



# **AppleService Technical Procedures**

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## **AppleColor Monitor 100**





# APPLECOLOR MONITOR 100 TECHNICAL PROCEDURES

## TABLE OF CONTENTS

### Section 1 - Basics

Product Description.....	1.2
Safety Precautions.....	1.3
Disposing of the Cathode-Ray Tube (CRT).....	1.7

### Section 2 - Take-Apart

Removing the Rear Enclosure.....	2.3
Replacing the Rear Enclosure.....	2.3
Discharging the CRT.....	2.5
Removing and Replacing Procedures:	
Logic Board.....	2.7
Power Supply (P/S) Board.....	2.13
Power Transformer.....	2.14
Tilt Motor.....	2.17
Front Bezel.....	2.19
CRT/Yoke Assembly.....	2.21
Mask.....	2.25
Brightness/Contrast Control Knobs.....	2.27
Brightness/Contrast Control.....	2.27
Green Only Switch.....	2.29
Power Button/Switch...(LED).....	2.31
Tilt Motor Button/Switch.....	2.33
Replace the Power Supply Fuse (F601).....	2.35

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### **Section 3 - Adjustments**

Logic Board Adjustments.....	3.3
Introduction.....	3.3
Materials Needed.....	3.3
Setup Procedure.....	3.5
Evaluating the Video Test.....	3.7
Vertical Adjustments.....	3.9
Horizontal Adjustments.....	3.9
Focus Adjustment.....	3.9
Color Adjustments.....	3.11
Color Bar Check.....	3.11
White Balance.....	3.11

### **Section 4 - Troubleshooting Guide**

Introduction.....	4.2
Symptoms.....	4.2

### **Section 5 - Illustrated Parts List**

AppleColor Monitor 100 Illustrated Parts.....	5.3
Monitor Cables.....	5.5

# AppleColor Monitor 100 Technical Procedures

## Section 1

### Basics

#### Contents:

Product Description.....	1.2
Safety Precautions.....	1.3
Disposing of the Cathode-Ray Tube (CRT).....	1.7

## PRODUCT DESCRIPTION

The AppleColor Monitor 100 is an accessory product to be used with the Apple II family of computers and the Apple ///. Its design incorporates the following features:

1. 12-inch tilting screen.
2. High-quality, 80-column display.
3. Green Only switch for systems that output white text.
4. Nonglare, high-contrast screen surface.
5. Accurate reproduction of color graphics.

There are two versions of the AppleColor Monitor 100: Rev. 0 and Rev. A. There are very slight differences between the two versions. Technical procedures are the same for both, except as noted.

Frequently used controls are located behind a protective door at the right front of the monitor. Other controls are on the back. Internationally recognized symbols, shown in Figure 1, are used to identify the controls.

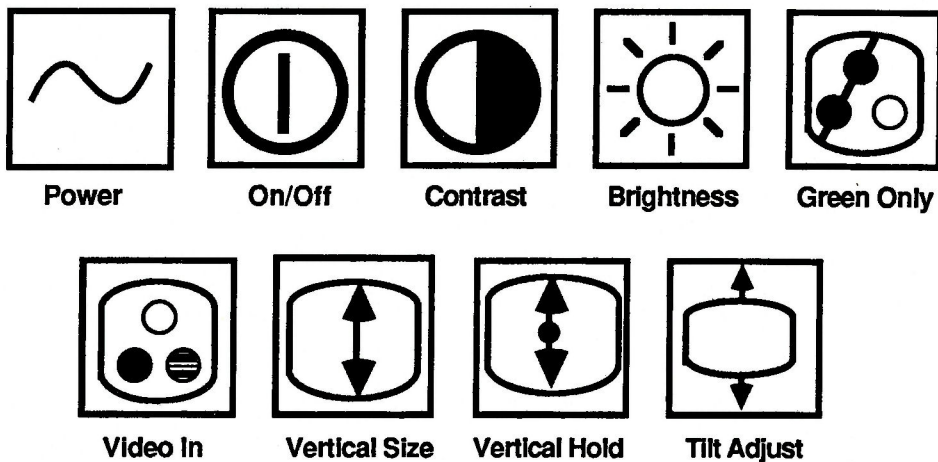


FIGURE 1

## **SAFETY PRECAUTIONS**

The Applecolor Monitor 100 is harmless as long as you're just watching the display. Removing the cover, however, exposes you 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 performing live adjustments on the monitor.

### **Safe Electrical Setup**

1. **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 area before working on **any** electrical equipment. If you have any doubts about your building's wiring, consult a qualified electrician.

2. **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.

3. **Use an isolation transformer between the monitor and the outlet when performing live adjustments.**

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, 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 a grounded three-prong cord and receptacle. Two such transformers, available from many electronics stores and distributors, are listed below:

Triad N-57MG

Stancor GIS 500

## **CRT Safety Rules**

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

In case of accident, it could save your life to have someone else nearby. Apple recommends that your staff be trained in Cardio-Pulmonary Resuscitation (CPR).

- 2. Remove rings, watches, 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.

- 3. 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.

- 4. 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.

- 5. 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.

- 6. 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.

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

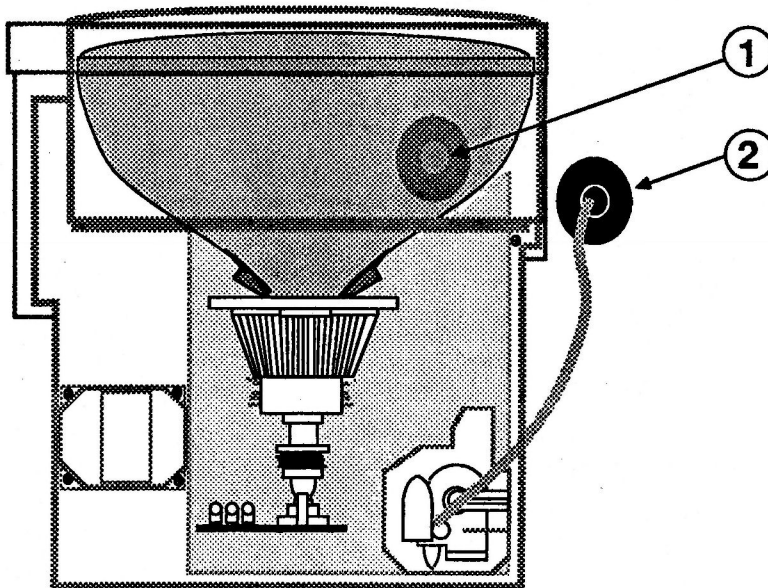
The anode of the CRT maintains a charge of about 24,000 volts DC (even when the power is off). Before touching any internal components you must discharge this voltage. The anode can regain some charge, even after it has been discharged. If the service procedure takes more than 30 minutes, the anode should be discharged again.

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

Normally the anode aperture (Figure 2, #1) has a connector plugged into it (Figure 3, #2). When a CRT is replaced, the anode connector is removed, exposing the anode. The anode can maintain a charge of several thousand volts (even after the power is off).

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

To prevent an implosion, you should take every precaution against breaking the tube. Be especially careful with the neck, the area where the tube is the thinnest.



