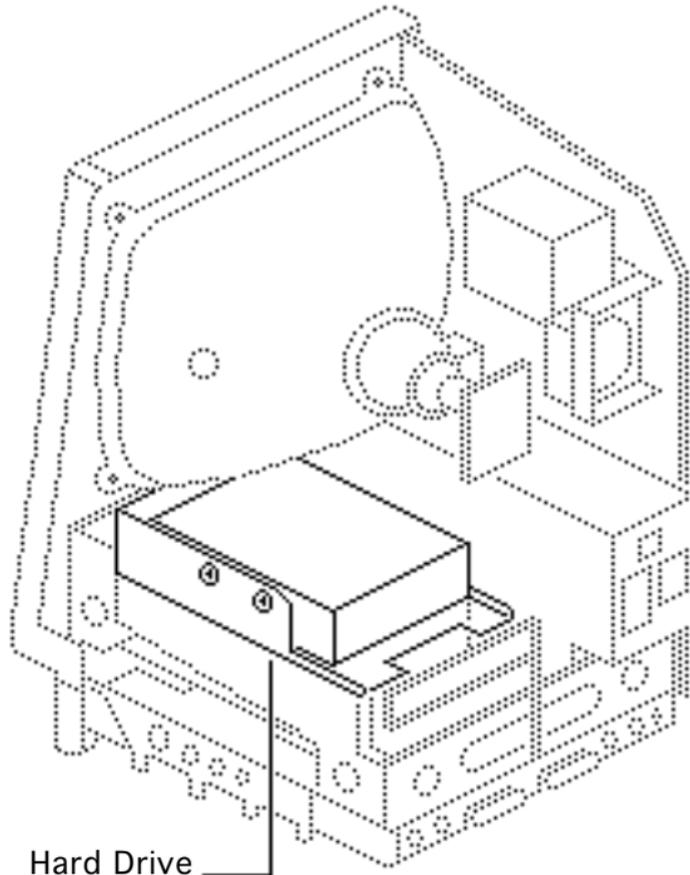
Hard Drive Data Cable
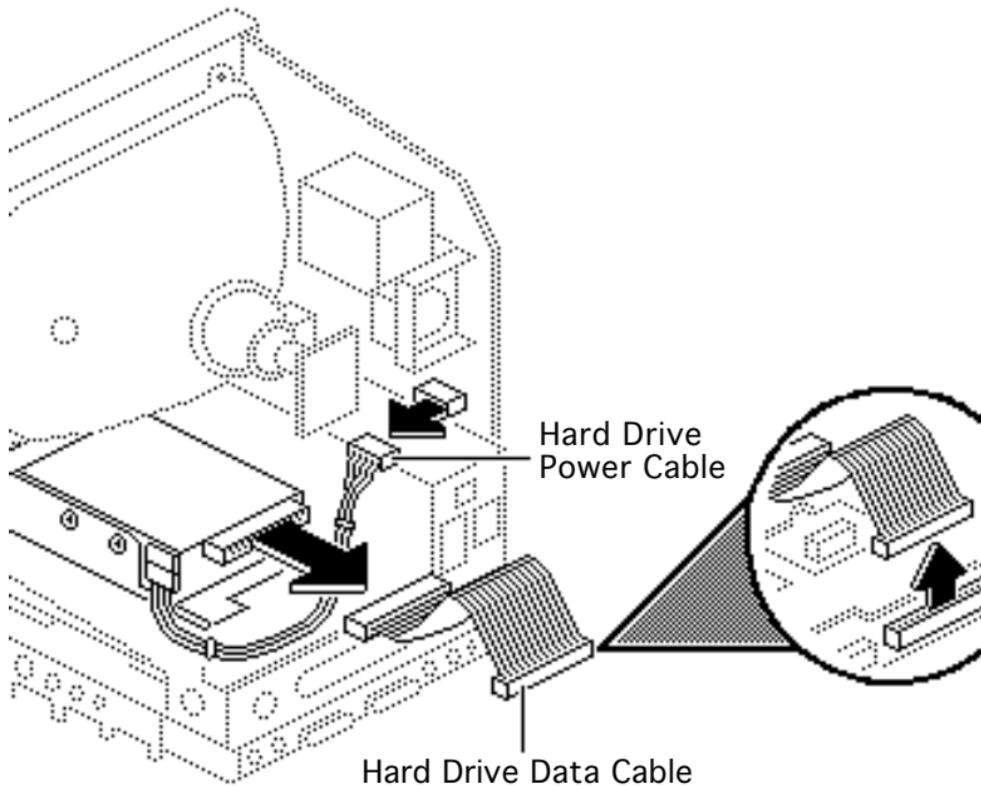
1 Disconnect the hard drive data cable from the hard drive and the logic board. Keep the cable.

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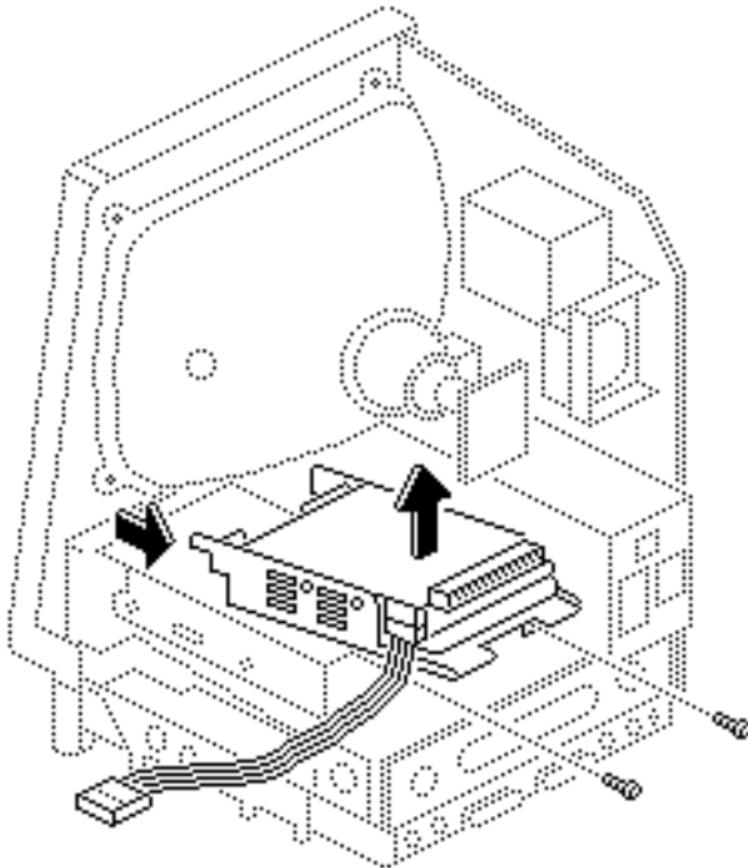
3   Remove the two mounting screws and lift out the hard drive with carrier attached.

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
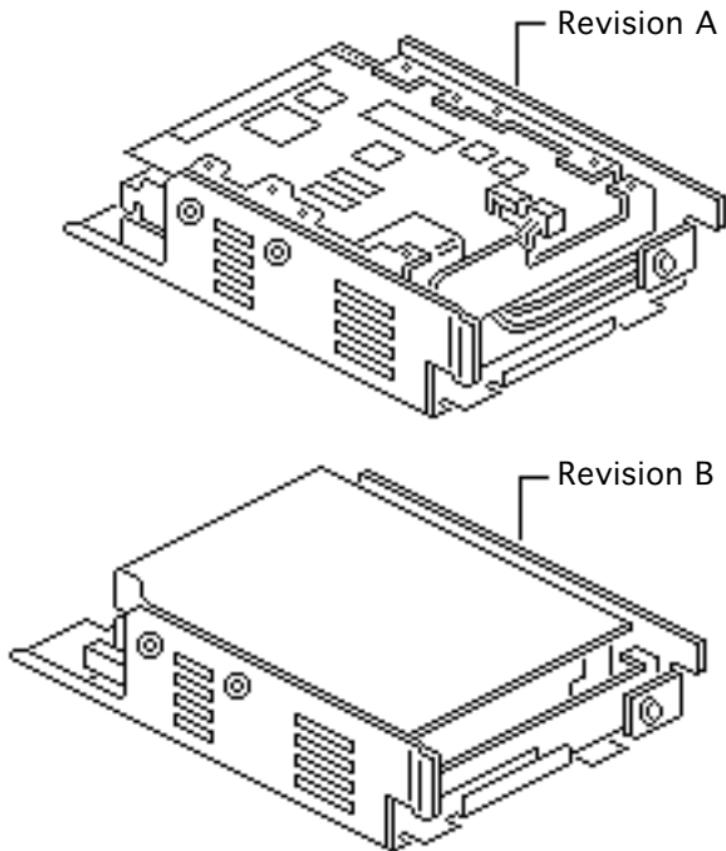
Revision B

