

High-Res Monochrome Monitor

Technical Procedures

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High-Res Monochrome Monitor

Section 1 – Basics

□ CONTENTS

- 1.2 Product Description
- 1.3 Safety Precautions
 - 1.3 Safe Electrical Setup
 - 1.4 CRT Safety Rules
 - 1.6 Live Adjustment Rules
- 1.7 Disposing of the Cathode-Ray Tube (CRT)

□ PRODUCT DESCRIPTION

The Apple® High-Res Monochrome Monitor is a 12-inch monitor that provides a high-resolution black and white display for the Macintosh II. The monitor features 640 x 480 resolution, a universal power supply, and glare protection.

The power switch (Figure 1, #1), contrast control (Figure 1, #2), and brightness control (Figure 1, #3) are the only controls recommended for user access. The LED on the lower front case indicates when the power is on.

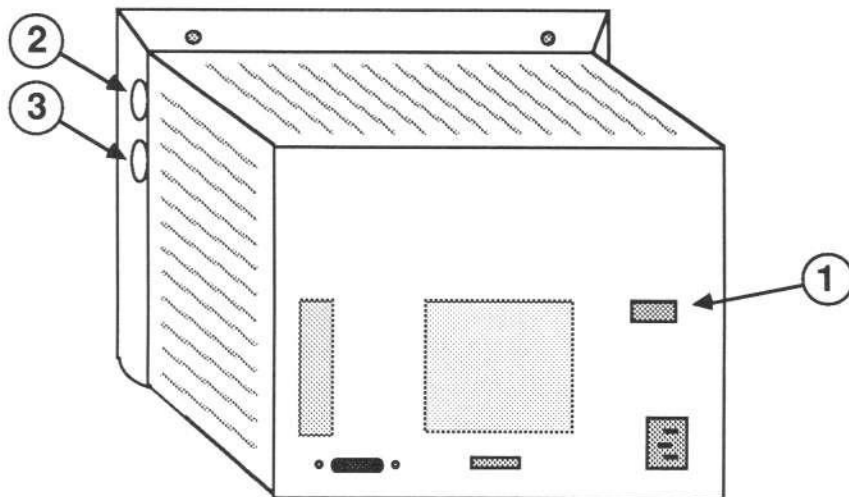


FIGURE 1

□ SAFETY PRECAUTIONS

The Apple High-Res Monochrome Monitor is harmless as long as you're just watching the display. Once you remove the cover, however, you are exposed to the high-voltage Cathode-Ray Tube (CRT)—the picture tube. The following precautions must be taken to ensure your safety, especially when you are making adjustments on a live monitor.

Safe Electrical Setup

- **Be sure your outlet is correctly wired and properly grounded.**

Polarity and ground testers are available from most electronics stores. Test all outlets in your service shop before working on **any** electrical equipment. If you have any doubts about your building's wiring, consult a qualified electrician.

- **Never use an adaptor plug to connect a monitor's three-prong power plug to a two-prong wall outlet.**

Adaptors defeat the ground pin, which is a safety feature.

- **When performing live adjustments, use an isolation transformer between the monitor and the outlet.**

Order an isolation transformer from your electronics distributor, and make it a practice to use it whenever you are working with **any** charged monitor or other powered system under test. An isolation transformer isolates the circuitry of the system under test from the power company's circuitry, thus reducing the likelihood of a fatal shock should you simultaneously contact high voltage and anything else that is earth grounded.

Do not connect more equipment to the transformer than the wattage capacity of the transformer will bear. (It is usually best to connect only one piece of equipment at a time.) We recommend an isolation transformer with a minimum wattage capacity of 500 VA, with grounded three-prong cord and receptacle. Two such transformers, available from many electronics stores and distributors, are listed below:

Triad N-57M

Stancor GIS 500

CRT Safety Rules

- **Do not work on a monitor alone.**

If there is an accident, it could save your life to have someone else nearby. Apple recommends that your staff be trained in cardio-pulmonary resuscitation (CPR).

- **Remove rings, wristwatches, bracelets, hanging necklaces, and other jewelry before performing repairs on a monitor.**

Metal jewelry is an excellent conductor of electricity. Removing jewelry will reduce the possibility of electric shock.

- **Never use a grounding wriststrap or heelstrap or work on a grounded workbench mat when discharging a monitor or when performing live adjustments.**

Grounding wriststraps, heelstraps, and mats are used to protect sensitive components from the damaging effects of electrostatic discharge from your own body or clothing. Even though they contain a one-megohm resistor and are designed to conduct only small electrical charges, we recommend that they be used **only** when working on "dead" (uncharged) equipment.

- **Wear safety goggles when working with a CRT.**

The CRT contains a high vacuum. If cracked or broken, it can implode (collapse into itself), then explode. To protect your eyes from serious injury, always wear safety goggles when working on or near a CRT, and be careful of other people in the area.

- **Before working inside a monitor, turn off the power and disconnect the AC power cord.**

Certain parts of a monitor chassis are **hot** (electrified) when the monitor is under power. Except when you **must** have the power on (for example, when making live adjustments), never work on a plugged-in monitor—even if you have the power turned off.

- **Keep one hand in your pocket or behind your back when working on a live monitor.**

This practice reduces the risk of current passing through your heart, should you accidentally contact high voltage.

- **Always discharge the anode before touching anything inside the monitor.**

The High-Res Monochrome Monitor has a bleeder resistor on the anode that drains the charge when the power is turned off. **Nevertheless, in case the resistor fails and leaves the anode fully charged, you must perform the discharge procedure before working inside the monitor.**

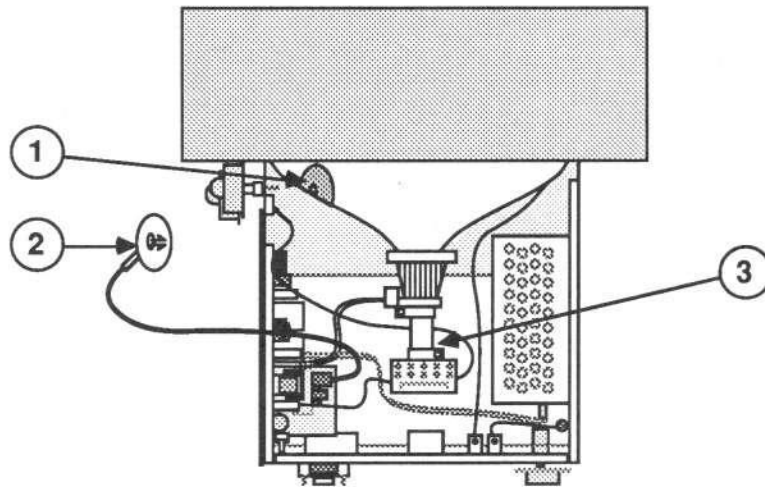


FIGURE 2

- **Never touch the anode connector or the anode aperture.**

Normally the anode aperture (Figure 2, #1) has a connector plugged into it (Figure 2, #2). When a CRT is replaced, the anode connector is removed, exposing the anode. If the bleeder resistor fails, the anode can retain a charge of several thousand volts (even when power is off), and can regain some charge even after it has been discharged.

- **Do not pick up or handle a CRT by its neck.**

To prevent an implosion, you should take every precaution against breaking the tube, especially at the neck (Figure 2, #3) where the tube is the thinnest.

Live Adjustment Rules

In addition to the precautions listed on the previous page, never touch the following components when adjusting a live monitor:

- The yoke wires (Figure 3, #1)
- The anode connector (Figure 3, #2)
- The anode wire (Figure 3, #3)
- The flyback transformer (Figure 3, #4)

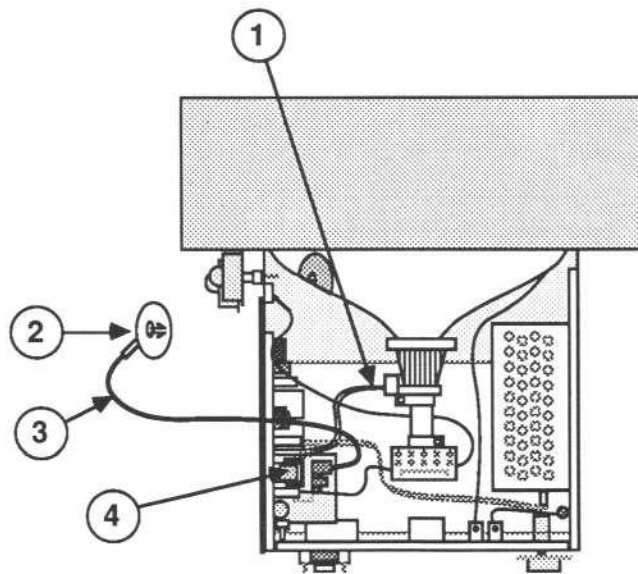


FIGURE 3

WARNING: *Serious injury could result if you touch any of these components with the power on.*

❑ DISPOSING OF THE CATHODE-RAY TUBE (CRT)

Remember that a CRT can implode unless it is devacuumed. Putting a defunct CRT into a trash receptacle without devacuuming it can endanger other people.

Materials Required

Thick cardboard box, large enough to conceal the CRT
Large, sharp, diagonal cutters
Large pliers
Duct tape
Safety goggles
Gardening gloves
12-inch square of cloth or heavy paper

Devacuuming the CRT

1. Put on safety goggles.
2. In the side of the box about six inches from the bottom, cut or drill a hole just large enough to accommodate the very tip of the CRT neck.
3. Place the CRT inside the box with the tip of the neck protruding through the hole, and tape down the box flaps with the duct tape (Figure 4).