**FIGURE 2**

## Live Adjustment Rules

In addition to the precautions listed on the previous pages, never touch the following components when adjusting a live AppleColor Monitor 100:

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

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

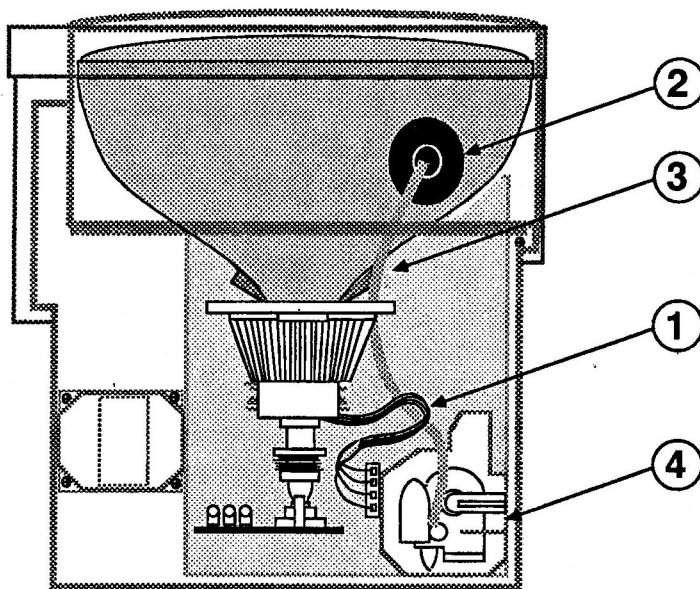


FIGURE 3



## DISPOSING OF THE CATHODE-RAY TUBE (CRT)

**WARNING:** 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 the 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.
3. Place the CRT inside the box with the tip of the neck protruding through the hole, and tape the box flaps down with duct tape (Figure 4).

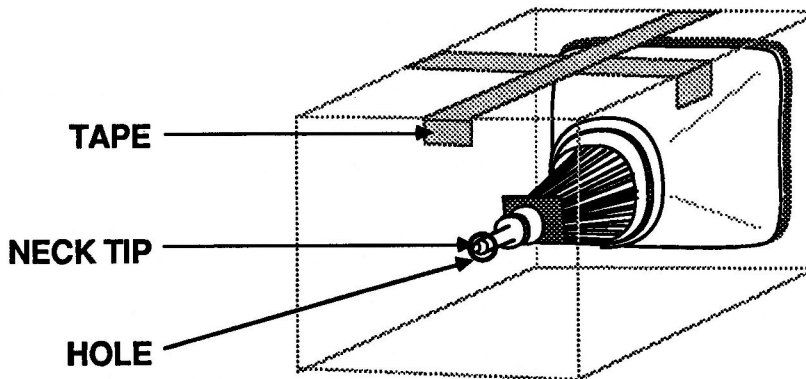


FIGURE 4

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## □ DISPOSING OF THE CATHODE-RAY TUBE (CRT)

When replacing a defective CRT assembly from a color monitor, devacuum the defective color CRT (see "Devacuinating the CRT" below) and send it to Apple for proper disposal. If the CRT is cracked, however, do not return it to Apple; instead, make sure the cracked CRT is completely devacuumed and dispose of it according to local hazardous-waste ordinances.

When returning a defective color CRT to Apple, use the original packaging. Refer to the "Product Notices" section of your *Service Programs* binder for special packaging requirements.

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**WARNING:** *To properly dispose of a defective monochrome CRT, you must first devacuum the CRT before throwing it in a trash receptacle. Discarded CRTs that have not been devacuumed may crack and implode. To prevent serious injury, follow the procedure described in this section whenever discarding a CRT.*

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### 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

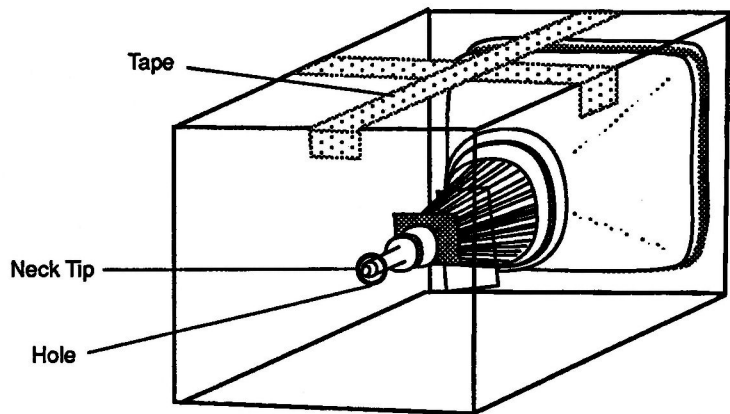
### Devacuinating the CRT

1. Put on the 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 tip of the CRT.
3. Place the CRT inside the box with the tip of the neck protruding through the hole, and tape the box flaps down with duct tape (Figure 4).

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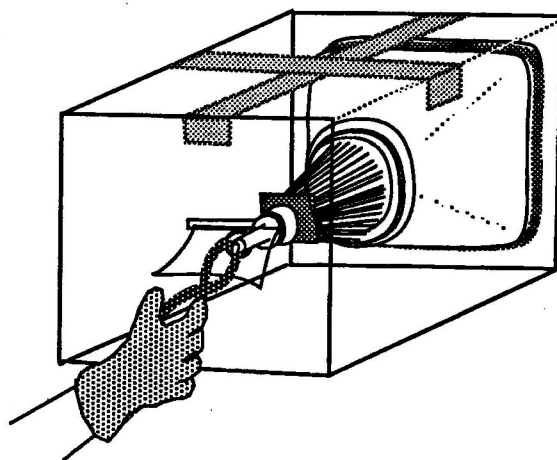
**WARNING:** *Only the tip of the CRT neck should protrude through the hole in the box. The box must not have any other openings.*

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**FIGURE 4**

4. Put on the gloves.
5. Pull off the black plastic guide at the end of the CRT neck. Using the diagonal cutters, carefully clip 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 the cloth or paper 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 the bits of glass that may fly during the following step.



**FIGURE 5**

7. Make sure no one is nearby. Place the pliers under the veil, stand to one side, and look away. Use the pliers to snip off the exposed tip of the CRT (see Figure 5).

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

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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 tip of the CRT is clearly broken.

# AppleColor Monitor 100 Technical Procedures

## Section 2

### Take-Apart

#### Contents:

Removing the Rear Enclosure.....	2.3
Replacing the Rear Enclosure.....	2.3
Discharging the CRT.....	2.5
Removing and Replacing Procedures:	
Logic Board.....	2.7
Power Supply (P/S) Board.....	2.13
Power Transformer.....	2.14
Tilt Motor.....	2.17
Front Bezel.....	2.19
CRT/Yoke Assembly.....	2.21
Mask.....	2.25
Brightness/Contrast Control Knobs.....	2.27
Brightness/Contrast Control.....	2.27
Green Only Switch.....	2.29
Power Button/Switch...(LED).....	2.31
Tilt Motor Button/Switch.....	2.33
Replacing the Power Supply Fuse (F601).....	2.35
Control Panel Door.....(See <b>Section 5, Illustrated Parts</b> )	
Tilt Loading Spring.....(See <b>Section 5, Illustrated Parts</b> )	