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

LED Cable Assembly

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

Warning: Never use a grounding wriststrap until after discharging the CRT.
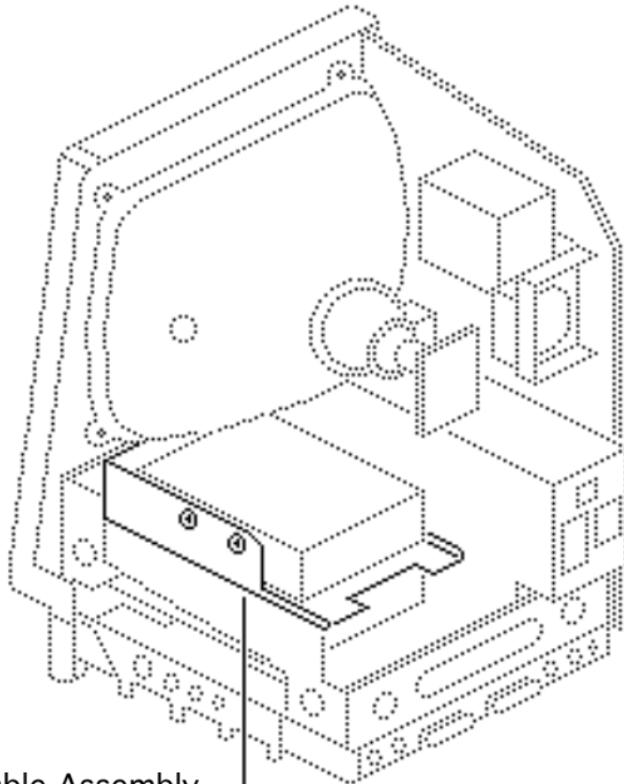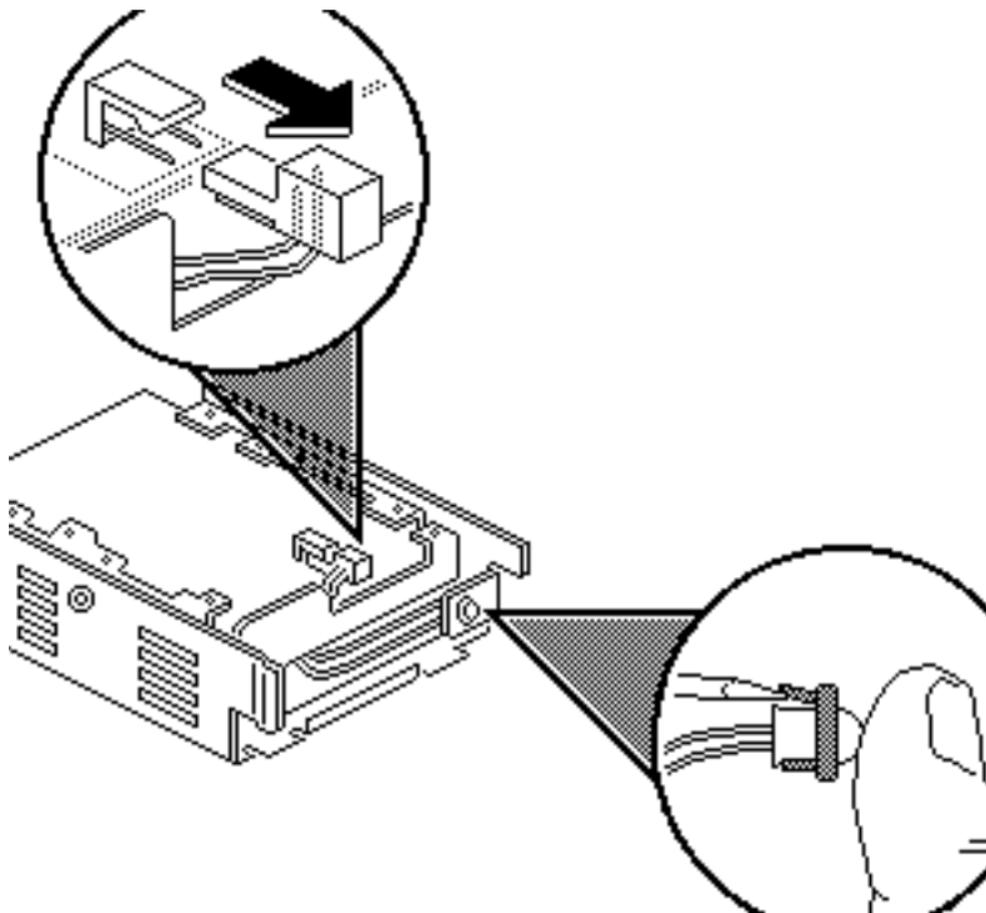
1 Disconnect the LED connector from the hard drive.

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

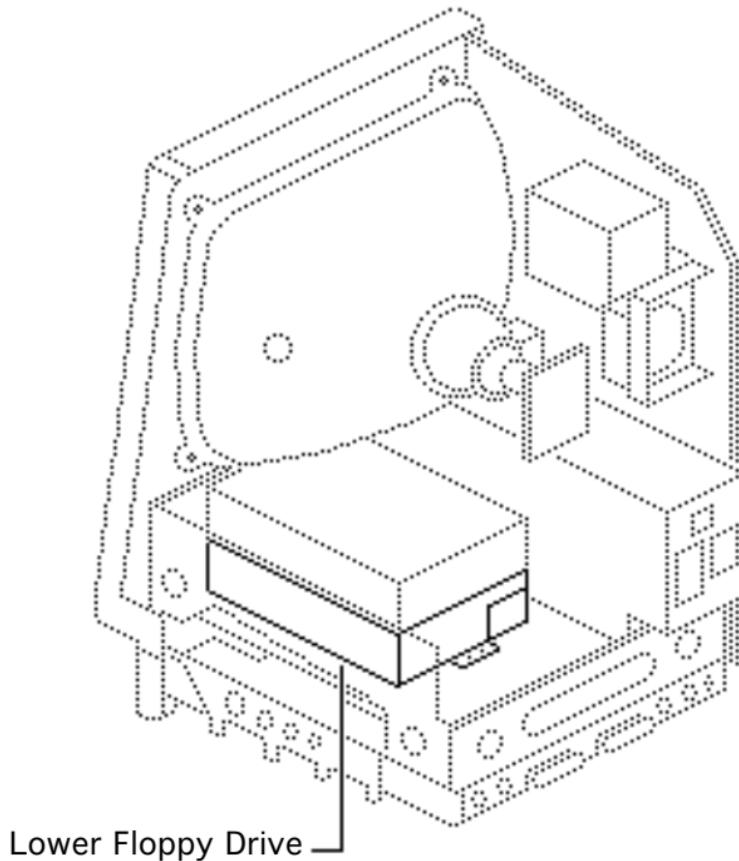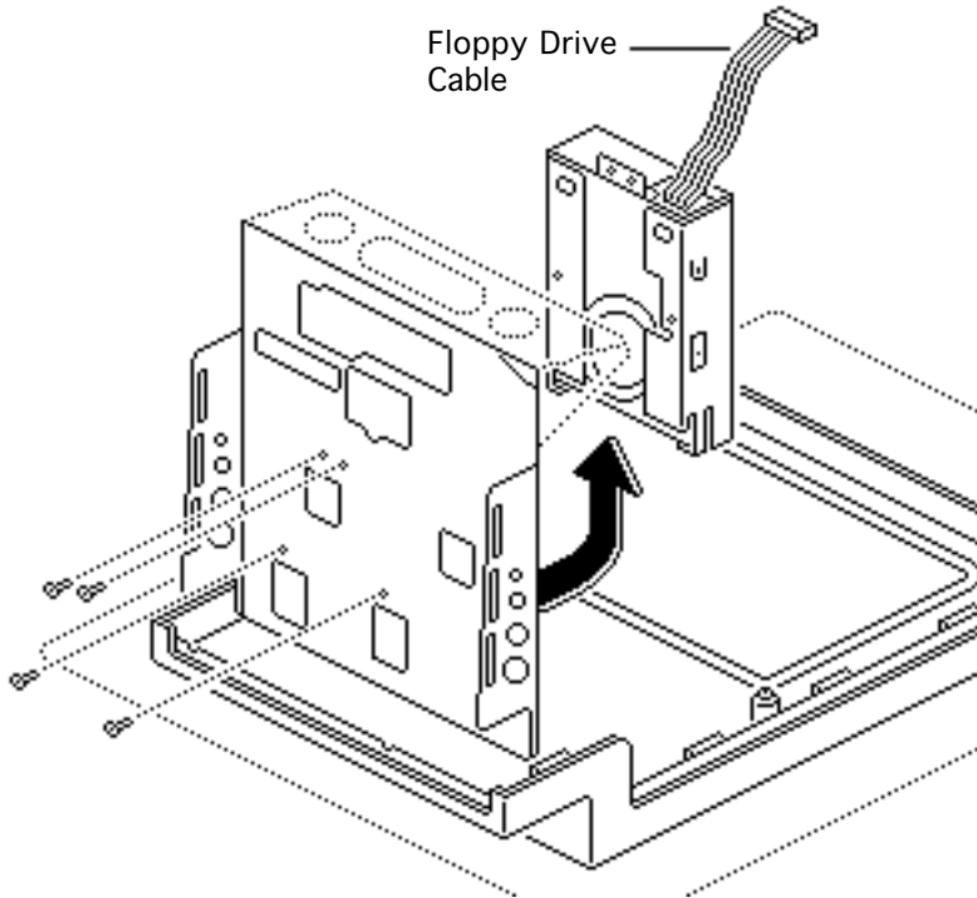# Upper Floppy Drive