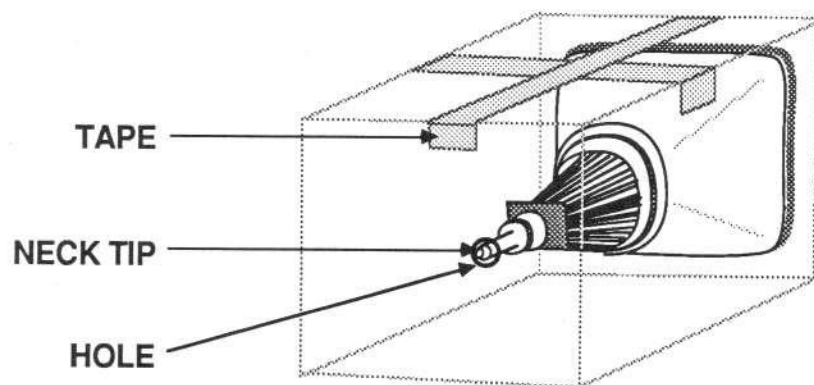


FIGURE 4

WARNING: Only the very tip of the CRT neck should be protruding through the hole in the box. The box must not have any other openings.

4. Put on the gloves.
5. Using the diagonal cutters, carefully clip off the connector pins on the end of the CRT neck.
6. Tape the piece of cloth or paper onto the box (Figure 5, #1) so that it forms a veil over the opening (Figure 5, #2) but allows your hand access to the tip of the CRT. The veil's purpose is to catch bits of glass that may fly during the following step.

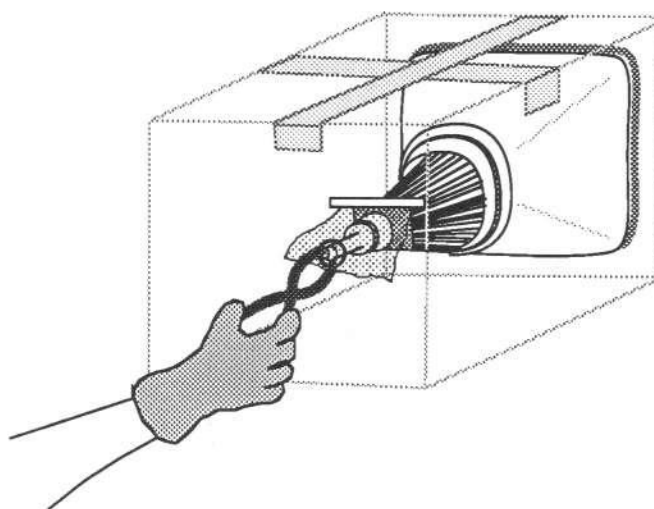


FIGURE 5

7. Make sure no one is standing nearby. Place the pliers under the veil, stand to one side, and look away while you use the pliers to snip off the exposed tip of the CRT.

WARNING: Do not look directly at the box when cutting off the tip of the CRT!

Note: You will probably hear a rush of air entering the CRT when the CRT vacuum breaks—but even if you don't, the procedure is complete if the interior of the CRT is clearly visible through the opening created by the removed tip.

High-Res Monochrome Monitor

Section 2 – Take-Apart

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2.26	Power Switch
2.28	A/C Inlet

□ REAR COVER

Materials Required

Medium Phillips screwdriver

Remove

To remove the rear cover:

1. Turn off the monitor, and disconnect the AC power cord and the video cable from the monitor.
2. Place the monitor on its face on a soft surface to avoid damage to the CRT screen.

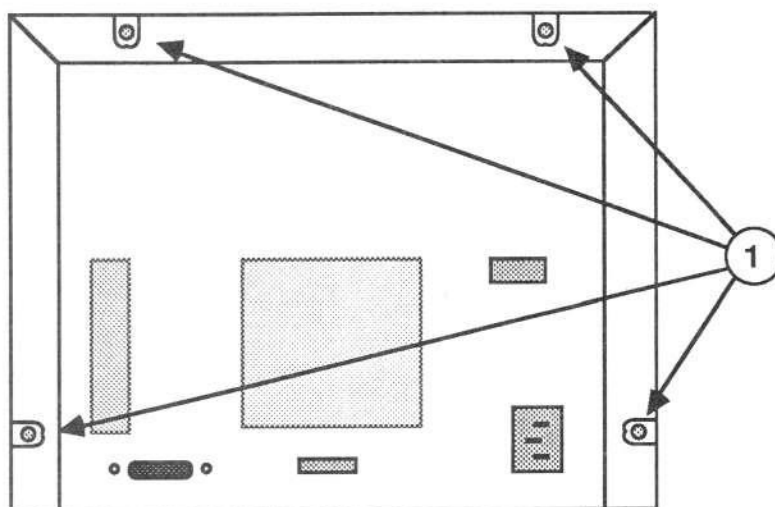


FIGURE 1

3. Remove the four screws (Figure 1, #1) from the rear cover.
4. Lift the rear cover off the CRT bezel and set it to the side.

Replace

To replace the rear cover:

1. Slide the rear cover onto the CRT bezel.
2. Replace the four Phillips screws (Figure 1, #1).

❑ DISCHARGING THE CATHODE RAY TUBE (CRT)

Materials Required

Long flatblade screwdriver
CRT discharge tool (or a 12-inch jumper wire with insulated alligator clips)
Small flatblade screwdriver
Safety goggles

Procedure

The High-Res Monochrome Monitor is equipped with a bleeder resistor that automatically drains the charge from the CRT when the power is shut off. **Nevertheless, you must follow the discharge procedure below to ensure your safety in the event that the resistor has failed and the anode is still fully charged.**

To discharge the CRT:

1. Remove the rear cover.
2. Set the monitor upright with its back facing you.
3. Remove any metal jewelry (rings, watches, bracelets, hanging necklaces, etc.) and your grounding wriststrap.
4. Put on the safety goggles.

WARNING: Use only one hand while discharging the CRT. If you are using a screwdriver, grasp only the insulated handle while discharging the RT.

5. Attach the clips of the CRT discharge tool to any part of the metal chassis that surrounds the back of the CRT (Figure 2, #1).
6. Slide the discharge tool under the anode cap (Figure 2, #1) and push it toward the center of the cap until the blade comes in contact with the metal anode ring.

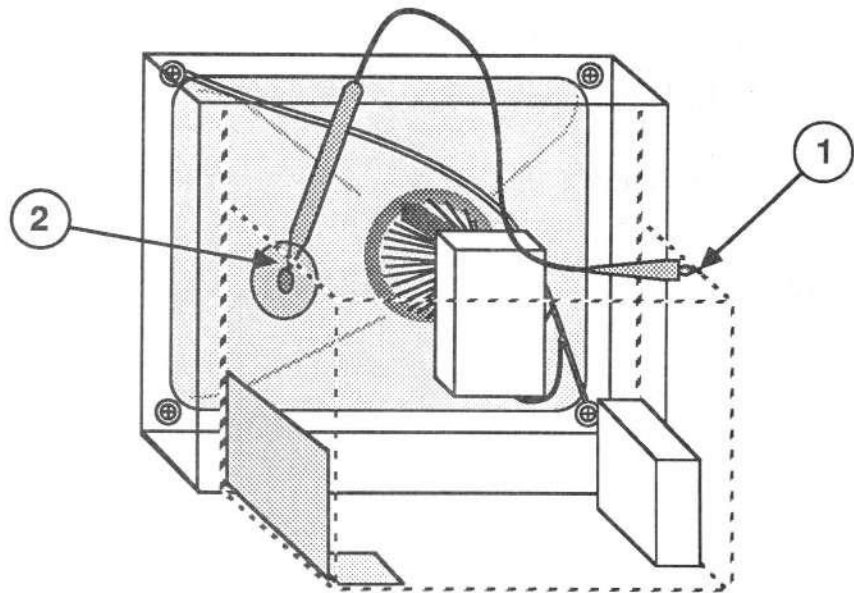


FIGURE 2

7. Remove the discharge tool and disconnect it from the metal chassis.
8. For some of the following procedures, you may have to remove the anode cap. To do so, peel back the anode cap until you can see the anode ring at the center. Look at the metal connector in the center of the cap and notice how it is clipped into the CRT. Push one side of the metal connector in and lift the cap off the tube.

Note: A secondary charge can build up even after you have discharged the CRT. If repairs are not finished within 30 minutes, the anode should be discharged again. Or, to ensure that any residual charge is dissipated during the service procedure, establish a ground lead by fastening one end of an alligator lead to the metal chassis, and the other end to the anode aperture.

□ MAIN LOGIC BOARD

Materials Required

Medium Phillips screwdriver

Remove

To remove the main logic board:

1. Remove the rear cover.
2. Discharge the CRT. Remove the anode cap.
3. Place the monitor on a grounded workbench pad and put on your grounding wriststrap. (Never do this step until after the CRT has been discharged.)