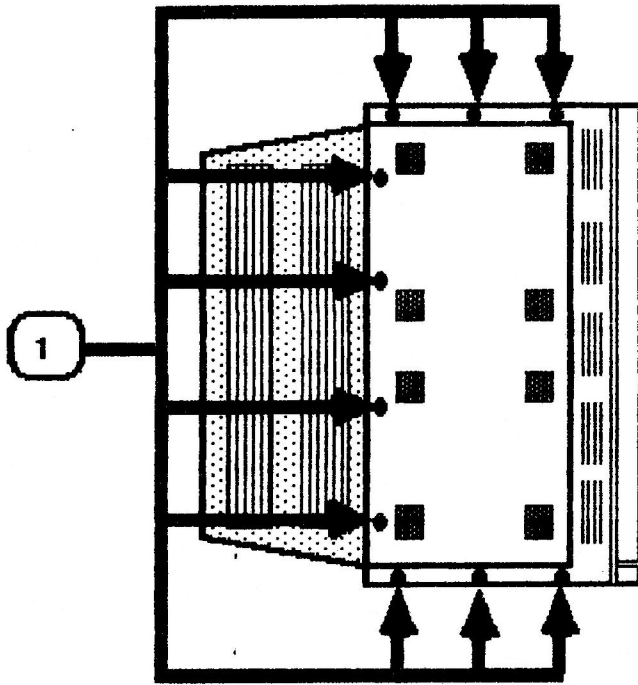


FIGURE 1

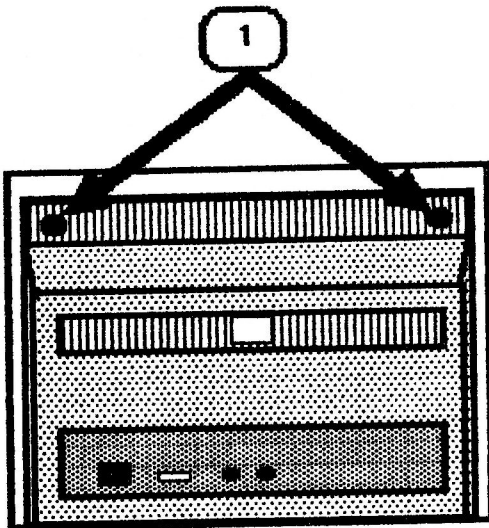


FIGURE 2

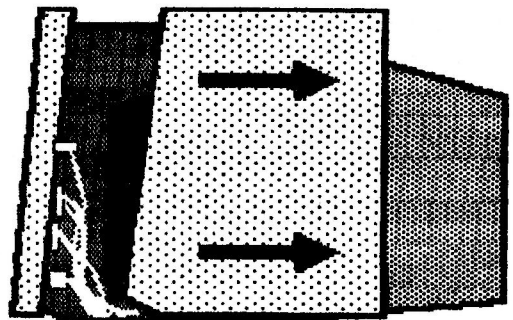


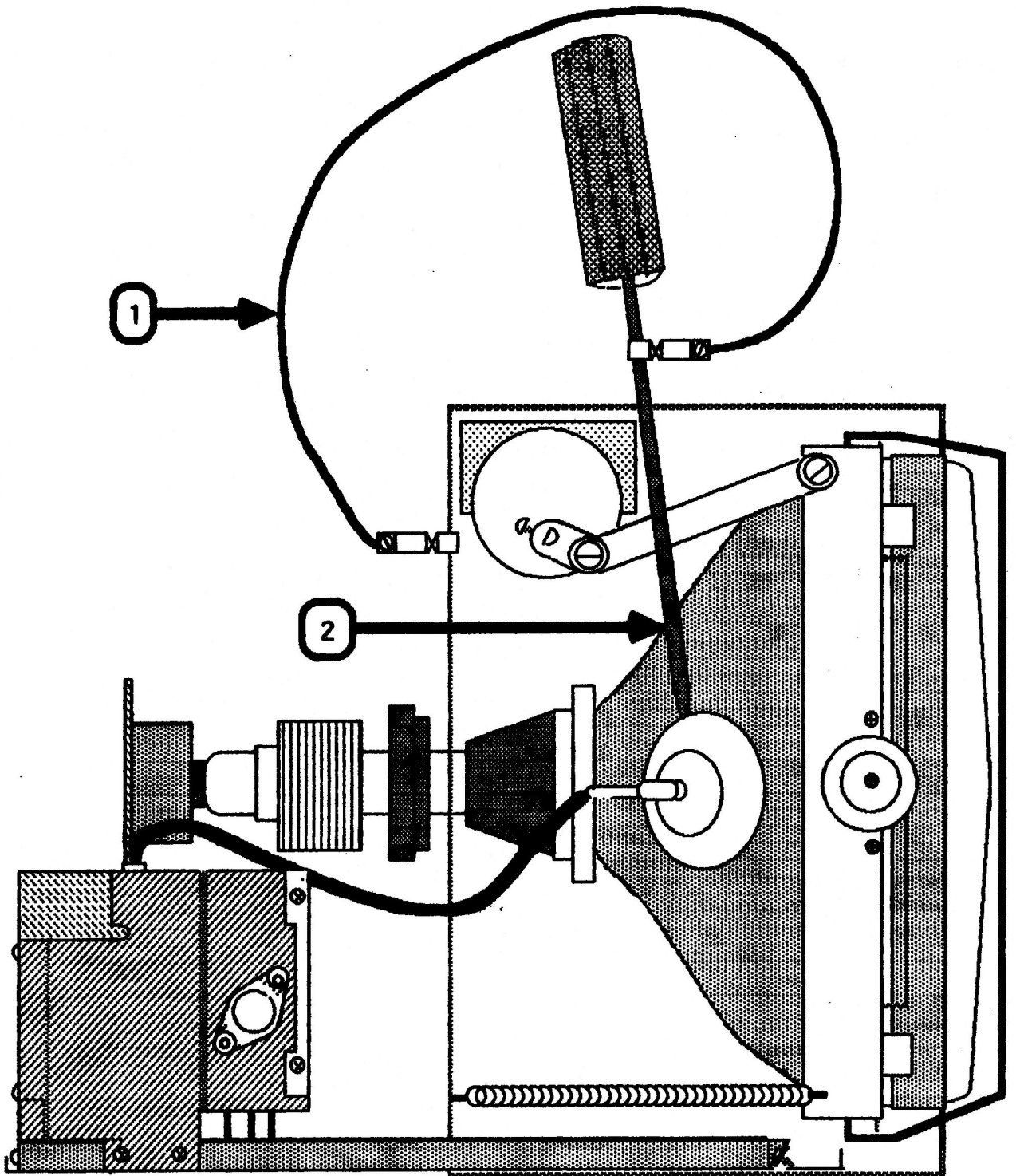
FIGURE 3

## **REMOVING THE REAR ENCLOSURE**

1. Turn the monitor on and use the tilt switch to rotate the screen until it is facing as far down as possible. This will position the CRT neck away from the logic board for easy access to the logic board.
2. Turn the monitor off. Disconnect the AC power cord and the video cable from the back of the monitor.
3. Place the monitor on its right side and turn it so that the bottom is facing you.
4. Remove the ten screws shown in Figure 1, #1.
5. Carefully set the monitor back on its feet with the back facing you, as shown in Figure 2.
6. Remove the two screws shown in Figure 2, #1.
7. Slide the case straight back and away from the monitor (Figure 3). Set it aside.

## **REPLACING THE REAR ENCLOSURE**

1. Turn the monitor so that the back is facing you.
2. Carefully slide the case forward onto the monitor chassis.
3. Tighten the two screws shown in Figure 2, #1.
4. Carefully set the monitor on its side with the bottom facing you and replace the ten screws shown in Figure 1, #1.
5. Set the monitor upright.