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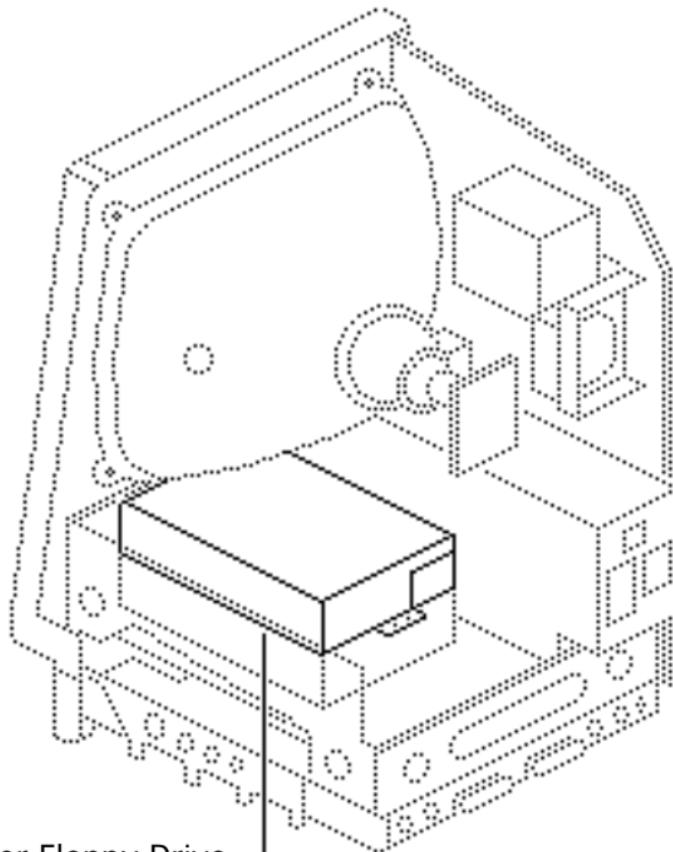
Upper Floppy Drive
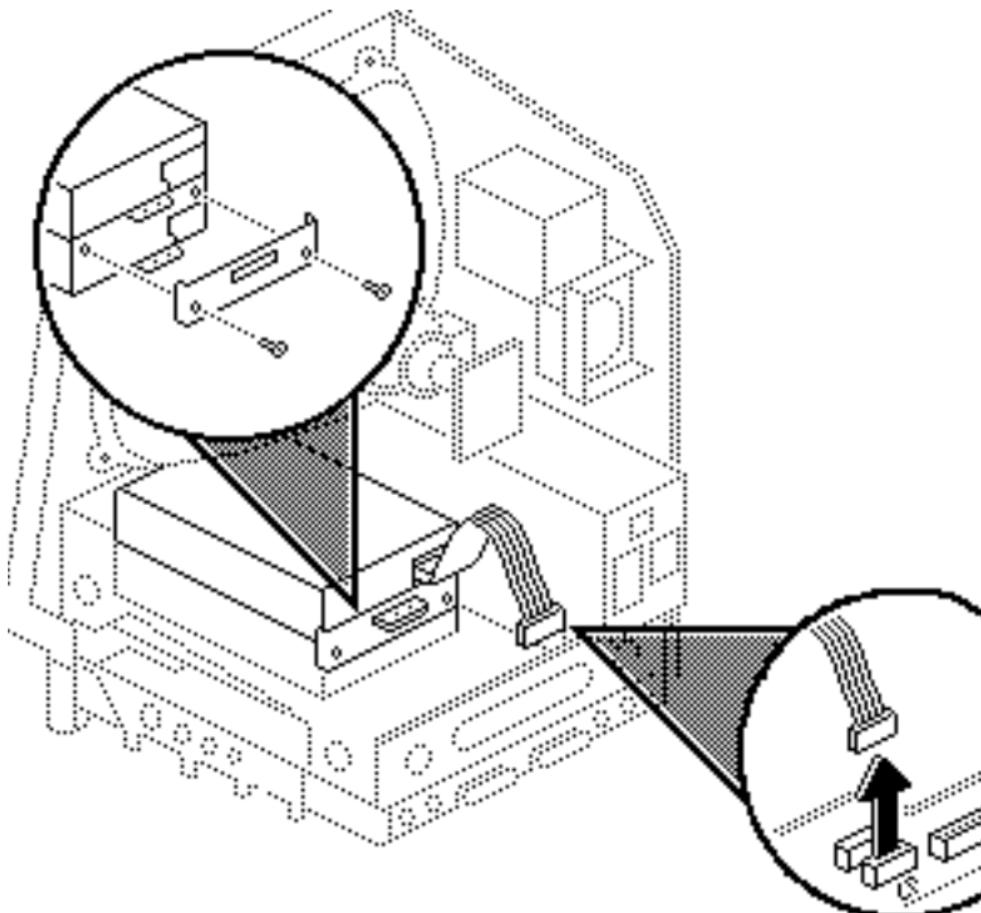
1   Disconnect the upper floppy drive cable from logic board connector J7.

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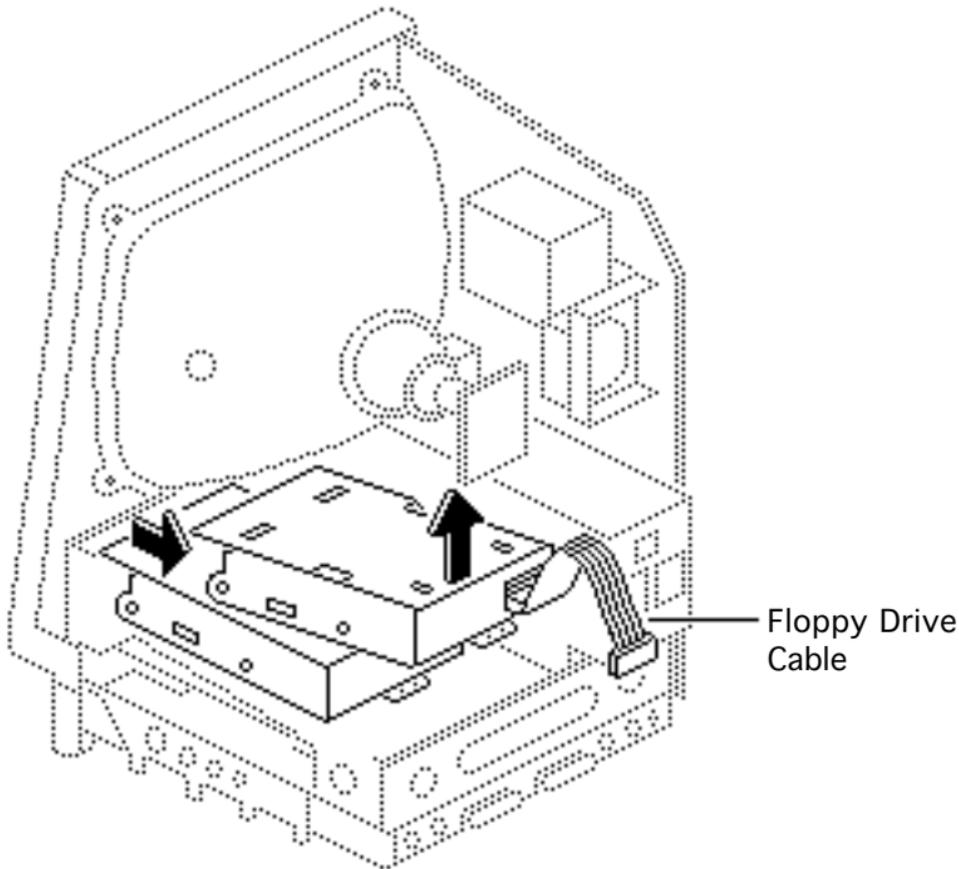
Floppy Drive
Cable

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).
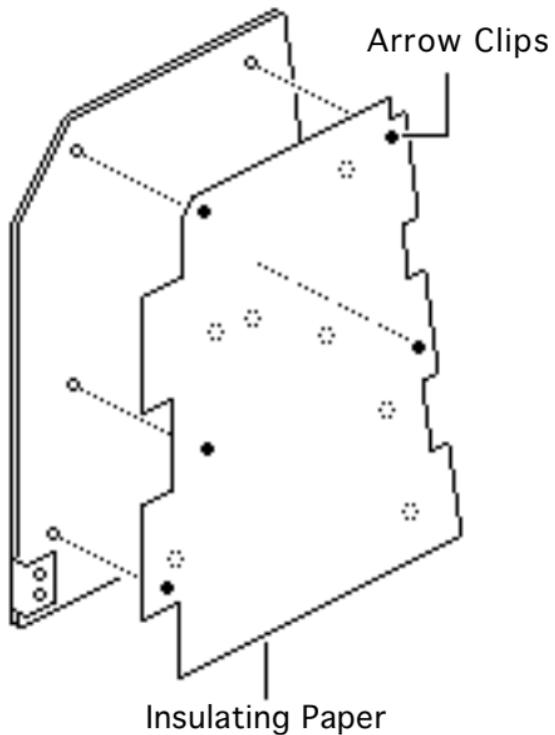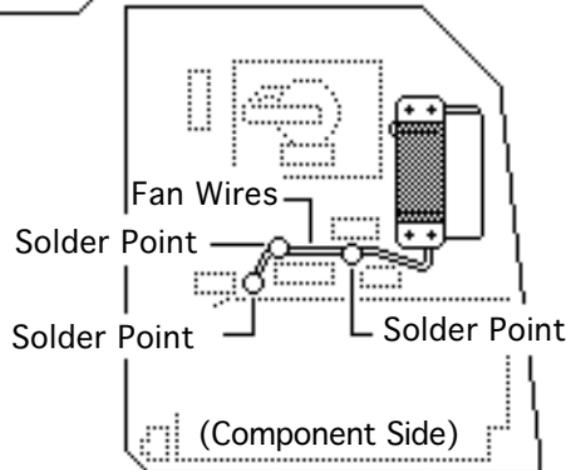
Lower Floppy Drive

Lower Floppy Drive

Before you begin,
- Remove the cover
- Discharge the CRT
- Remove the video board
- Remove the hard drive or upper floppy drive
- Remove the logic board