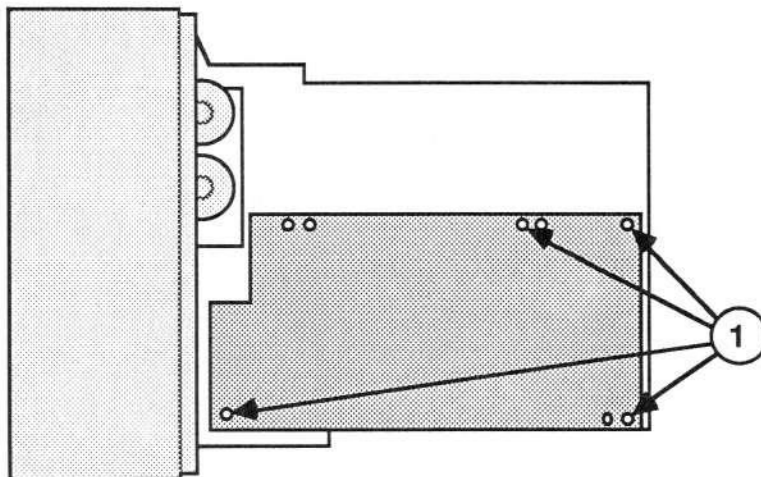


FIGURE 3

4. Remove the four screws that fasten the logic board to the metal chassis frame (Figure 3, #1).

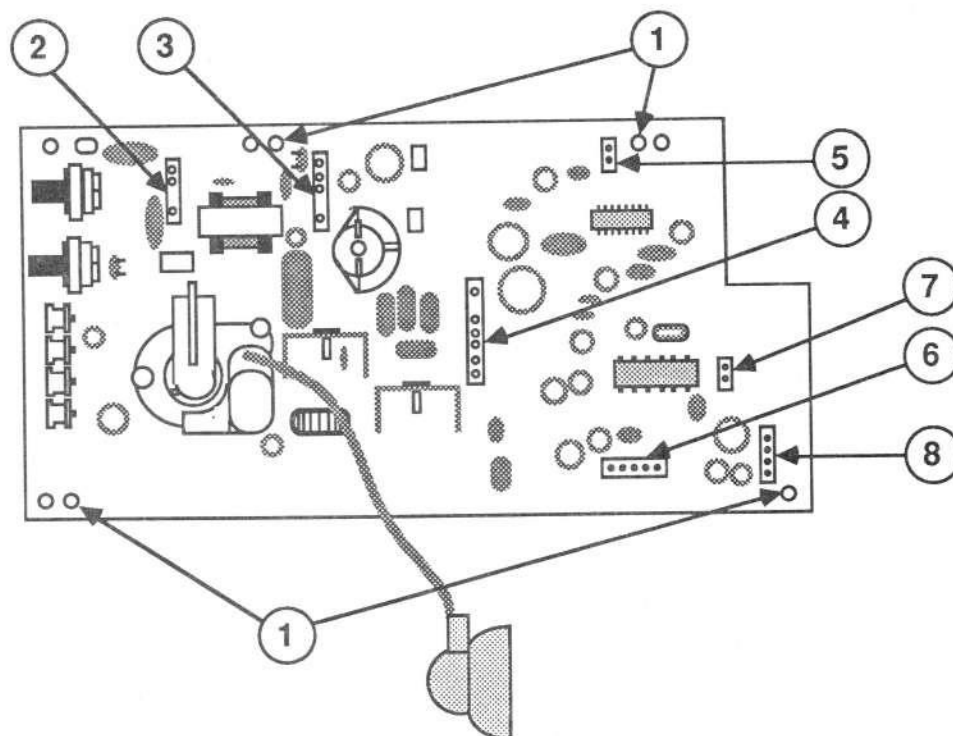


FIGURE 4

5. Look at the inside of the logic board and take off all the connectors. The seven connectors are:

- D-7, the large three-pin connector (Figure 4, #2)
- D-8, the large four-pin connector (Figure 4, #3)
- D-6, the large six-pin connector (Figure 4, #4)
- D-9, the two-pin connector (Figure 4, #5)
- D-2, the five-pin connector (Figure 4, #6)
- D-5, the two-pin connector (Figure 4, #7)
- D-4, the four-pin connector (Figure 4, #8)

Note: The last four connectors are tightly fitted and difficult to reach, so pull the logic board away from the metal chassis before you try to remove them.

6. Remove the anode wire from the plastic cable clamp under the CRT yoke.
7. Lift the main logic board from the metal chassis.

Replace

To replace the main logic board:

1. Pass the anode wire through the flyback arch on the chassis.

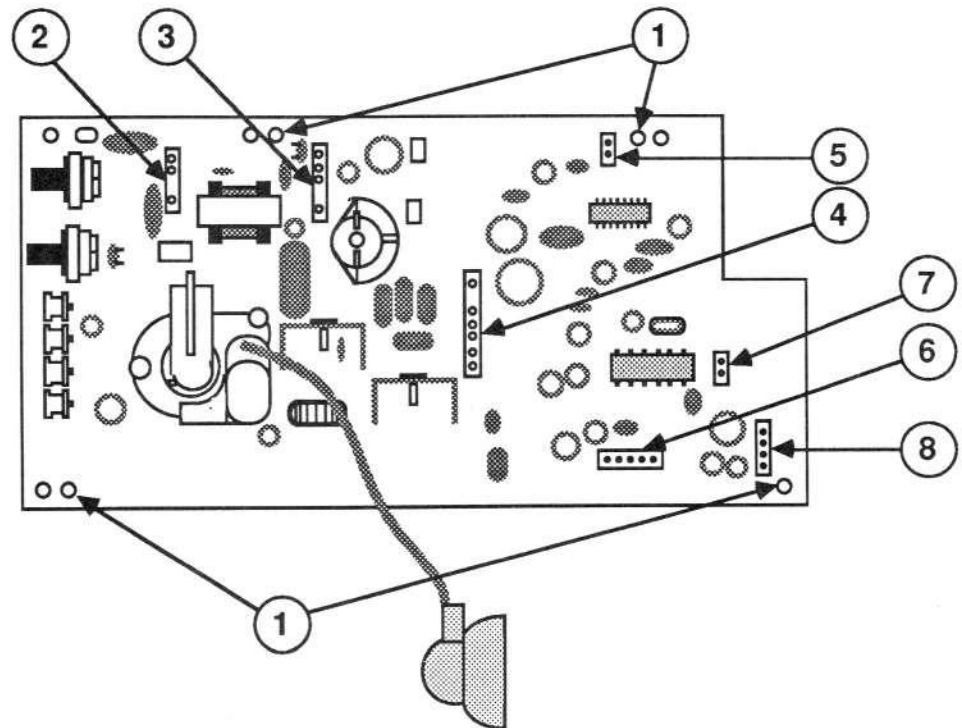


FIGURE 5

2. Starting from the end closest to the CRT, hook the connectors back to the main logic board.
 - D-4, the four-pin connector from the contrast board (Figure 5, #8)
 - D-2, the five-pin connector from the video board "C" (Figure 5, #6)
 - D-5, the two-pin connector from the interface connector (Figure 5, #7)
 - D-9, the two-pin connector from the LED board (Figure 5, #5)
 - D-6, the six-pin connector from the power supply (Figure 5, #6)

- D-8, the four-pin connector from the CRT yoke (Figure 5, #3)
 - D-7, the three-pin connector from the video board "C" (Figure 5, #2)
3. Place the logic board against the metal chassis and align the screw holes. Replace the four screws that hold the main logic board in place (Figure 5, #1).
 4. Route the anode wire through the cable clamp on the bottom of the chassis. Reconnect the anode cap, making sure that both metal clips are hooked in correctly.
 5. Place all loose wires in their plastic cable clamps.
 6. Replace the rear cover.

□ POWER SUPPLY

Materials Required

Medium Phillips screwdriver

Remove

To remove the power supply:

1. Remove the rear cover.
2. Discharge the CRT.
3. Place the monitor on a grounded workbench pad and put on your grounding wriststrap. (Never do this step until after the CRT has been discharged.)

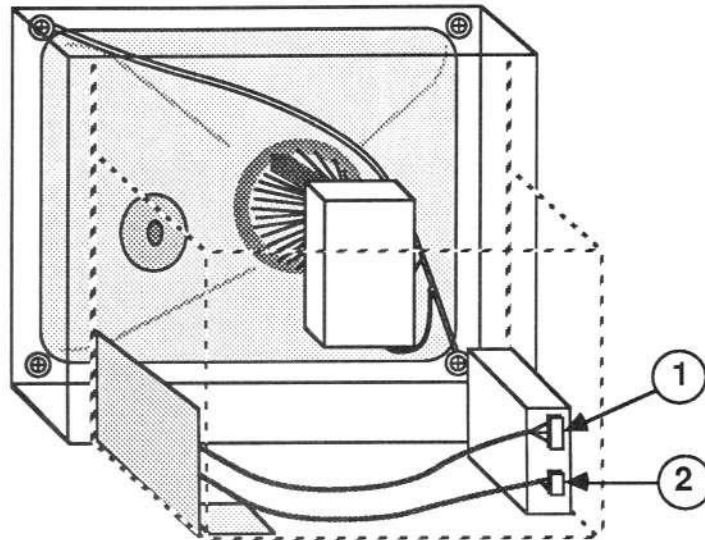


FIGURE 6

4. Unplug the six-pin connector from the top rear of the power supply (Figure 6, #1) and the three-pin connector below the six-pin connector (Figure 6, #2).

Note: It may be easier to remove the lower connector if you lift the chassis with one hand and reach the power supply from underneath with the other hand.

5. Release the CRT ground wire from the plastic cable clamp on the side of the power supply.

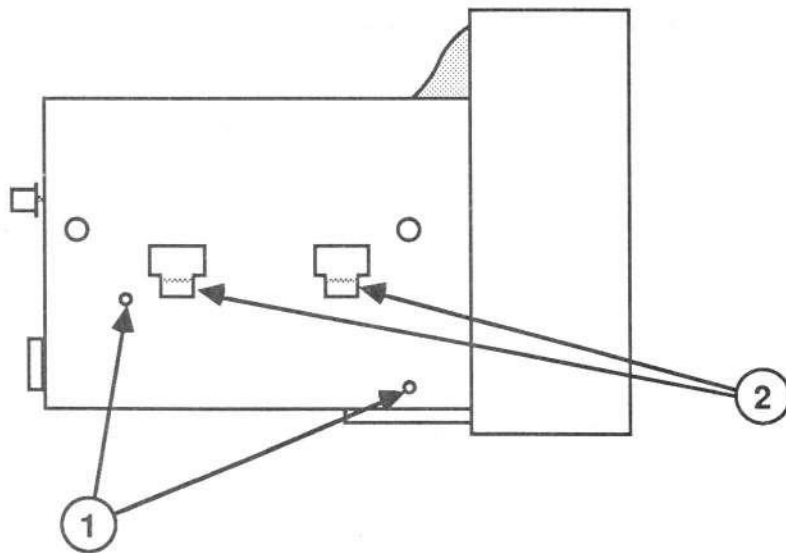


FIGURE 7

6. Unscrew the two screws on the outside of the chassis that hold the power supply in place (Figure 7, #1).
7. Lift the power supply up until the tabs on the side of the power supply (Figure 7, #2) are free of the corresponding chassis holes. Take the power supply out of the monitor and set it aside.