**FIGURE 4**



## DISCHARGING THE CRT

1. Turn off the monitor.
2. Disconnect the AC power cord.
3. Remove the rear enclosure.
4. Position the monitor so that the back is facing you.
5. Remove any rings, wristwatches, bracelets, or grounding wriststraps.
6. Put on safety goggles.
7. Attach one end of an alligator lead to a long flatblade screwdriver, two inches from the insulated handle. Attach the other end to any part of the metal chassis surrounding the CRT. (Figure 4, #1).

**WARNING: USE ONLY ONE HAND WHILE DISCHARGING THE CRT.** This is to eliminate any chance of your becoming a path for current should your hand slip and touch the metal part of the screwdriver. Grasp only the insulated handle of the screwdriver while discharging the CRT.

8. Slide the screwdriver under the CRT anode cap (Figure 4, #2) and push it towards the center of the cap until the blade comes into contact with the metal anode ring.

**CAUTION: DO NOT USE FORCE.** If it is difficult to get the screwdriver under the anode cap, use a smaller screwdriver to loosen the suction of the anode cap on the tube. Then proceed to discharge the anode with the larger screwdriver.

9. Remove the screwdriver.
10. Remove the alligator clips.
11. 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 on the cap in one direction and lift the cap off the tube.

**NOTE:** A secondary charge can build up even after you have discharged the CRT. To ensure that any residual charge is dissipated during the service procedure, establish a ground lead by fastening one alligator clip to the metal chassis and the other clip to the edge of the anode aperture.

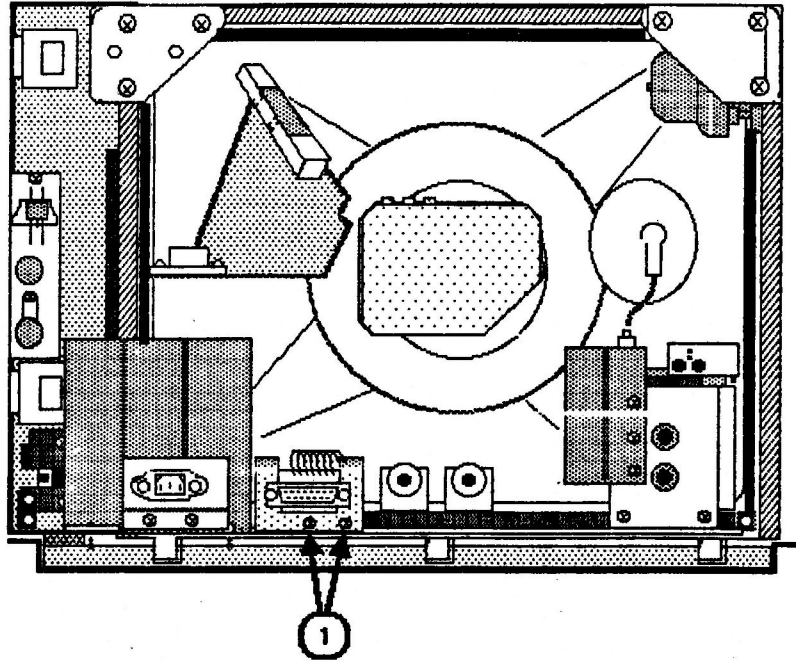


FIGURE 5

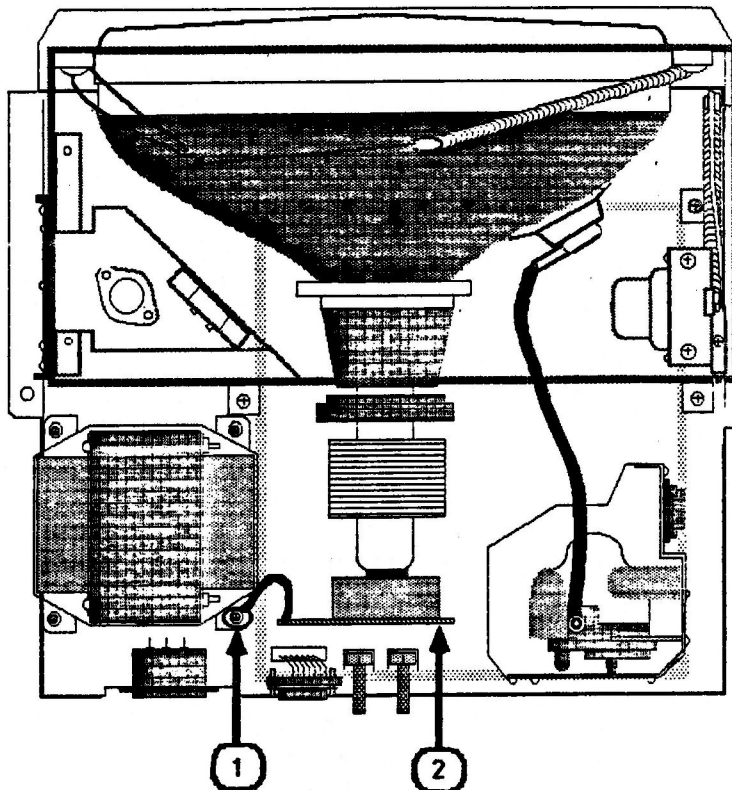


FIGURE 6

## REMOVING AND REPLACING ... PROCEDURES:

### Removing the Logic Board

**NOTE:** The CRT socket board, flyback transformer, and main logic board are all considered parts of one module since they cannot be separated from each other without desoldering components.

1. Disconnect the AC power cord.
2. Remove the rear enclosure.
3. Discharge the CRT. (See "Discharging the CRT" in this section.)
4. Remove the two Phillips screws (Figure 5, #1) which secure the metal bracket of the DB-15 connector to the chassis.
5. **DISCONNECT THE OTHER END OF THE DB-15 CABLE FROM THE LOGIC BOARD. DO NOT RETURN THIS CABLE AND ITS METAL BRACKET WITH THE DEFECTIVE LOGIC BOARD.** Keep the cable and bracket to install on the replacement logic board module. (You can order a new DB-15 cable, but you cannot order a bracket.)
6. Disconnect the ground strap by removing the power transformer screw shown in Figure 6, #1.
7. Carefully pull the CRT socket board (Figure 6, #2) away from the CRT neck until it barely clears the neck base. Hold the board so that it does not fall free, and tilt it so that the component side is facing up.