Floppy Drive Cable

1 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 install a dust shield on an existing 1.4 MB drive, you must first clean the drive (see the Hard Drives manual).
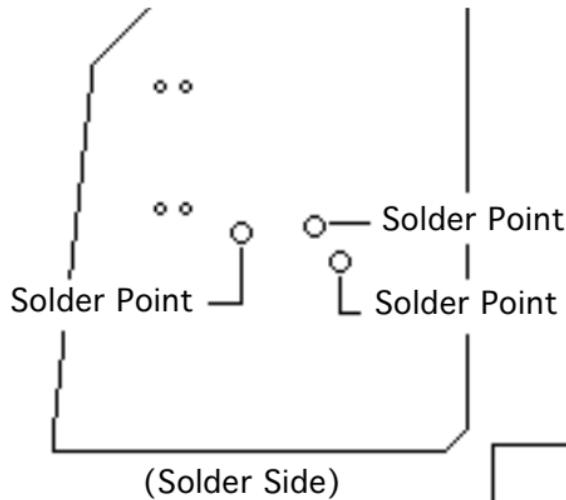
Fan Assembly

Fan Assembly

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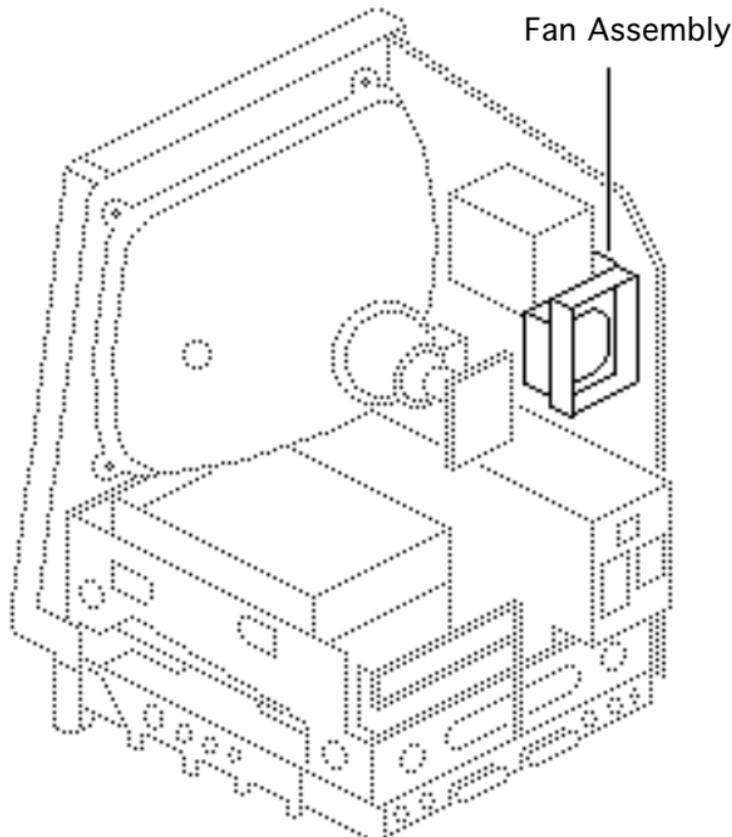
1 Compress the arrow clips and remove the insulating paper from the analog board.

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.

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.

Fan Solder Points

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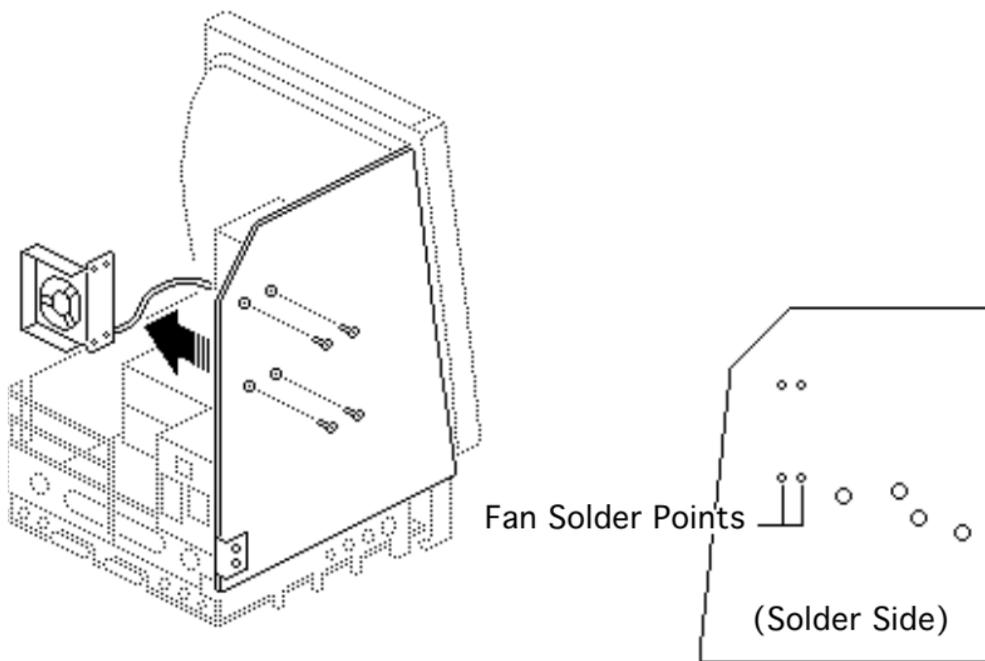
Replacement Caution: If you are replacing the fan with the newer axial (round) fan, make sure your customer's system has the redesigned, vertically mounted video board installed on the CRT. The axial fan does not allow adequate vibration clearance with the old, horizontally-mounted video board.
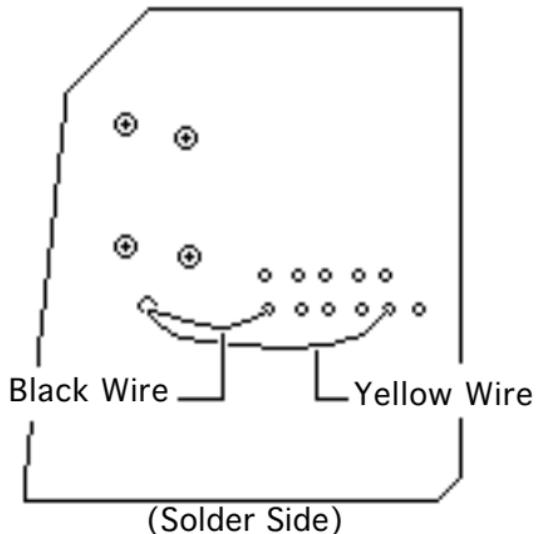
Replacement Note: Some replacement fans have a black wire and a yellow wire that must be soldered to the back side of the analog board. Insert these wires through the arrow clip hole in the board and solder them to the points shown.

Black Wire —   — Yellow Wire

(Solder Side)

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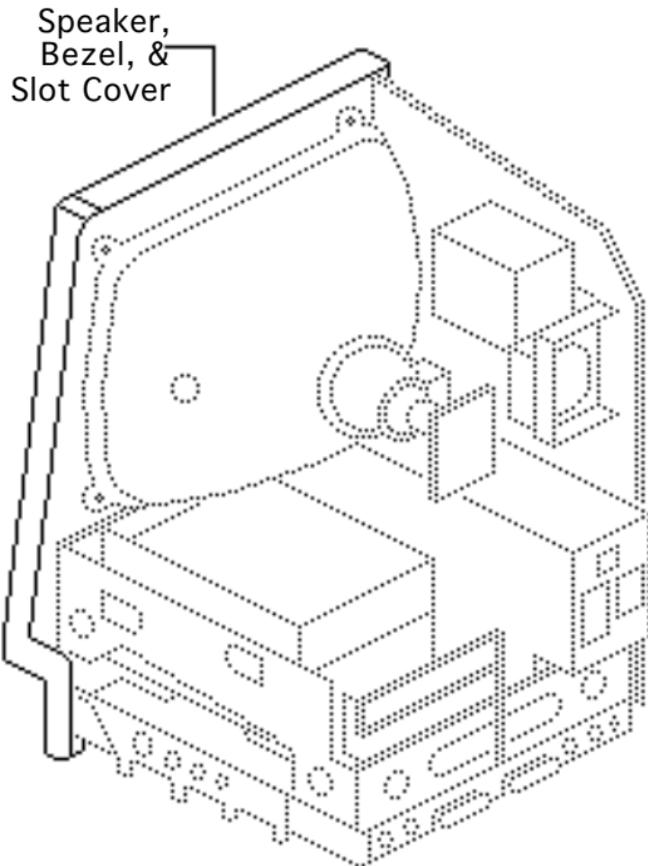
Speaker, Bezel, & Slot Cover