Replace

To replace the power supply:

1. Set the power supply inside the chassis, but don't yet insert the tabs. Reconnect the six-pin connector from the logic board (Figure 6, #1) and the three-pin connector from the power switch (Figure 6, #2) to their connectors on the rear of the power supply.
2. Slide the tabs on the side of the power supply into the holes in the side of the chassis (Figure 7, #2).
3. Replace the two screws that hold the power supply in place. The screw holes in the chassis are indicated by etched arrows (Figure 7, #1).
4. Replace all loose wires in the plastic cable clamps.
5. Replace the back cover.

□ FUSE

Materials Required

Plastic adjustment tool

Remove

To remove the fuses on the power supply:

1. Remove the rear cover.
2. Discharge the CRT.
3. Remove the power supply.
4. Remove the two screws on the sides of the power supply housing (Figure 8, #1) and the screw in the indentation on the bottom (Figure 8, #2).
5. Slide the power supply board out of the metal casing and locate the fuse on the upper left corner of the board (Figure 8, #3).
6. If the wire inside the fuse is broken, remove the fuse. Insert a plastic adjustment tool or small plastic screwdriver under one metal end, and gently pry up until you can pull the fuse out with your fingers.

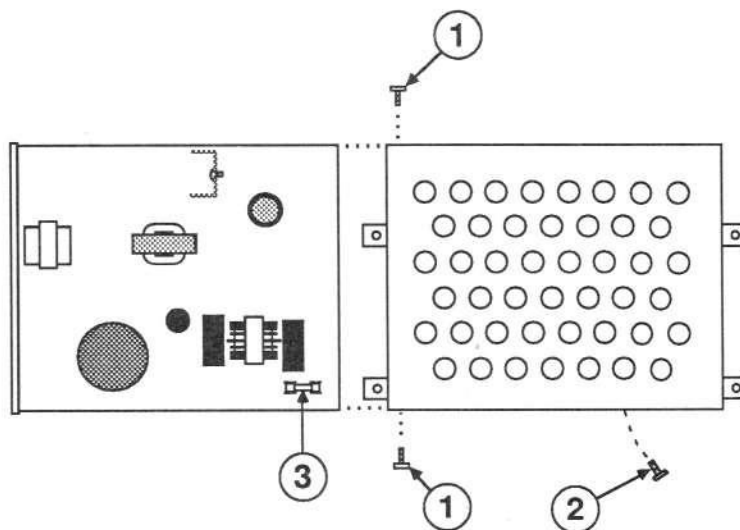


FIGURE 8

Replace

To replace the fuse:

1. Be sure you have the correct fuse (250 v, 2 A).
2. Gently press the fuse into the clamp.
3. Slide the power supply board back into its metal casing.

IMPORTANT: Make sure the power supply board slides into the middle slot on the side of the casing (Figure 9, #1). The board should not touch the bottom of the casing.

4. Replace the two screws on the side of the housing (Figure 8, #1) and the screw in the indentation on the bottom of the housing (Figure 8, #2).
5. Replace the power supply.
6. Replace the rear cover.

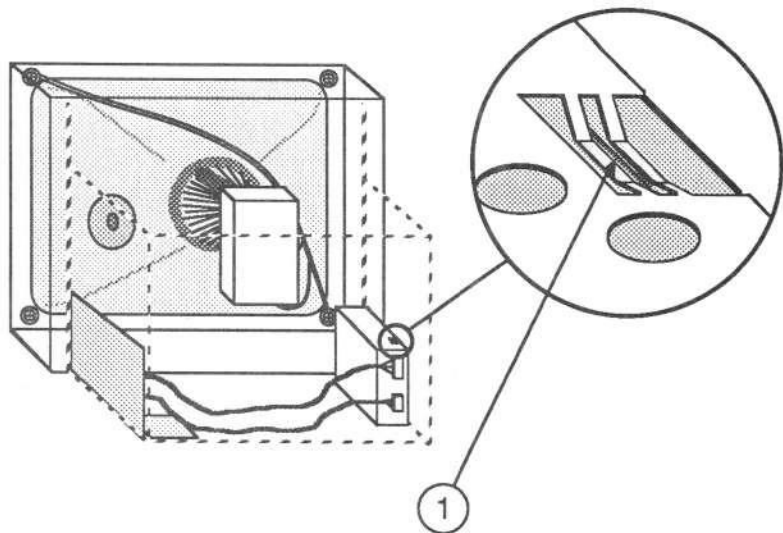


FIGURE 9

❑ CONTRAST CONTROL BOARD

Materials Required

Medium Phillips screwdriver

Remove

To remove the contrast control board:

1. Remove the rear cover.
2. Discharge the CRT.
3. Place the monitor on a grounded workbench pad and put on your grounding wriststrap. (Never do this step until after the CRT has been discharged.)

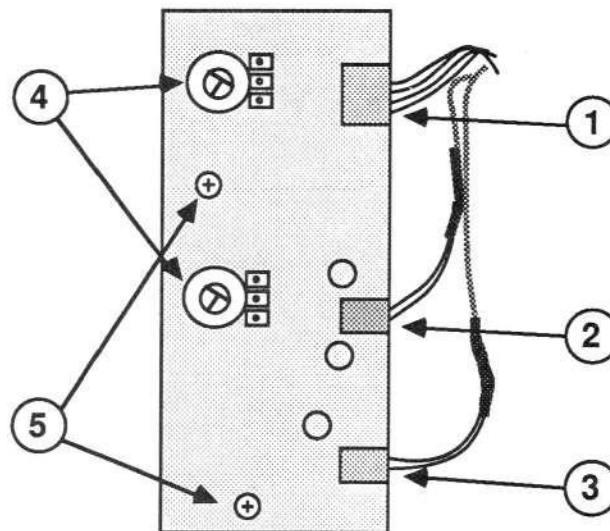


FIGURE 10

4. Remove the wires from the cable clamps. Disconnect the upper (Figure 10, #1), middle (Figure 10, #2), and lower connectors (Figure 10, #3) on the contrast control board.
5. Pull the two knobs off of the board (Figure 10, #4).
6. Remove the two screws holding the board in place (Figure 10, #5).
7. Set the board aside.

Replace

To replace the contrast control board:

1. Position the contrast control board against the chassis so that the two screw holes in the board line up with the corresponding holes in the chassis. Replace the two screws (Figure 10, #5).
2. The contrast control knob stems are keyed so that the knobs will fit in only one position. Look at the inside of the knobs and align them with the knob stems. Slide the knobs onto the stems (Figure 10, #4).
3. Reconnect the four-pin connector from the logic board (Figure 10, #1), the two-pin connector from the video board "C" (Figure 10, #2), and the two-pin connector from the interface connector (Figure 10, #3).
4. Replace the rear cover.

□ VIDEO BOARD "C"

Materials Required

Medium Phillips screwdriver

Remove

To remove the video board "C" and its cables:

1. Remove the rear cover.
2. Discharge the CRT.
3. Place the monitor on a grounded workbench pad and put on your grounding wriststrap. (Never do this step until after the CRT has been discharged.)

Note: The video board "C" is enclosed in a metal box. When replacing the video board "C," **keep the back cover of the metal box** and send the rest of the module, including the cables, back to Apple.

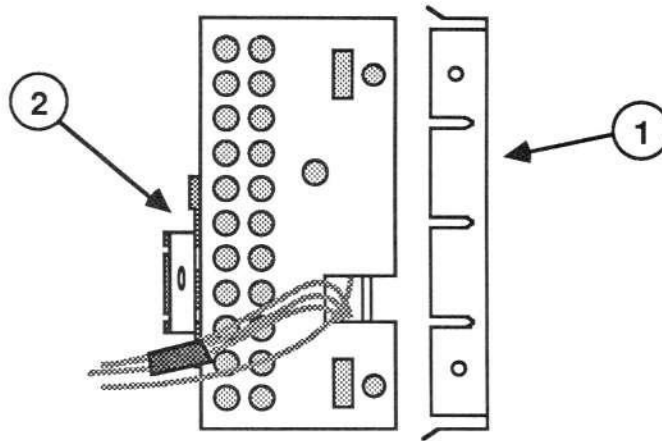


FIGURE 11

4. Pull off and set aside the back of the metal box that holds the video board "C" (Figure 11, #1).

5. Remove the cables from the plastic cable clamps. Disconnect the following connectors from the logic board:

- D2, coming from the right side of the video board "C" (Figure 12, #1).
- D7, coming from the left side of the video board "C" (Figure 12, #3).