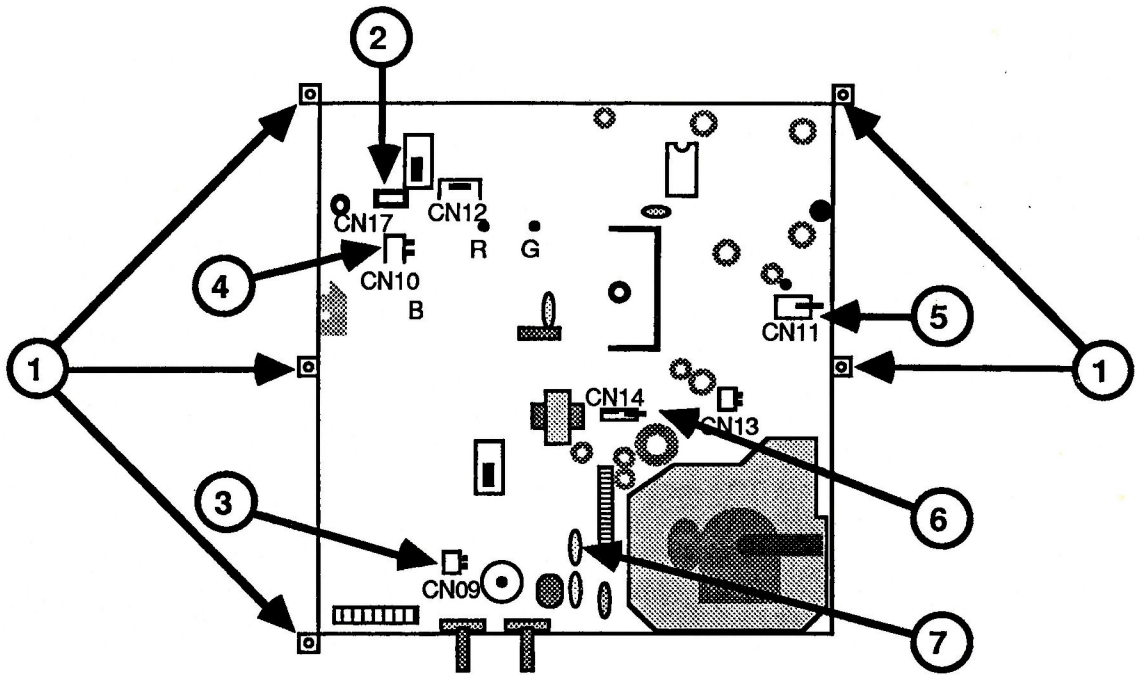


FIGURE 8

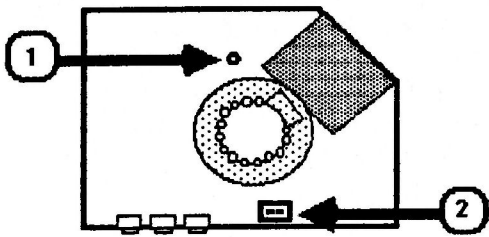


FIGURE 7

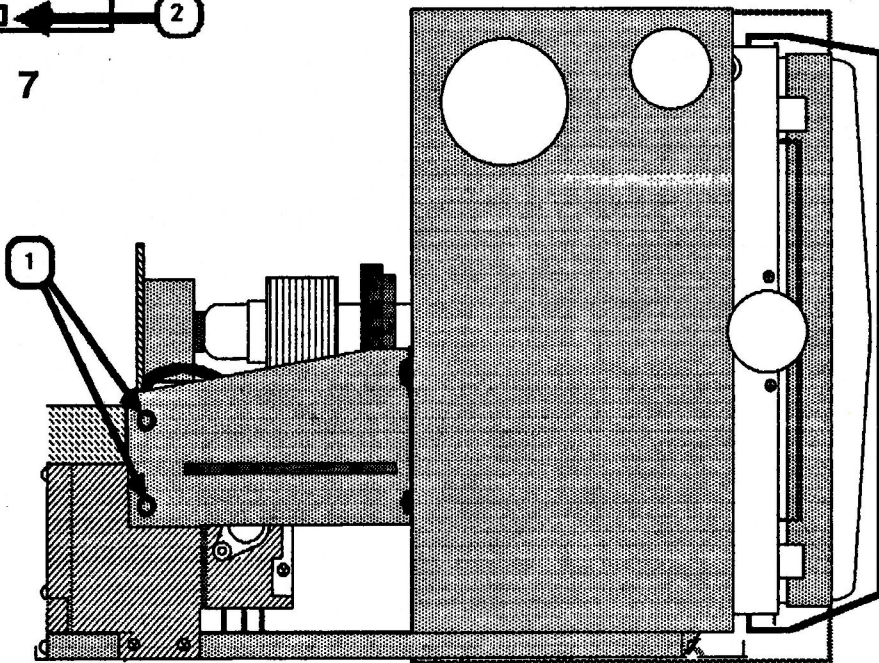


FIGURE 8A

## Replacing the Logic Board

**NOTE:** If AND ONLY IF you are replacing the logic board of a Rev. 0 monitor with an adapted Rev. A board (identified in the packaging as a substitute assembly) follow the two steps below before continuing with the usual replacement procedure:

- \* Remove the two small nuts that hold the sheet metal piece to the old DB15 connector assembly (from the defective logic board). Bolt the new DB15 connector (included in the substitute service module) to the sheet metal piece.
  - \* Remove and discard the old contrast control assembly by removing the two mounting screws (Figure 9, #2).
- 

1. Slide the logic board halfway back into the chassis.
2. Connect to the logic board the connectors listed in step 11 of "Removing the Logic Board". **CAUTION: Be sure all the connector wires are placed under the CRT neck!**
3. Replace the CRT socket board. It fits only one way.
4. Position the ground strap over the power transformer screw hole and tighten the screw. (See Figure 6, #1.)
5. Replace the five Phillips mounting screws to secure the logic board to the chassis. For Rev. A monitors, also replace the two Phillips screws which secure the flyback transformer unit bracket to the chassis.
6. Connect the CRT socket board connectors listed in step 8 of "Removing the Logic Board". **CAUTION: Be sure the anode lead is not touching any other components or wires. This is to protect other components should the anode lead insulation wear off.**
7. Replace the anode cap. Replace the rear enclosure.<sup>†</sup>

<sup>†</sup> **NOTE:** If you removed the old DB15 connector and contrast control from a Rev. 0 monitor (note above), you must follow the replacement procedures below before closing the monitor:

- \* Replace the two screws that attach the DB15 connector's sheet metal piece to the logic board sheet metal frame (Figure 9, #1). Connect CN08 to the logic board.
- \* Attach the new contrast control assembly: connect CN09, CN11, and CN17 (Figure 9A) to the logic board and screw the new contrast control assembly in place (Figure 9, #2).