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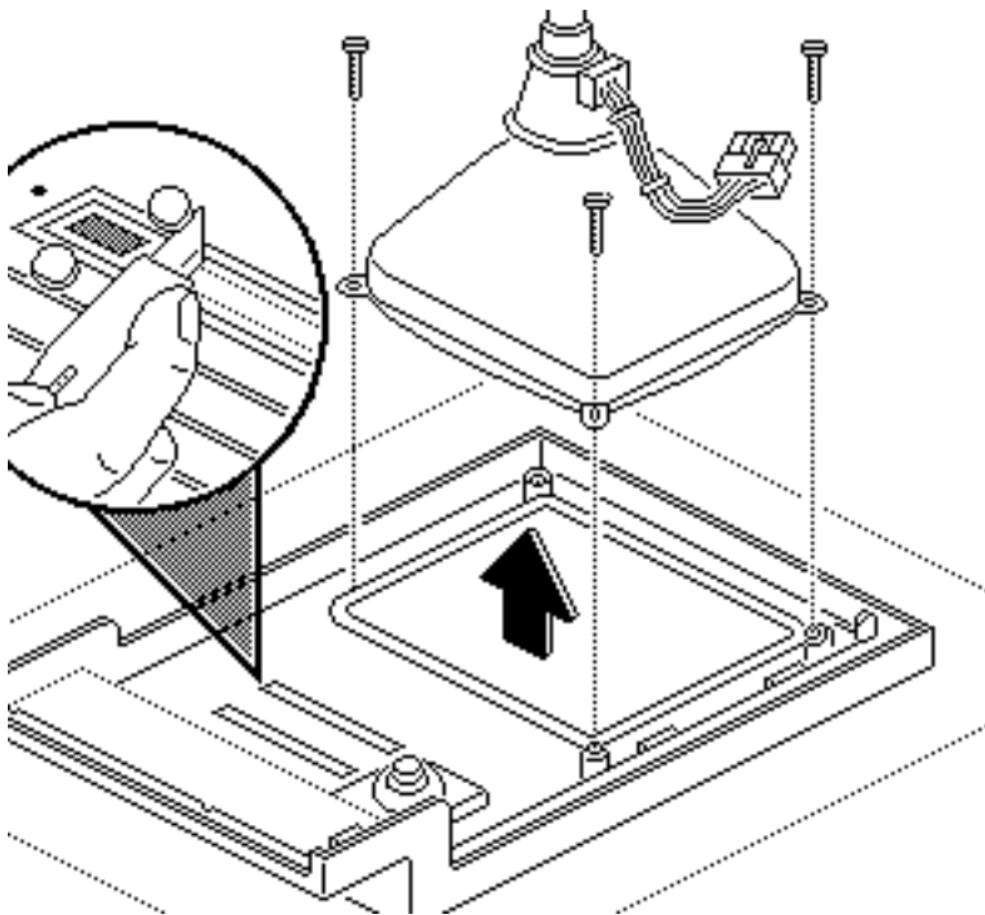- Remove the analog board (only)
- Remove the logic board
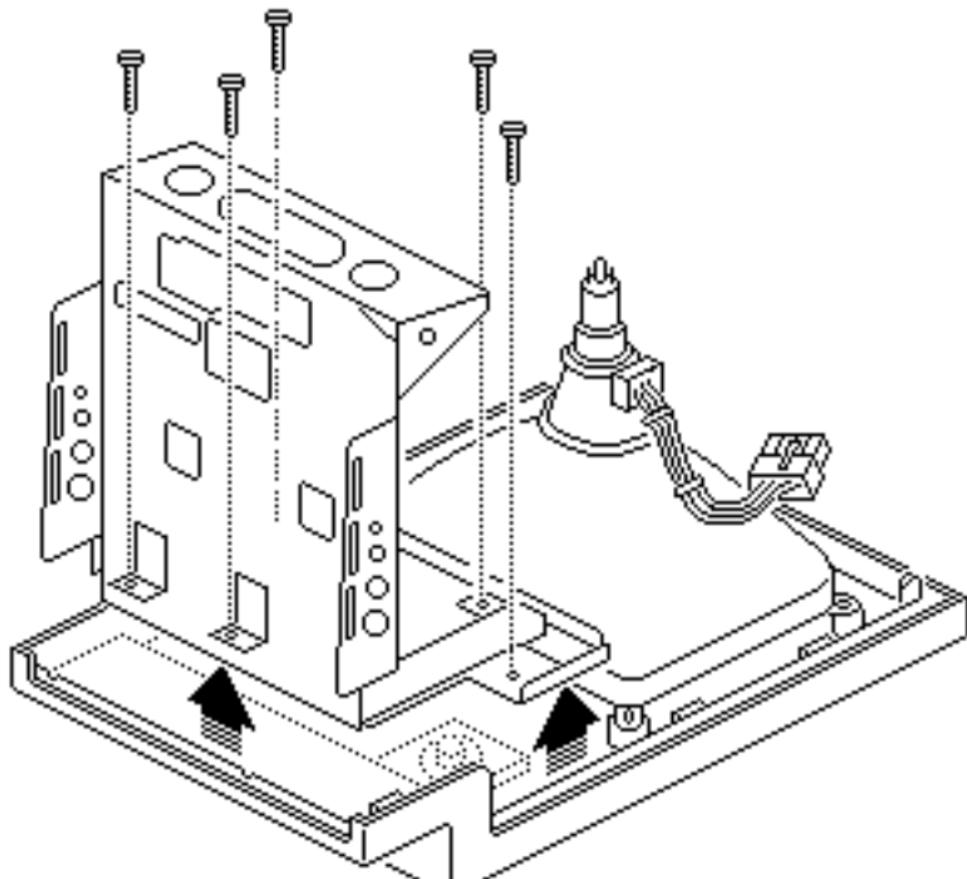
1 Remove the five Torx screws and lift the chassis (with attached drives) off the front bezel.
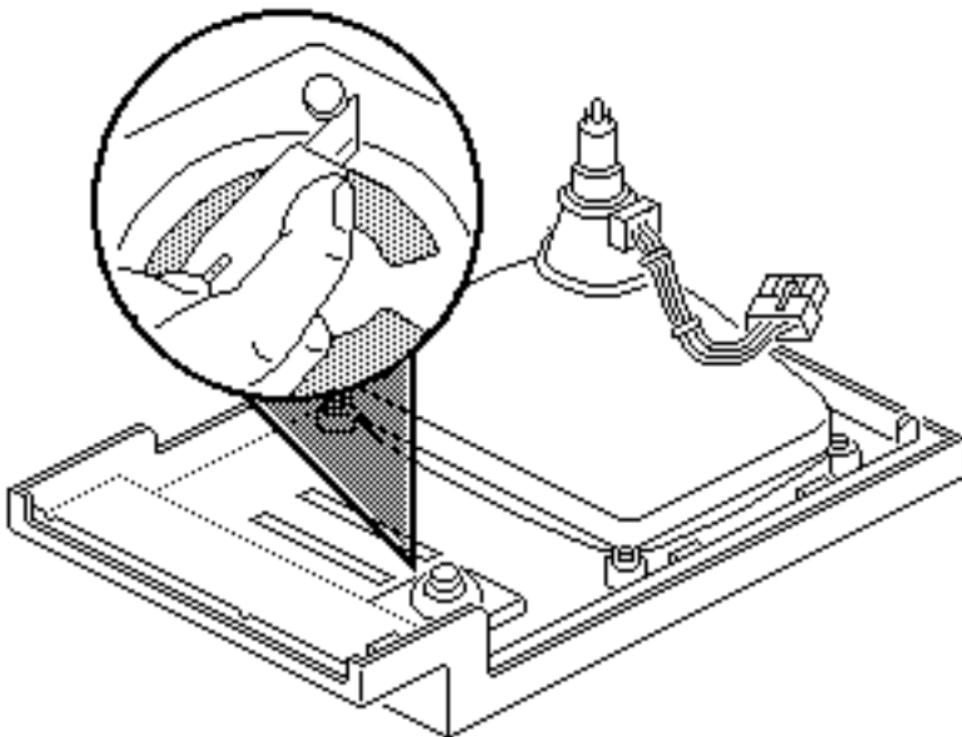
2 To remove the speaker, cut away (with a matte knife) the melted plastic that secures the speaker to the inside of the front bezel.