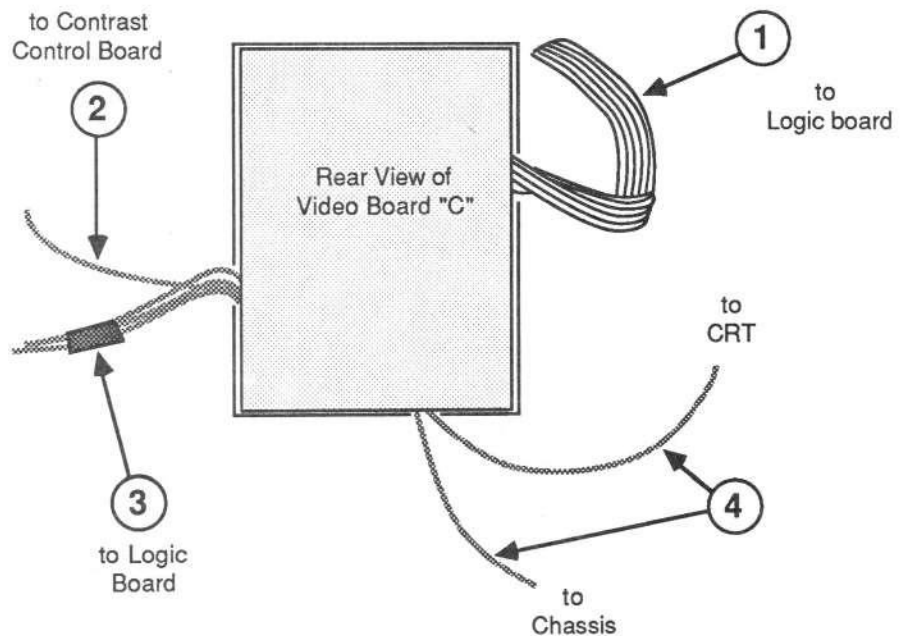


FIGURE 12

6. Disconnect the cable at location V-5 on the contrast control board (Figure 12, #2).
7. Disconnect the two black cables from the bottom of the video board "C" at their midpoint connectors (Figure 12, #4).
8. Loosen the clamp that holds the video board "C" to the CRT neck by loosening the screw partway (Figure 11, #2).
9. Pull the video board "C" off the CRT neck.

Replace

To replace the video board "C":

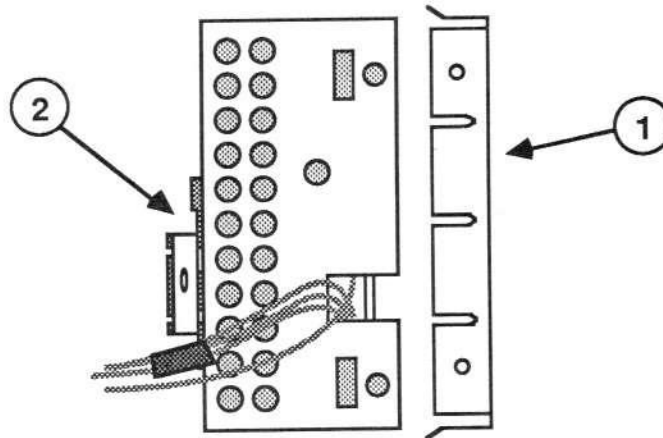


FIGURE 13

1. Replace the back cover (Figure 13, #1) on the video board "C."
2. Slide the video board "C" onto the CRT neck.
Tighten the screw (Figure 13, #2) on the ring clamp just enough to keep the assembly from slipping.

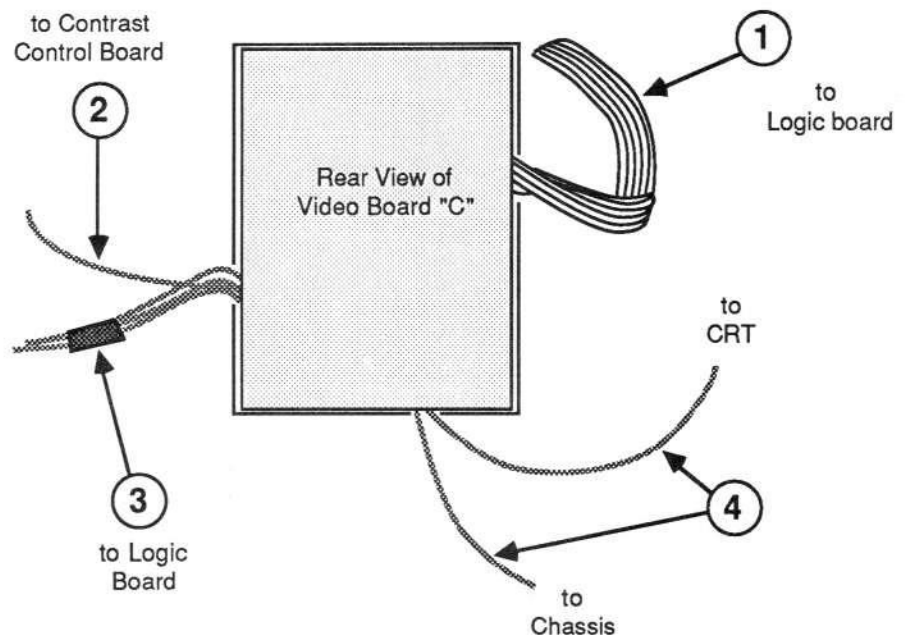


FIGURE 14

3. Reconnect the two black wires from the bottom of the video board "C" at their midpoint connectors (Figure 14, #4). The short wire goes to the chassis and the long wire goes to the CRT.
4. Reconnect the following connectors to the logic board:
 - D-2, from the left side of the logic board (Figure 14, #3).
 - D-7, from the right side of the logic board (Figure 14, #1).
5. Plug the two-pin connector (Figure 14, #2) into the contrast control board at location V-5.
6. Replace all loose cables in the plastic cable clamps.
7. Replace the rear cover.

□ CHASSIS ASSEMBLY

Materials Required

Long-handled medium Phillips screwdriver

Remove

To remove the chassis assembly:

1. Remove the rear cover.
2. Discharge the CRT. Disconnect the anode cap.
3. Place the monitor on a grounded workbench pad and put on your grounding wriststrap. (Never do this step until after the CRT has been discharged.)
4. Remove the video board "C."

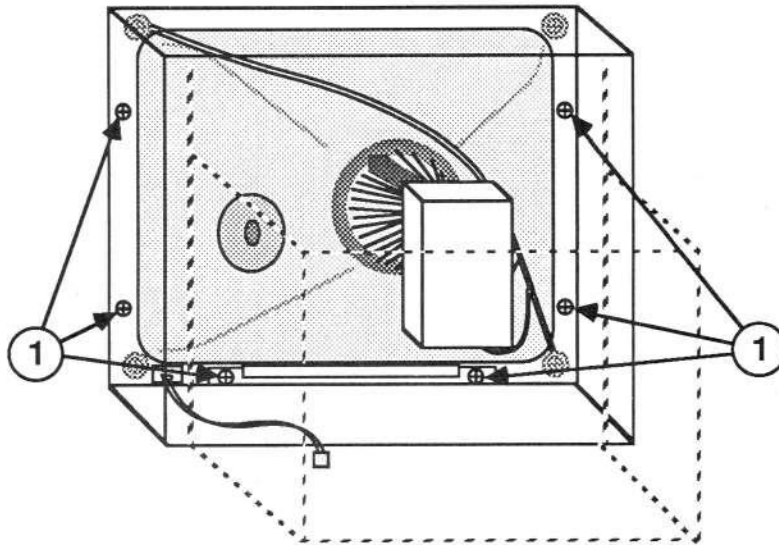


FIGURE 15

5. Remove the two-pin connector at location D-9 on the logic board.
6. Remove the six screws holding the chassis in place (Figure 15, #1).
7. Pull the chassis off the bezel.

Replace

To replace the chassis:

1. If you have removed the power supply and the logic board, replace them on the metal chassis frame.
2. Slide the chassis into the front bezel. Make sure the front of the chassis slides all the way inside the bezel at top, sides, and bottom.
3. Replace the six chassis screws (Figure 15, #1).

Note: The two screws on the bottom of the chassis have small alignment holes next to them. Make sure the corresponding plastic bumps on the bezel are aligned with these holes before you tighten the screws.

4. Replace the video board "C."
5. Replace the anode cap.
6. Replace the rear cover.

□ CATHODE RAY TUBE (CRT)

Materials Required

Long-handled medium Phillips screwdriver

Remove

To remove the CRT:

1. Remove the rear cover.
2. Discharge the CRT. Disconnect the anode cap.
3. Place the monitor on a grounded workbench pad and put on your grounding wriststrap. (Never do this step until after the CRT has been discharged.)
4. Remove the video board "C."
5. Remove the connector at location D-9 on the logic board.
6. Remove the chassis assembly.

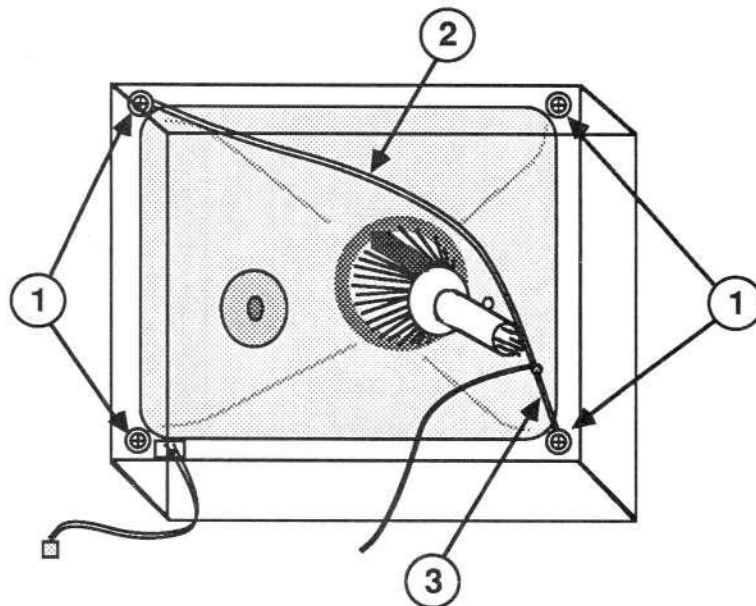


FIGURE 16

7. Remove the four mounting screws from the corners of the CRT (Figure 16, #1).
8. Carefully grasp the sides of the CRT (not the neck), and lift the CRT out of the bezel.
9. Remove the grounding strap (Figure 16, #2) and the spring (Figure 16, #3). Save them to use on your replacement CRT.