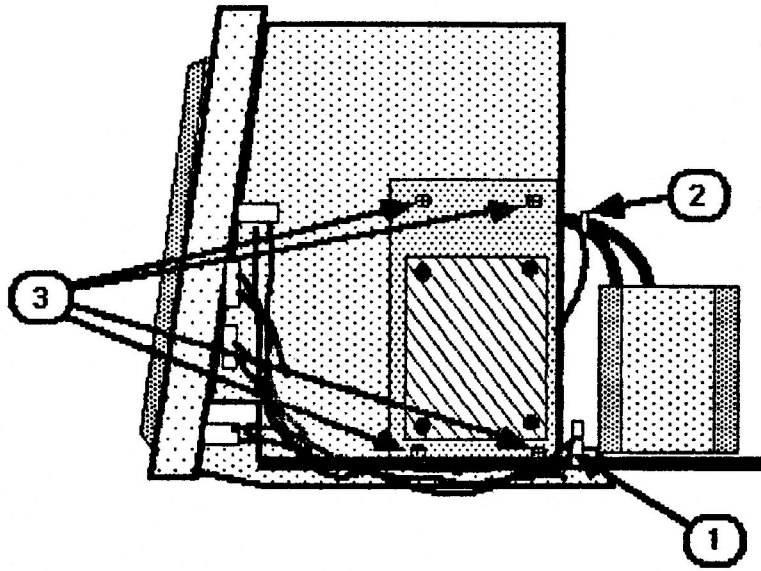


FIGURE 10

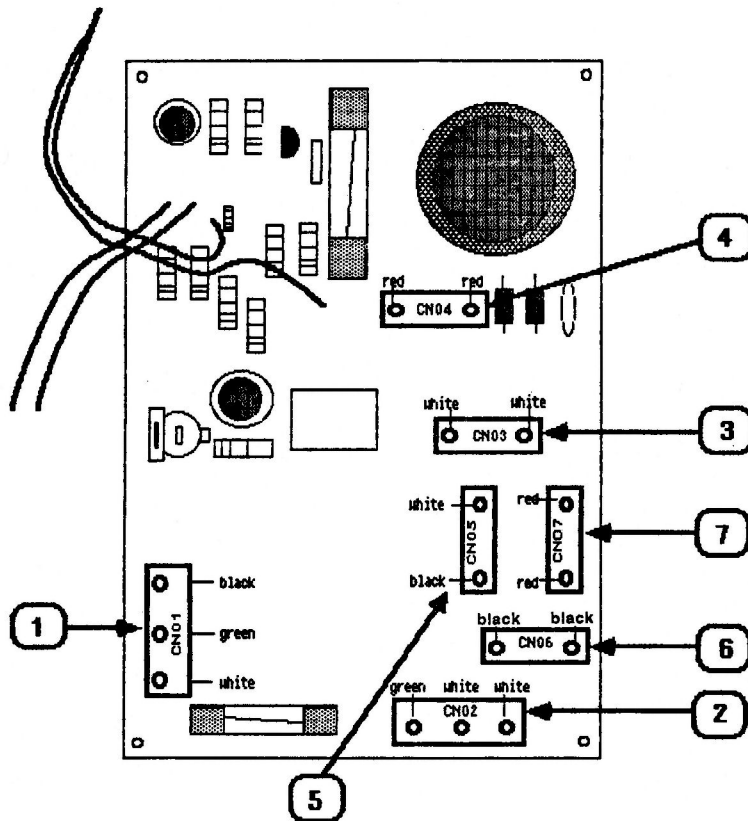


FIGURE 11

## Removing the Power Supply (P/S) Board

1. Disconnect the AC power cord.
2. Remove the rear enclosure.
3. Follow steps 4 through 8 of "Discharging the CRT."
4. Disconnect CN14 from the logic board. (Figure 8, #6.)
5. Release the wires from the plastic cable clamp. (Figure 10, #1.)
6. Use a pair of diagonal cutters to cut the cable tie (Figure 10, #2) that holds the power supply wires together.
7. Remove the four Phillips screws from the P/S mounting plate (Figure 10, #3).
8. Tilt the plate slightly forward so that you can see where the connectors are on the component side (inside) of the P/S board (Figure 11).

**NOTE:** The connectors are labeled on the solder side of the P/S board.

9. Disconnect the following connectors from the P/S board:

**CAUTION:** Do not pull on the wires attached to the connectors when removing them. If any connectors are too hard to remove by hand, pry at the bottom of the connectors with a small screwdriver to loosen them before removing them. **BUT BE CAREFUL: JIGGLING THE CONNECTORS TOO HARD WHEN REMOVING THEM MAY BREAK THE TRACES NEAR THE CONNECTOR POLES ON THE SOLDER SIDE OF THE BOARD.**

- a) CN01 (black, green, and white) -- Figure 11, #1)
- b) CN02 (green, white, and white) -- Figure 11, #2)
- c) CN03 (white and white) -- Figure 11, #3)
- d) CN04 (red and red) -- Figure 11, #4)
- e) CN07 (red and red) -- Figure 11, #7)
- f) CN05 (white and black) -- Figure 11, #5)
- g) CN06 (black and black) -- Figure 11, #6)

10. Carefully remove the P/S board mounting plate.



## Replacing the Power Supply (P/S) Board

**NOTE:** If you are installing a new power supply board, loosen the screw that mounts the white, rectangular heat sink resistor to the inside of the metal plate (see Diagram A, below). Position the resistor as shown in Diagram B, below and tighten the screw. The power supply board is now ready to be installed.