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).
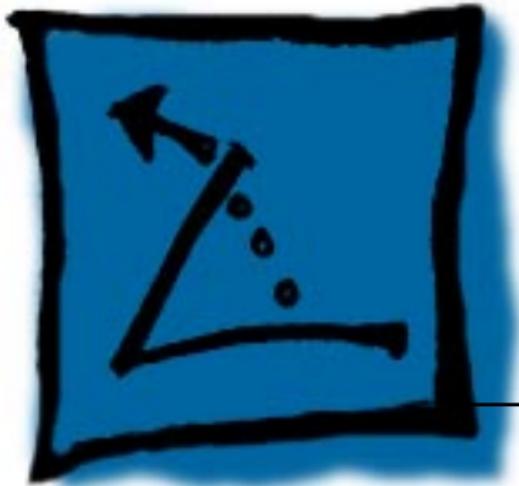
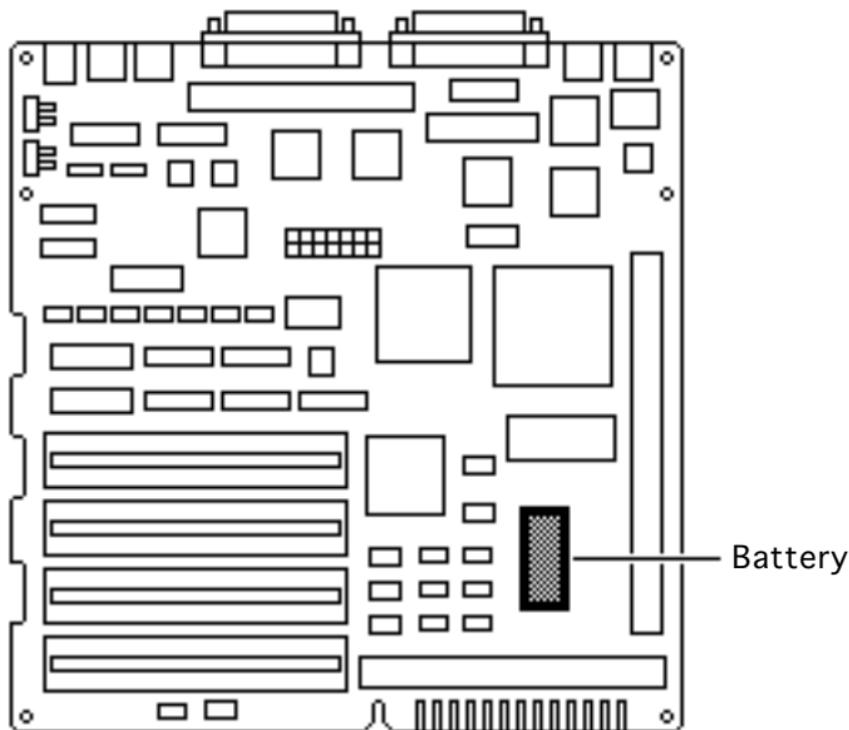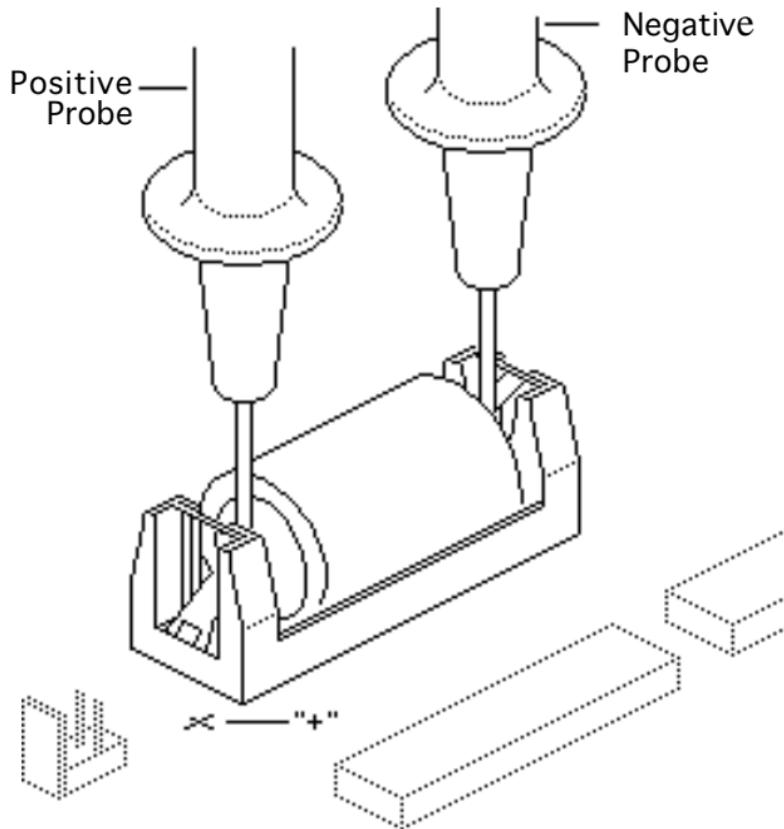# Additional Procedures

Macintosh SE/30

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.

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.
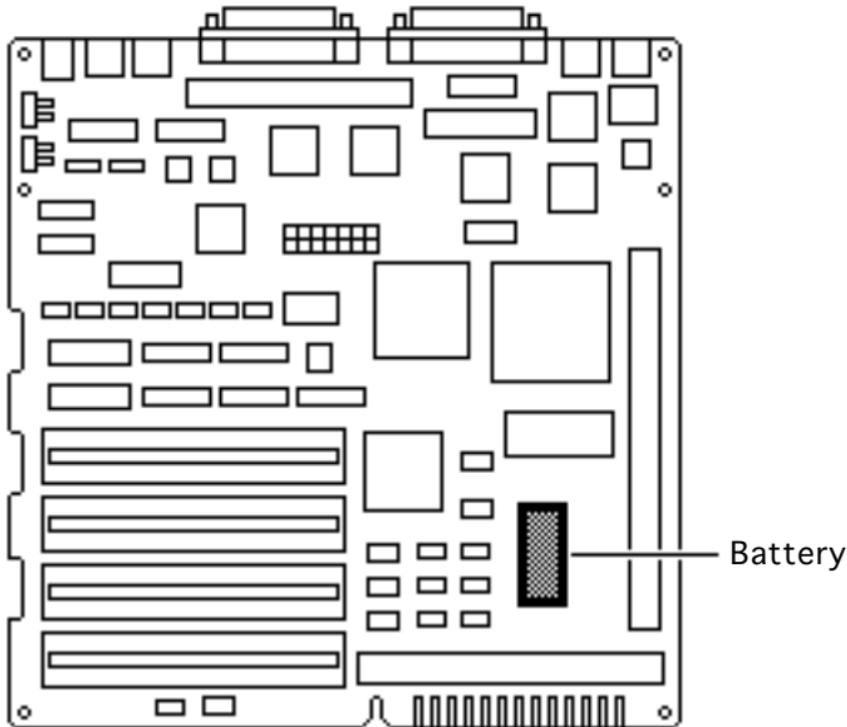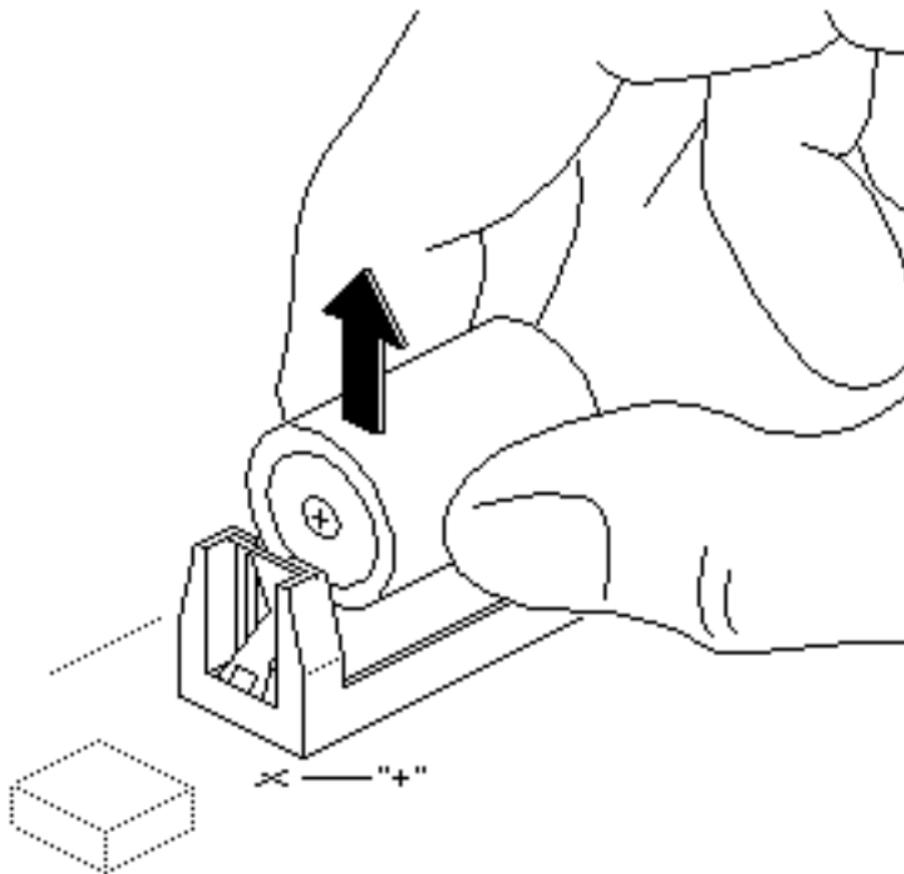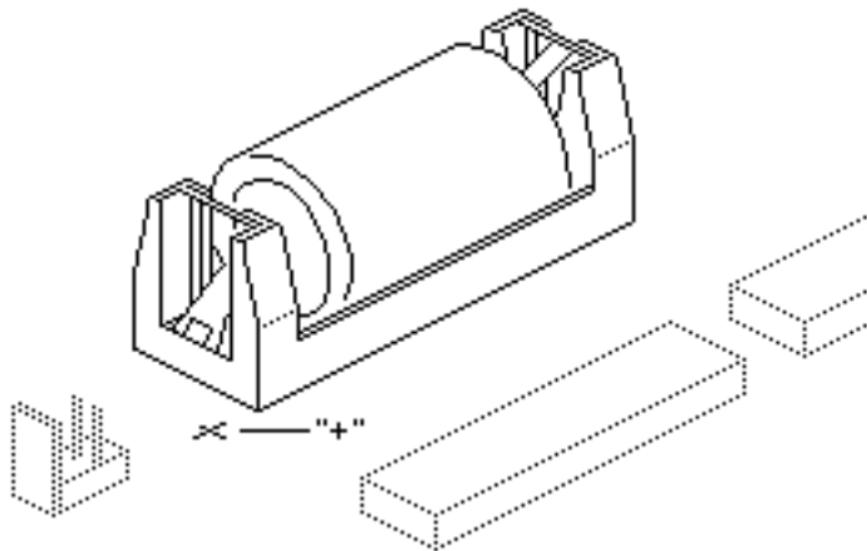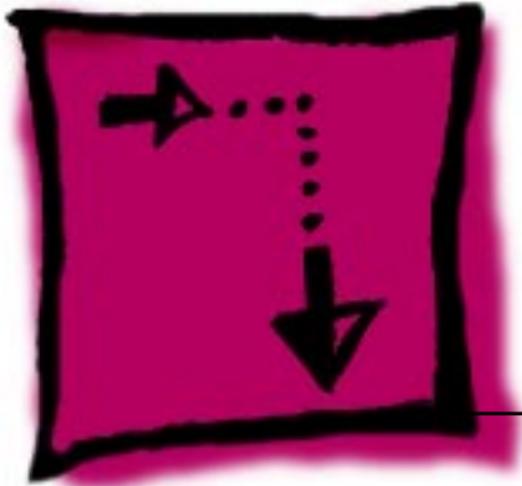
1   Remove the cover from the battery holder and pull out the battery.