WARNING: *If you intend to dispose of the CRT, refer to "Disposing of the Cathode Ray Tube" in Section 1, Basics.*

Replace

To replace the CRT:

1. Place the bezel face down on a clean, soft surface.
2. Loop the grounding strap (Figure 16, #2) over the top left screw bracket, and attach the spring (Figure 16, #3) to the bottom right screw bracket on the CRT.
3. Carefully set the CRT inside the bezel.
4. Replace the four mounting screws in the corners (Figure 16, #1). The washers go on the corners that have the attached grounding strap and spring.
5. Replace the chassis assembly.
6. Replace the connector at location D-9 on the logic board. Replace the cable in the plastic cable clamps.
7. Replace the video board "C."
8. Replace the anode cap.
9. Replace the rear cover.

□ LED CABLE ASSEMBLY

Materials Required

Long-handled medium Phillips screwdriver (magnetic)
Needlenose pliers

Remove

To remove the LED cable assembly:

1. Remove the rear cover.
2. Discharge the CRT.
3. Place the monitor on a grounded workbench pad and put on your grounding wriststrap. (Never do this step until after the CRT has been discharged.)
4. Disconnect the connector at location D-9 on the logic board. Remove the cable from the cable clamps.
5. Place the monitor face down on the grounded workbench pad.

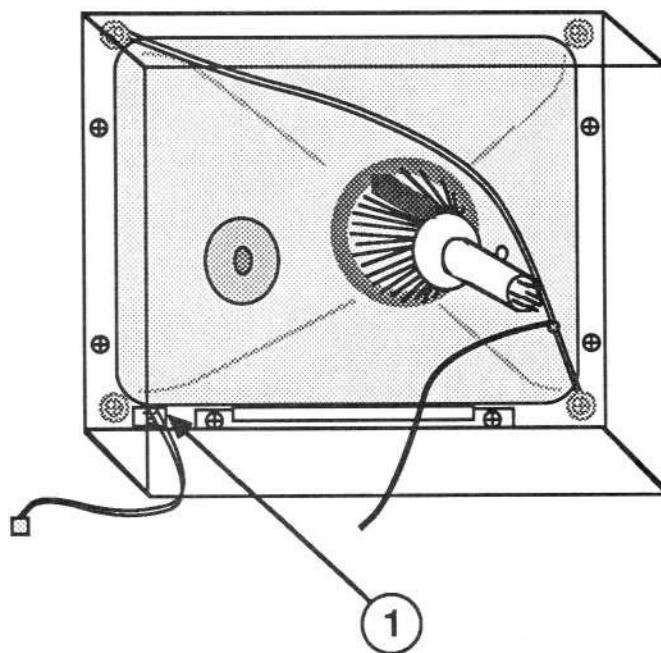


FIGURE 17

6. Remove the screw that holds the LED board in the lower left corner of the bezel (Figure 17, #1).
7. Lift the LED assembly free.

Replace

To replace the LED cable assembly:

1. Place the monitor face down. Holding the LED cable, lower the LED board through the corner space between the metal chassis and the CRT.
2. Replace the screw that holds the LED board in place on its plastic mounting. Be sure to line up the plastic alignment bump with the corresponding hole in the LED board.
3. Replace the connector at location D-9 on the logic board. Replace the cable in the plastic cable clamps.
4. Replace the rear cover.

□ POWER SWITCH

Materials Required

Medium Phillips screwdriver
Soldering tools

Remove

To remove the power switch:

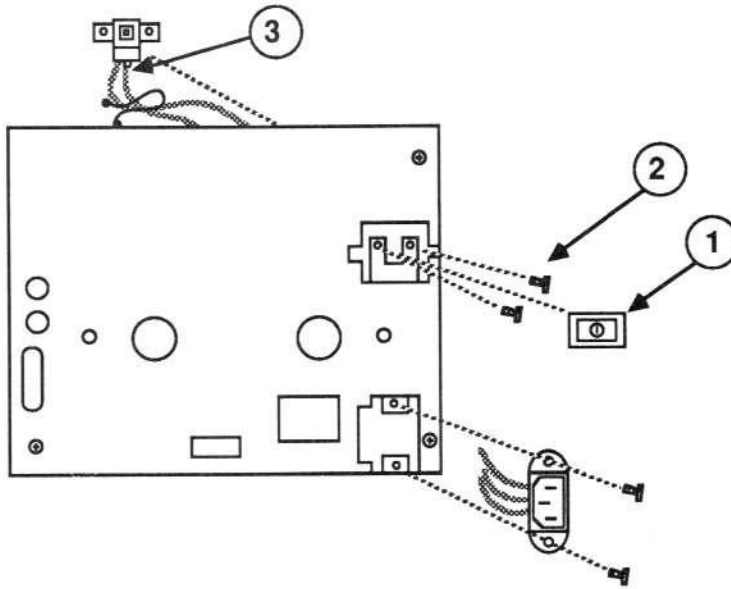


FIGURE 18

1. Pull the plastic knob off the power switch stem (Figure 18, #1).
2. Remove from the metal bracket the two screws that hold the switch (Figure 18, #2) .
3. Remove the two wires (Figure 18, #3) from the plastic cable clamp and desolder the wires from the switch.

Replace

To replace the power switch:

1. Solder the two wires to the switch (Figure 18, #3).
2. Replace the plastic cable clamp. Replace the switch in its metal bracket, lining up the screw holes.
3. Replace the two screws (Figure 18, #2).
4. Push the button on the switch stem (Figure 18, #1).

□ A/C INLET

Materials Required

Medium Phillips screwdriver
Soldering tools

Remove

To remove the A/C inlet:

1. Remove the two screws holding the inlet in place.
(Figure 19, #1).

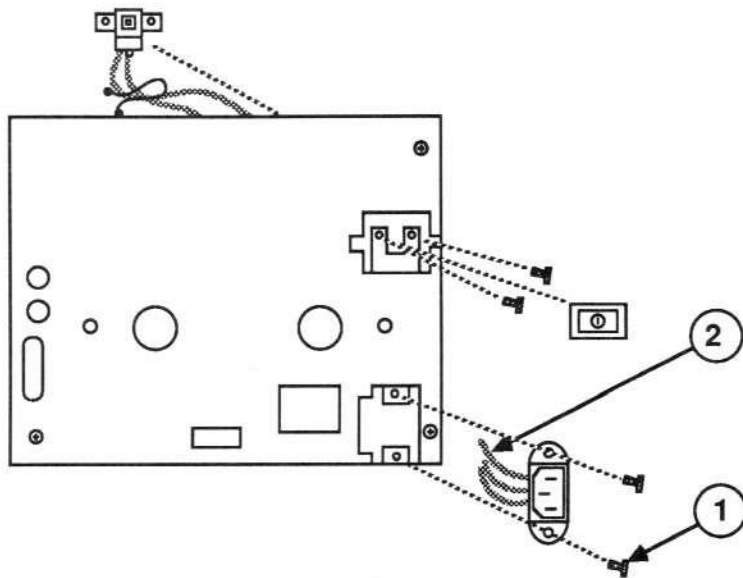


FIGURE 19

2. Remove the wires and the ferrite bead from the plastic cable clamps.
3. Desolder the three wires from the inlet (Figure 19, #2). Note where the wires go on the inlet so that you can remember where to resolder them later. Save the capacitors to reuse.

Replace

To replace the A/C inlet:

1. Make the wires to the inlet (Figure 19, #2) and the capacitors mechanically secure by twisting the wires together, then solder them.
2. Replace the wires and ferrite bead in the plastic cable clamps.
3. Line up the screw holes on the inlet with the bracket, and replace the two screws (Figure 19, #1).

High-Res Monochrome Monitor

Section 3 – Adjustments

□ CONTENTS

3.2	Introduction
3.3	Safety Instructions
3.4	Setup
3.4	Materials Required
3.4	Running the Test
3.5	Procedure
3.5	Introduction
3.6	Subbrightness (Cutoff)
3.6	Horizontal Size (Width)
3.7	Vertical Size (Height)
3.7	Focus

❑ INTRODUCTION

After you replace any module in the system you are working on, you should check the text and graphics production of the CRT. Use any text and graphics software program for the evaluation.

Do Not Adjust the Yoke

All yoke adjustments have been set by the manufacturer. Do not attempt to make any tilt, ring, or geometric adjustments on the High-Res Monochrome Monitor. If the customer's monitor has adjustment problems that the following procedures do not correct, isolate the faulty module (see Troubleshooting) and return it to Apple for repair.

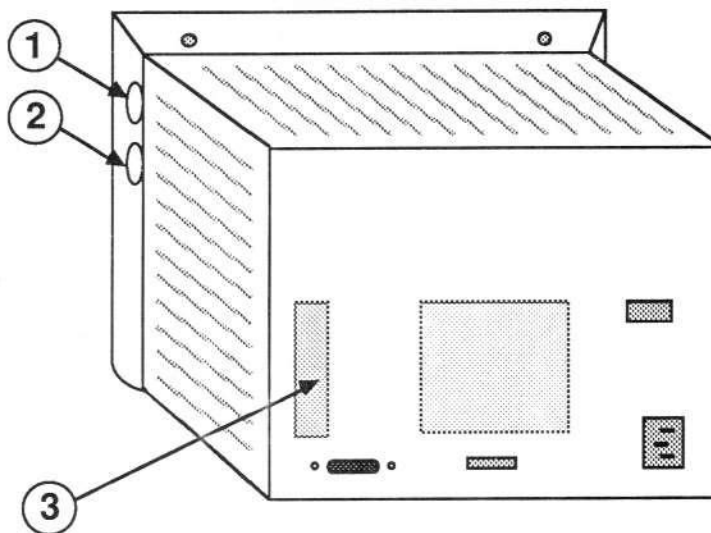


FIGURE 1

Location of Controls

The brightness control (Figure 1, #1) and the contrast control (Figure 1, #2) are located on the side of the monitor for access by the customer. All other adjustment controls are located under a rear panel for dealer access.