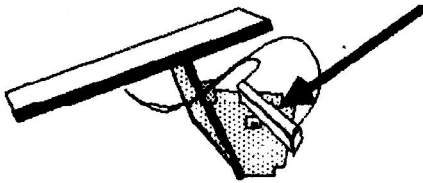


DIAGRAM A

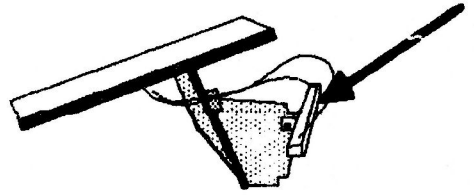


DIAGRAM B

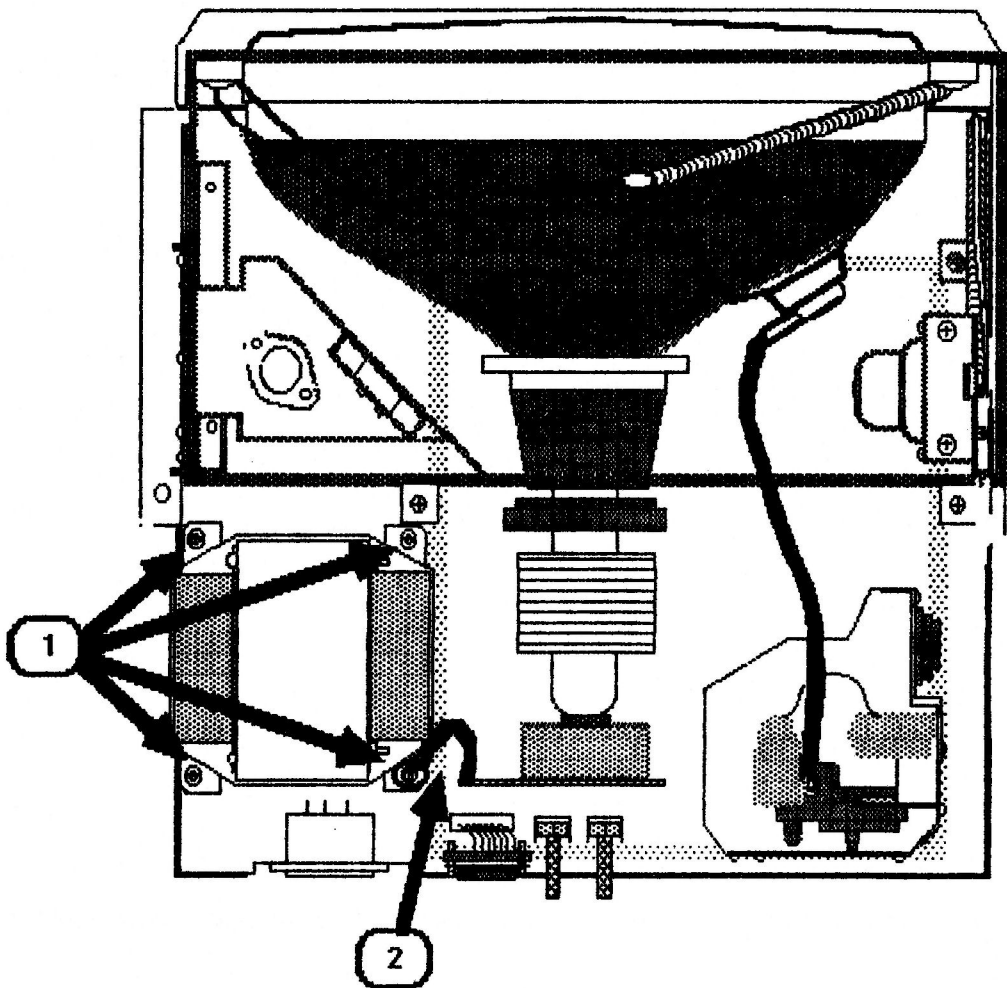


FIGURE 12



### **Replacing the Power Supply (P/S) Board (cont.)**

1. Connect CN01 through CN07. **MAKE SURE THAT WIRE COLORS MATCH THE COLORS LISTED NEXT TO THE CONNECTORS AS SHOWN IN FIGURE 11** (see Figure 11, #1 - #7).
2. Connect CN14 to the logic board.
3. Replace the four P/S board mounting plate screws.
4. Set the wires back in the cable clamp from which they were removed (Figure 10, #1).
5. Replace the rear enclosure.

### **Removing the Power Transformer**

1. Disconnect the AC power cord.
2. Remove the rear enclosure.
3. Follow steps 4 through 8 of "**Discharging the CRT.**"
4. Remove the four power transformer mounting screws shown in Figure 12, #1.
5. Move the power transformer over so that you can easily reach the component side of the P/S board.
6. Disconnect CN04 and CN05 (Figure 11) from the component side of the power supply board.
7. Remove the power transformer.

### **Replacing the Power Transformer**

1. Connect the CN04 and CN05 to the power supply board.
2. Place the transformer over its mounting holes with the wires closest to the P/S board. (Figure 12, #1.)
3. Position the ground strap over the proper screw hole (Figure 12, #2) and secure the ground strap by tightening the screw over the strap.
4. Replace the other three screws to secure the power transformer to the monitor chassis.
5. Replace the rear enclosure.