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

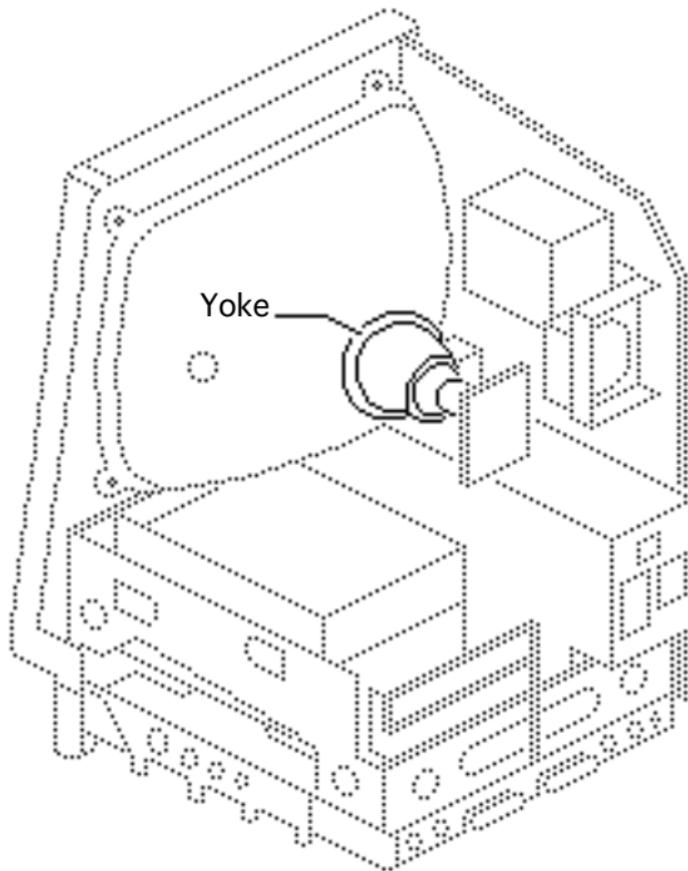**Replacement Note:** When replacing the new battery, orient it so that the end marked +/ matches the +/ on the logic board.

Adjustments

Macintosh SE/30

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.
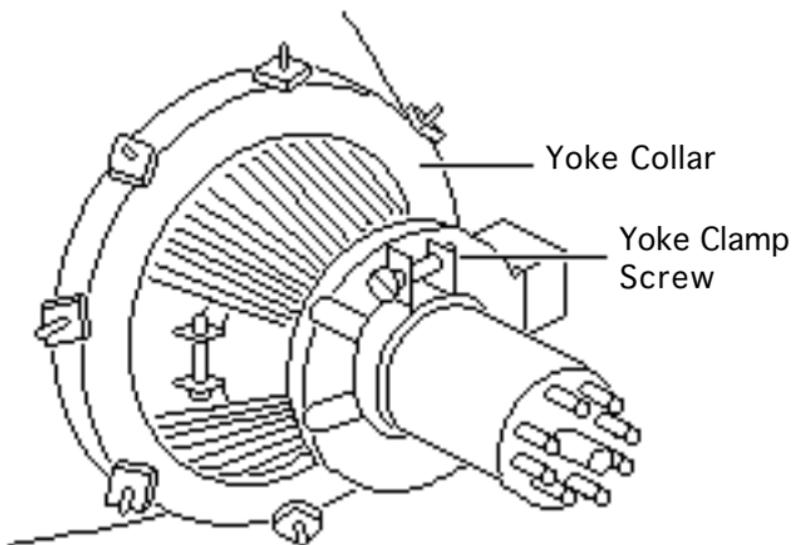
Note: If you replace the CRT, you will probably need to adjust the yoke.
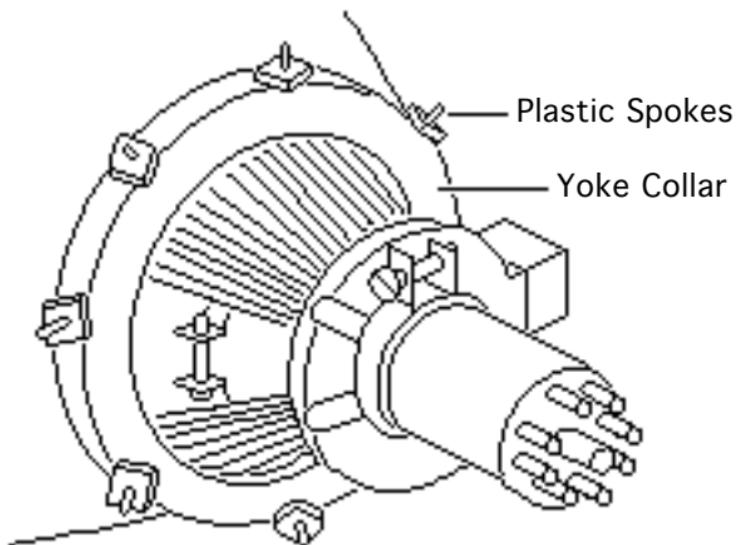
Yoke Collar

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.

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.

Plastic Spokes

Yoke Collar

Yoke Collar
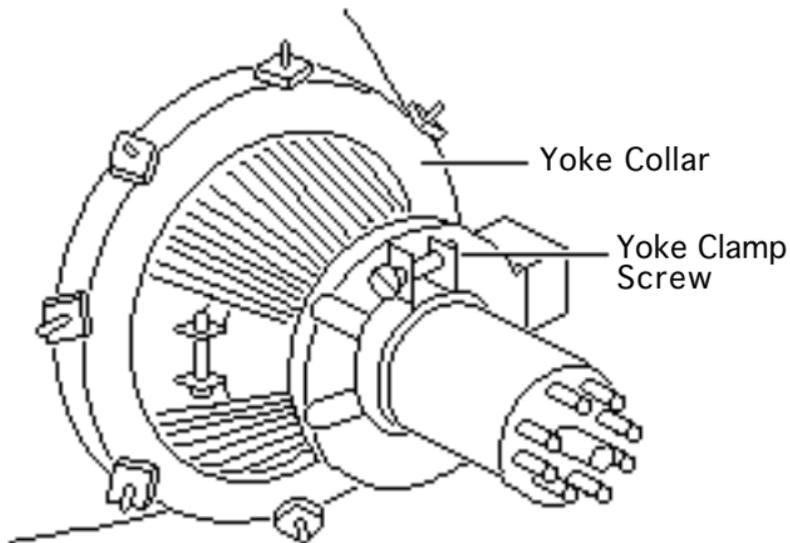
Yoke Clamp
Screw

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.
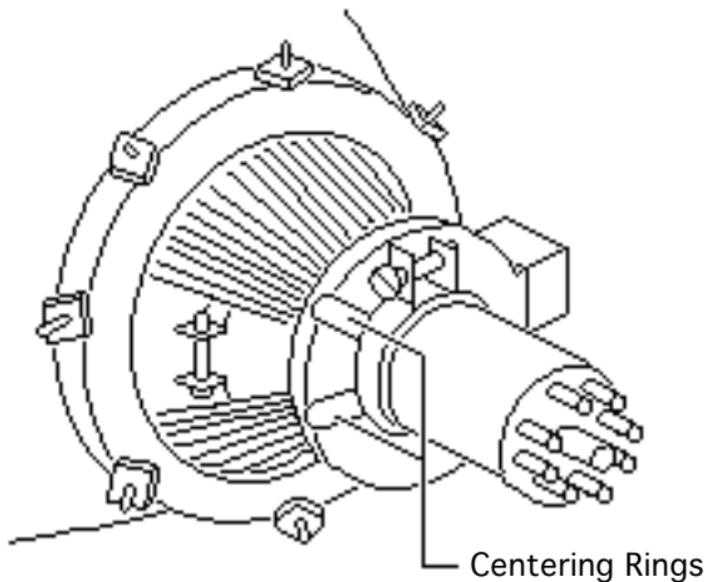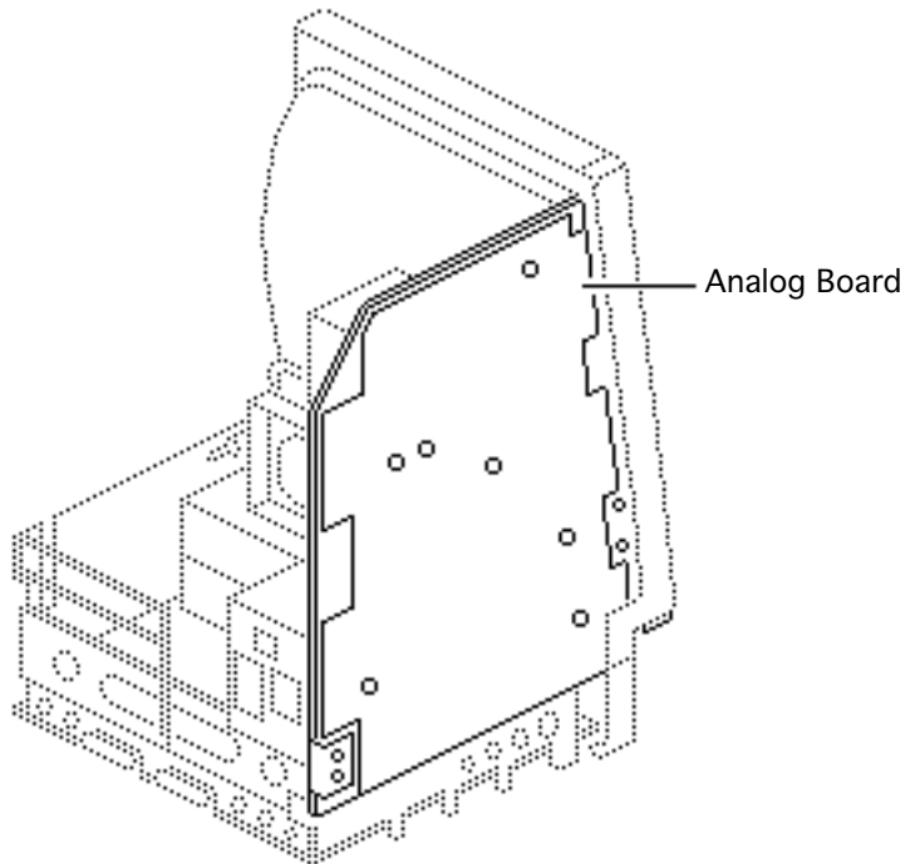
Centering Rings