- Focus (Figure 2, #1)
- Subbrightness or cutoff (Figure 2, #2)
- Vertical size or height (Figure 2, #3)
- Horizontal size or width (Figure 2, #6)

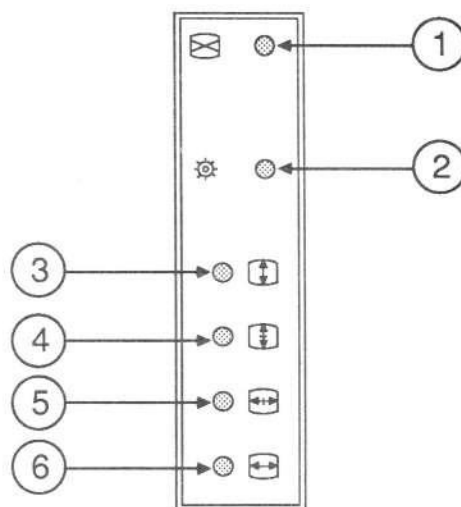


FIGURE 2

The horizontal hold (Figure 2, #4) and vertical hold (Figure 2, #5) adjustments are set at the factory and normally do not need adjusting. Only adjust these controls when symptoms described in the Diagnostics section warrant it.

□ SAFETY INSTRUCTIONS

1. Use only a three-pronged, grounded electrical outlet installed by a qualified electrician, and **do not under any circumstances use an adapter plug.**
2. Do not attempt to make any adjustments on the monitor other than those explained in this section, and do those with extreme caution.
3. Read and follow the "Safety Precautions" in the Basics section.

□ SETUP

Introduction

The monitor test section of the diagnostics contains test patterns to help you adjust the monitor. It **does not** test if the monitor is functioning correctly, nor will it diagnose monitor problems. To diagnose monitor problems, read the Troubleshooting section.

Materials Required

Plastic flatblade screwdriver (tweaker)
MacTest™II diagnostics diskette

Running the Monitor Test

The monitor test is part of the diagnostic. To run the monitor test:

1. Insert the *MacTest II* disk in the right-side drive on the Macintosh II, and turn on the power.
2. When the desktop appears on the screen, go to the Apple menu and open the Control Panel.
3. Click on the monitor icon to select the monitor test.
4. In the box called **Characteristics of Monitor**, click on **Black & White/Gray**.

Note: If you select the color test for a black-and-white monitor, the gray bars will be incorrect and the test results invalid.

5. In the box called **Colors**, choose **16 or the highest number available**.
6. Close the Control Panel window. When the desktop reappears, click on the *MacTest II* icon to start the test.
7. The Video RAM Test runs automatically as soon as you start the diagnostic. You will see lines and bars flash across the screen until the crosshatch pattern appears. The crosshatch pattern is the first of the monitor test patterns.

Note: If the Video RAM Test fails, replace the video interface board and run the diagnostic again to get to the monitor section of the test.

□ PROCEDURE

Introduction

For all of the following adjustments, set the contrast knob (Figure 3, #2) on maximum and the brightness knob (Figure 3, #1) on the center click position.

To find the center click position on the brightness knob, turn the knob up as far as it will go, and then turn the knob down as far as it will go. The place in the middle where the knob hesitates is the center click.

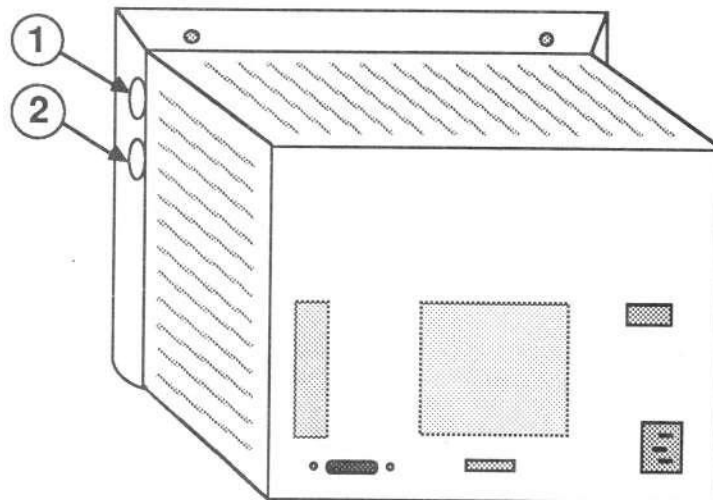


FIGURE 3

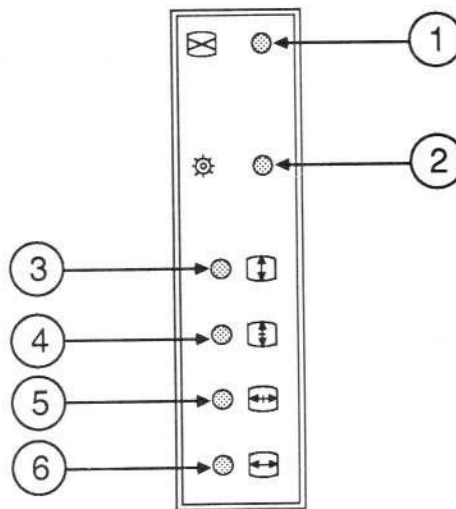


FIGURE 4

Subbrightness (Cutoff)

1. Select the **Gray Bar** pattern from the monitor tests on the *MacTest II* diagnostics.
2. Insert the plastic screwdriver in the subbrightness (cutoff) control (Figure 4, #2), and twist it until the second bar from the left is black at its center.

Horizontal Size (Width)

To make the horizontal adjustment:

1. Select the **Cross Hatch** pattern from the monitor tests on the *MacTest II* diskette.
2. Insert the plastic screwdriver in the horizontal size control (Figure 4, #6) and twist it until the raster is 213.5 mm wide.

IMPORTANT: *Always adjust the horizontal size before you adjust the vertical size. The horizontal adjustment can affect the height of the raster.*

Vertical Size (Height)

After you have adjusted the horizontal size, you can adjust the vertical size:

1. Select the **Cross Hatch** pattern from the monitor tests on the *MacTest II* diskette.
2. Insert the plastic screwdriver in the vertical size control (Figure 4, #3) and twist it until the raster is 160 mm high.

Focus

1. Select the **Cross Hatch** pattern from the monitor tests on the *MacTest II* diagnostics.
2. Insert the plastic screwdriver (tweaker) in the focus control (Figure 4, #1), and adjust the focus for the best clarity at the center of the screen.

High-Res Monochrome Monitor

Section 4 – Troubleshooting

□ CONTENTS

- 4.2 Introduction
- 4.2 Symptom Chart

□ INTRODUCTION

This section contains a symptom chart for the High-Res Monochrome Monitor showing common problems and their solutions. Find the best description of the symptom(s) your defective monitor is displaying; then try the recommended actions in the order listed.

If the first corrective action does not solve the problem, put back the original module or part before you try the next action.

□ SYMPTOM CHART

*No power
(LED does not light)*

1. Check the internal power connectors.
2. Check fuse; replace if blown. If it blows again, go to the next step.
3. Replace power supply.
4. Replace power switch.

No raster

1. Adjust the brightness and contrast knobs.
2. Adjust the sub-brightness (cut-off) control.
3. Make sure the logic board is connected to the power supply.
4. Check fuse; replace if blown. If it blows again, go to the next step.
5. Replace the power supply.
6. Replace the logic board.
7. Replace the power switch assembly.
8. Replace the video board "C."
9. Replace the contrast control board.
10. Replace the CRT.

*One horizontal
line appears
on screen*

1. Ensure that the yoke connectors are tight.
2. Replace the logic board.
3. Replace the CRT.

*One vertical
raster line
appears*

1. Ensure that the yoke connectors are tight.
2. Replace the logic board.
3. Replace the CRT.

*Raster not
rectangular*

1. Ensure that all connectors are plugged in correctly.
2. Replace the logic board.
3. Replace the power supply.
4. Replace the CRT assembly.

*Raster stretched or
compressed on
side of screen*

- Replace the logic board.

*Raster stretched or
compressed at top
of screen*

- Replace the logic board.

*Picture breaks in
diagonal lines*

1. Adjust horizontal hold.
2. Replace the logic board.
3. Replace the power supply.

*Raster size small,
picture abnormally
bright*

1. Ensure that the yoke connectors are tight.
2. Replace the logic board.
3. Replace the CRT.

*Picture rolls
vertically*

1. Adjust vertical hold.
2. Check the connector on the I/O connector board.
3. Replace the logic board.

*Raster not
centered*

1. Adjust the horizontal hold.
2. Replace the logic board.
3. Replace the CRT.

*Brightness cannot
be adjusted*

1. Replace the contrast control board.
2. Replace the logic board.
3. Replace video board "C."
4. Replace the CRT.

Picture jitters

1. Confirm that the grounding cables are attached to the chassis.
2. Confirm that the computer is grounded correctly.
3. Replace the power supply.
4. Replace the logic board.

Black spots on screen (burnt phosphor)

- Replace the CRT.

Image is too dark or too bright

1. Adjust the brightness knob.
2. Adjust the sub-brightness (cut-off) control.
3. Replace the logic board.
4. Replace video board "C."
5. Replace the CRT.