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.
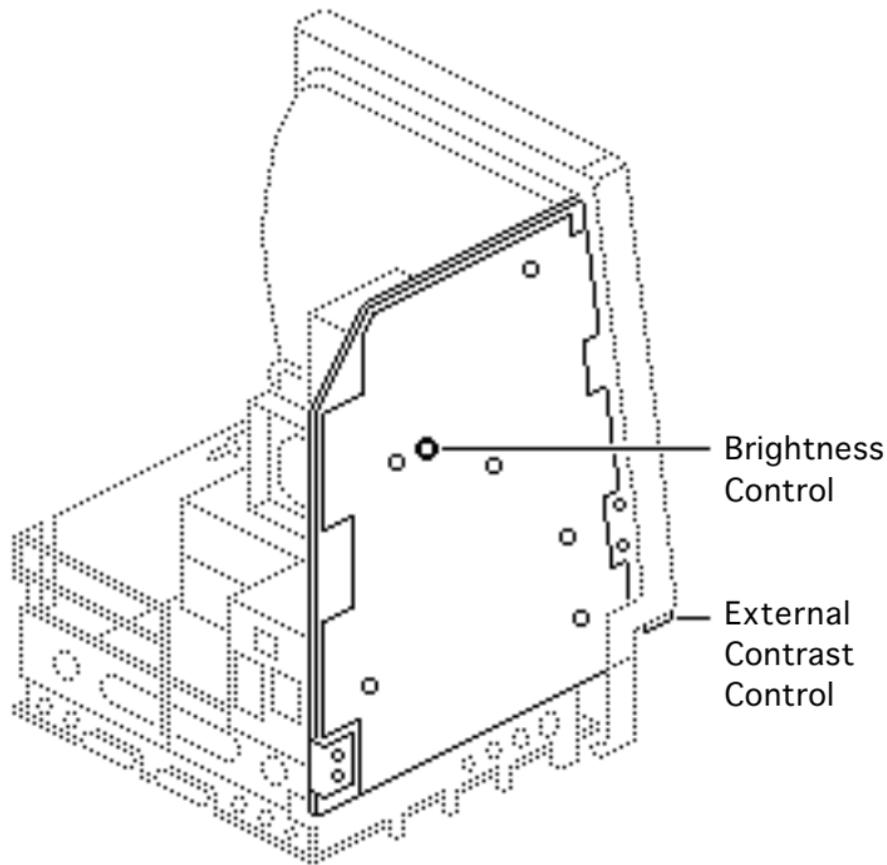
3   Turn the brightness
    control
    counterclockwise
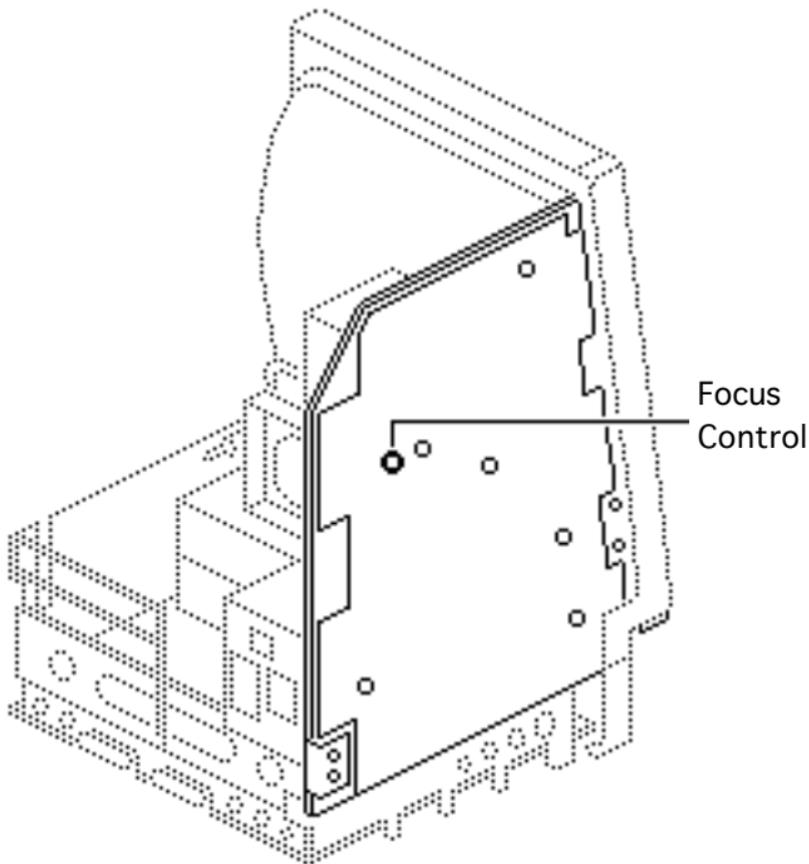   slightly.

Width
Control
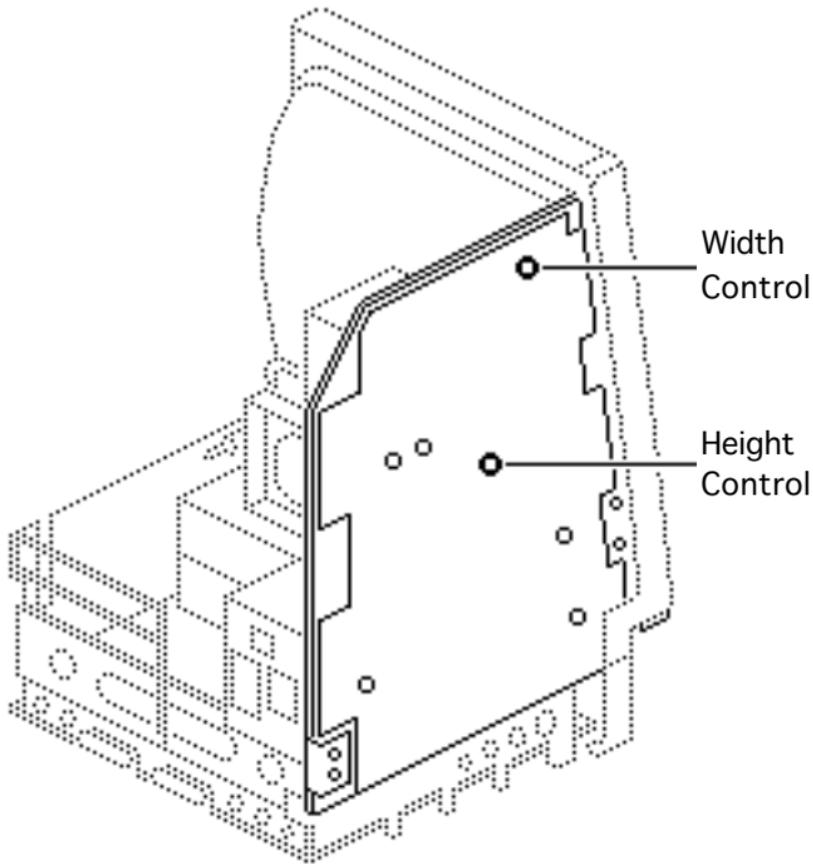
Height
Control

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
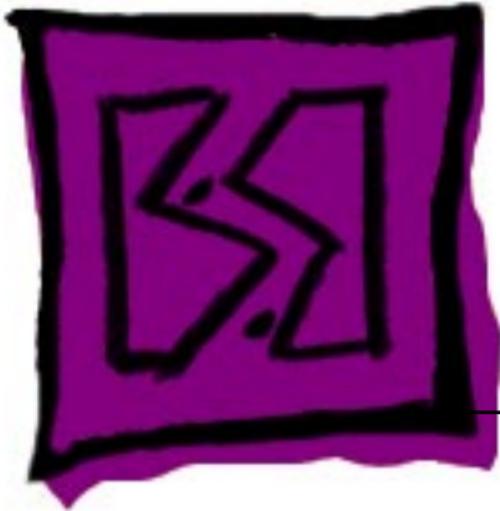   the height until the
   raster is 4.7 inches
   high.

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/30

Exploded View

Hard Drive
661-0216 (40 MB)

Dust Shield
076-0439

Floppy Drive
661-0474 (1.4 MB)

CRT and Yoke
Assembly
076-0103

Insulator
Shield
725-0020

Front
Bezel
630-5499

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
661-0527

Rear
Housing
630-5271

RFI
Shroud
805-0969

426-1007

Power
Cable
590-0380

435-5002