Focus cannot be adjusted

1. Replace the logic board.
2. Replace the video board.
3. Replace the CRT.

Flashing lines on screen

1. Confirm the contact of the video connector.
2. Replace the contrast control board.

Raster higher on one side than the other.

1. Replace the logic board.
2. Replace the CRT.

High-Res Monochrome Monitor

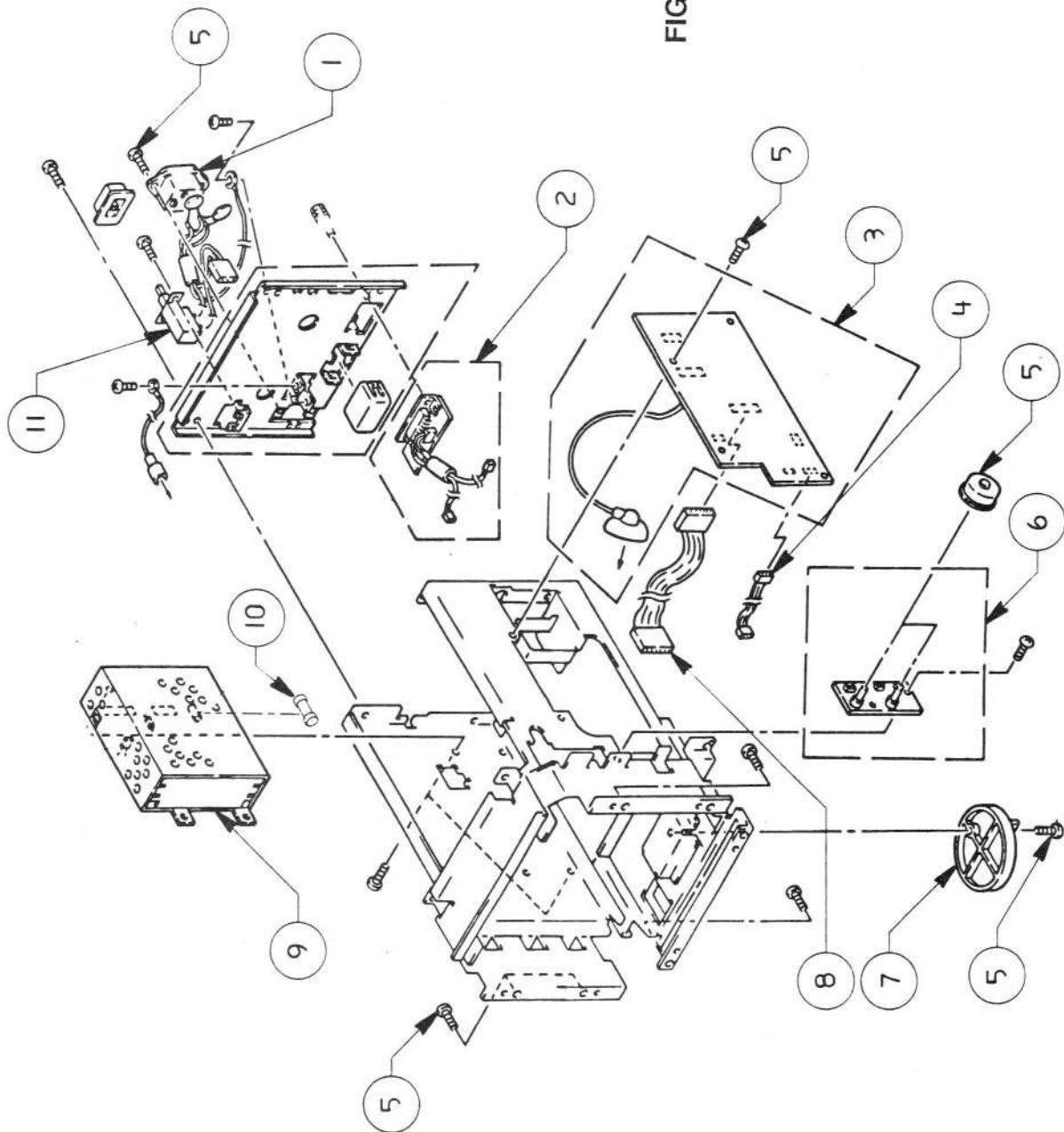
Illustrated Parts List

❏ CONTENTS

- IPL.3 Internal Assembly (Figure 1)
- IPL.5 CRT Case Assembly (Figure 2)

The figures and lists in this section include all piece parts that can be purchased separately from Apple for the Apple High-Res Monochrome Monitor, along with their part numbers. These are the only parts available from Apple. Refer to your *Apple Service Programs Manual* for prices.

FIGURE 1



□ INTERNAL ASSEMBLY (Figure 1)

<u>Item</u>	<u>Part No.</u>	<u>Description</u>
1	932-0003	AC Inlet
2	933-0014	I/O Connector Board
3	661-0396	Main Logic Board (D)
4	590-0442	Cable, Logic Board to Control Panel
5	956-0007	Screw/Knob Set
6	905-0004	Contrast Control Board
7	949-0118	Stand Attachment, Plastic Bottom
8	590-0441	Cable, Logic Board to Power Supply
9	661-0395	Power Supply
10	740-0305	Fuse, 250 v, 2 amp
11	937-0025	On/Off Switch

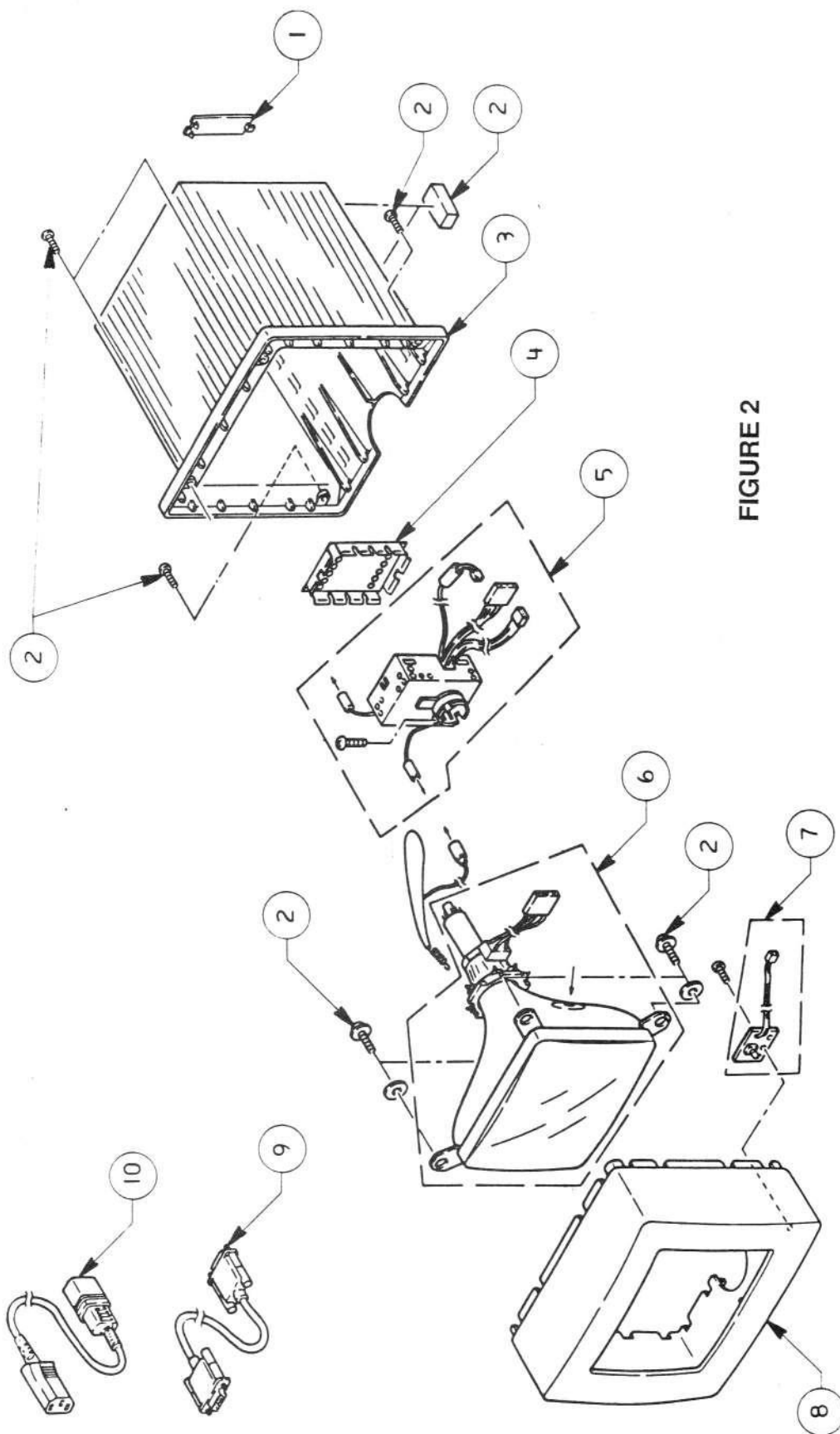


FIGURE 2

□ CRT CASE ASSEMBLY (Figure 2)

<u>Item</u>	<u>Part No.</u>	<u>Description</u>
1	949-0119	Adjustment Panel Cover
2	956-0007	Screw Knob Set
3	949-0117	Rear Cover, Plastic
4	948-0031	Video Board "C" Case Cover
5	981-0007	Video Board "C" with Cable
6	076-0246	CRT Assembly
7	590-0440	LED Cable Assembly
8	949-0116	Bezel, Plastic Case
9	590-0161	Cable, CPU to Monitor
10	590-0370	Cable, External Power