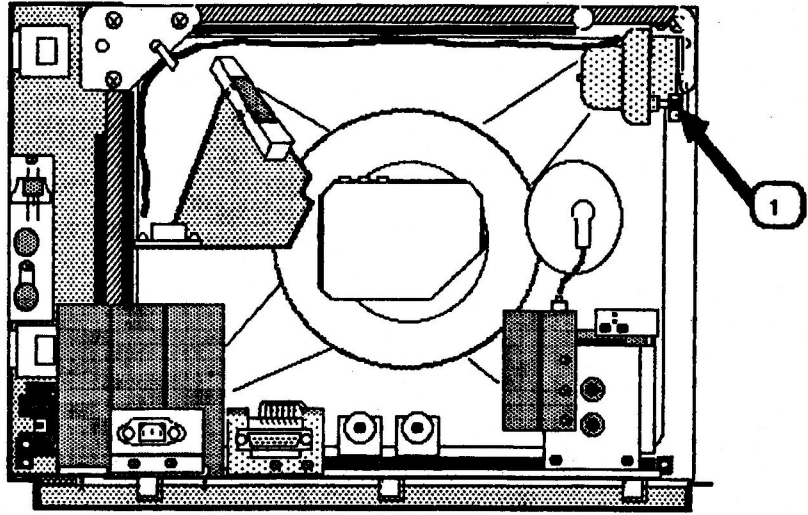


FIGURE 13

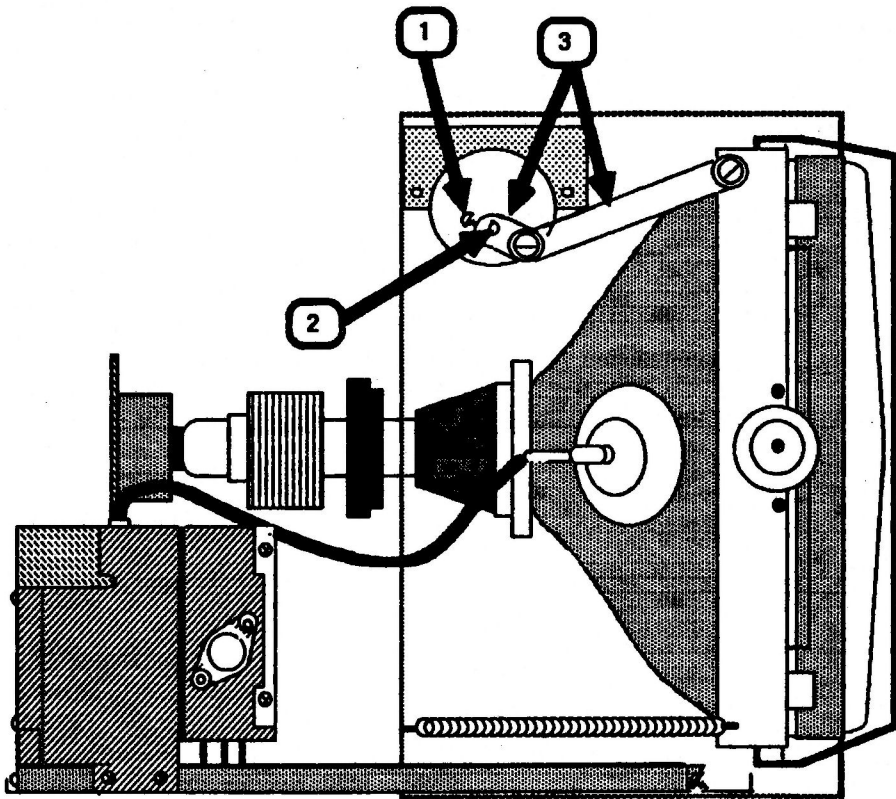


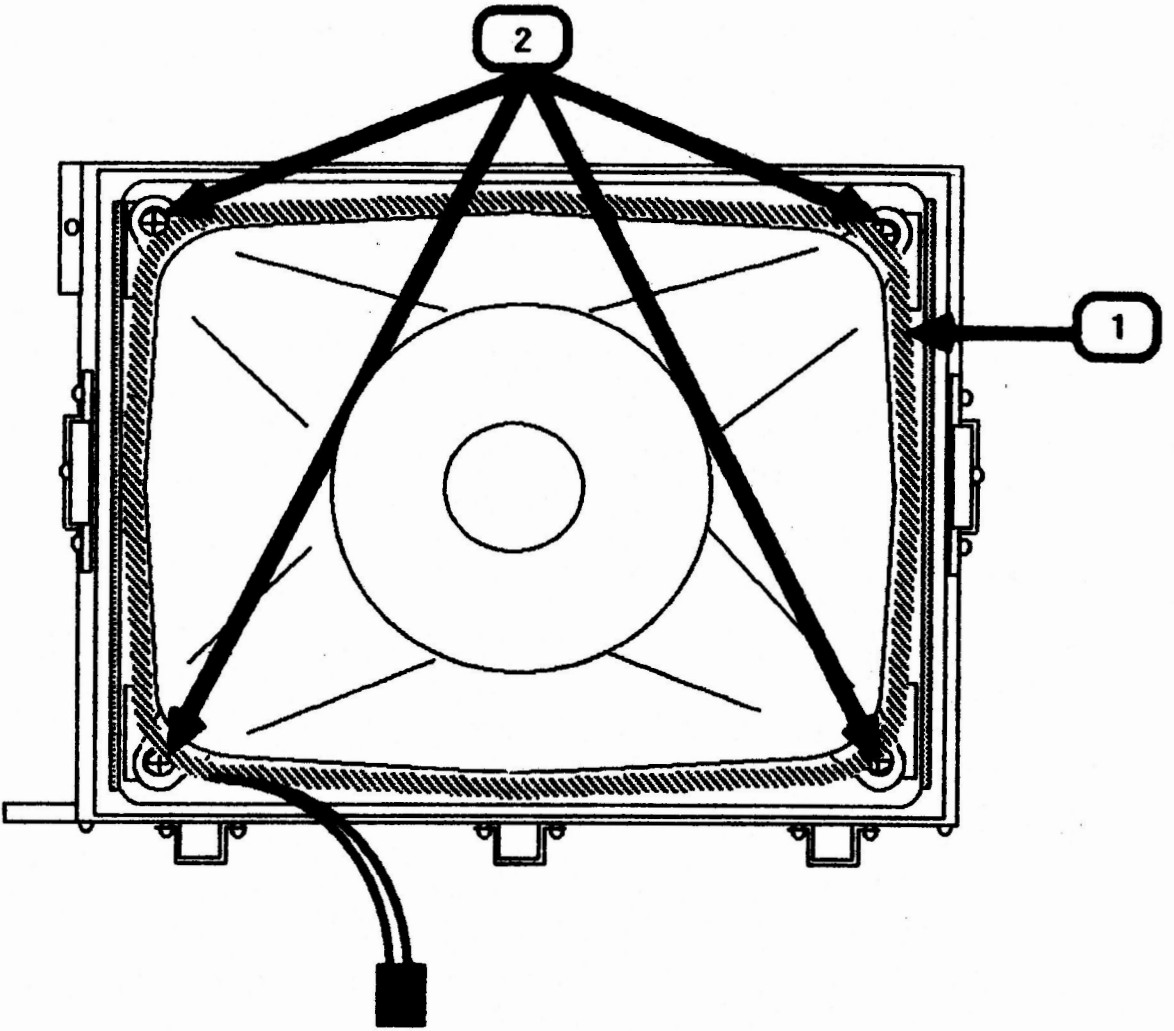
FIGURE 14

### **Removing the Front Bezel**

1. Disconnect the AC power cord.
2. Remove the brightness/contrast control knobs.
3. Remove the rear enclosure.
4. Follow steps 4 through 8 of "**Discharging the CRT.**"
5. Remove the brightness/contrast controls.
6. Remove the power button/switch.
7. Set the monitor on its feet. Figure 15 shows a top view of the monitor. Remove the three screws shown in Figure 15, #1.
8. Carefully place the monitor on its left side and remove the six screws shown in Figure 16, #1.
9. Place the monitor back on its feet.
10. Brace the front panel with one hand. Grasp the metal chassis by the top and lift it slightly off the table while you pull the front panel forward and away from the chassis.

### **Replacing the Front Bezel**

1. Slide the front bezel back onto the metal chassis and replace the three screws at the top.
2. Mount the metal plate (brightness/contrast controls) back onto the front bezel.
3. Mount the plastic plate (On/Off - tilt) back onto the front bezel.
4. Place the monitor on its left side and replace the six mounting screws.
5. Replace the rear enclosure.

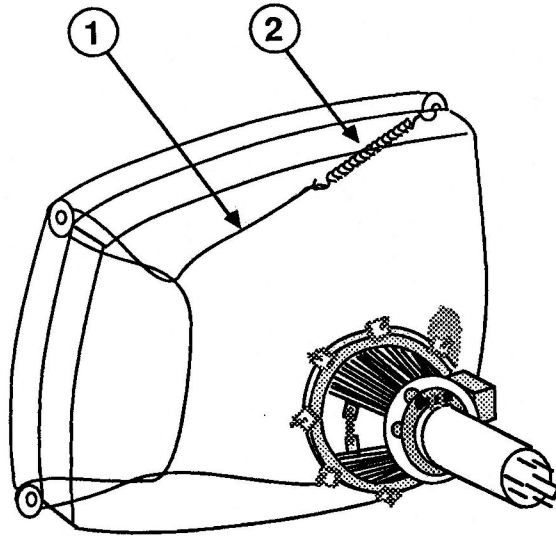


**FIGURE 17**

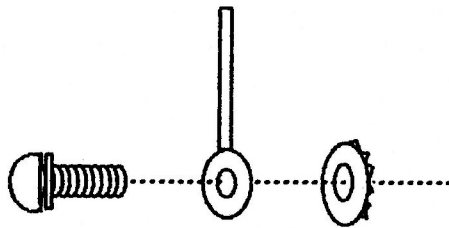
## Removing the CRT/Yoke Assembly

1. Turn off the power and disconnect the AC power cord.
2. Remove the rear enclosure.
3. **Discharge the CRT.**
4. Place the monitor on a grounded workbench mat and put on your grounding wriststrap. (Never do this until after the monitor has been discharged.)
5. Remove the logic board.
6. Remove the power transformer.
7. Remove the power supply board.
8. Remove the tilt motor.
9. Remove the tilt loading spring.
10. Place the monitor face down on the grounded workbench mat.
11. Locate the degaussing coil (Figure 17, #1). It is braced to the CRT by plastic-coated holding tabs at each corner.  
  
**NOTE:** For clarity, Figure 17 shows the CRT and degaussing coil without the surrounding chassis frame, which is still in place in this step.
12. Using needlenose pliers, bend the plastic tabs out to free the degaussing coil.
13. Carefully lift out the degaussing coil and set it aside.
14. Use a long Phillips screwdriver or a 5/16 nut driver to remove the four CRT mounting screws (Figure 17, #2). Remove the large washers.
15. Supporting the CRT with one hand, set the monitor chassis upright and slide the CRT out of the chassis.
16. Place the CRT face down on a soft surface.

**CONTINUED ON NEXT PAGE**



**FIGURE 17A**



**FIGURE 17B**

17. Observe how the silver ground wire (Figure 17A, #1) is connected to the four corner mounting tabs of the CRT. Disconnect the spring (Figure 17A, #2) that secures the ground wire to the fourth corner mounting tab, and remove the ground wire from CRT. Save the ground wire and spring to install on the replacement CRT.

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

### Replacing the CRT/Yoke Assembly

1. Place the new CRT face down on a soft surface.
2. Loop the silver ground wire around the three corner mounting tabs and reconnect the spring to the fourth corner tab, as shown in Figure 17A.
3. Place the monitor chassis face down on the grounded workbench mat.
4. Carefully set the CRT inside the chassis with the anode on the right side as you face the rear of the CRT.
5. Place the plastic holding tabs on the CRT mounting screws. Place the large washers under the plastic tabs (see Figure 17B).
6. Hold the plastic tabs in place as you tighten the CRT mounting screws.
7. Orient the degaussing coil around the CRT so that the connector is at the bottom. Make sure the coil is as close to the front of the CRT as possible.
8. Bend the plastic holding tab stems around the corners of the degaussing coil to secure the coil to the CRT.
9. Replace the tilt loading spring.
10. Replace the power supply board.
11. Replace the tilt motor.
12. Replace the logic board.
13. Replace the power transformer.
14. Replace the rear enclosure.

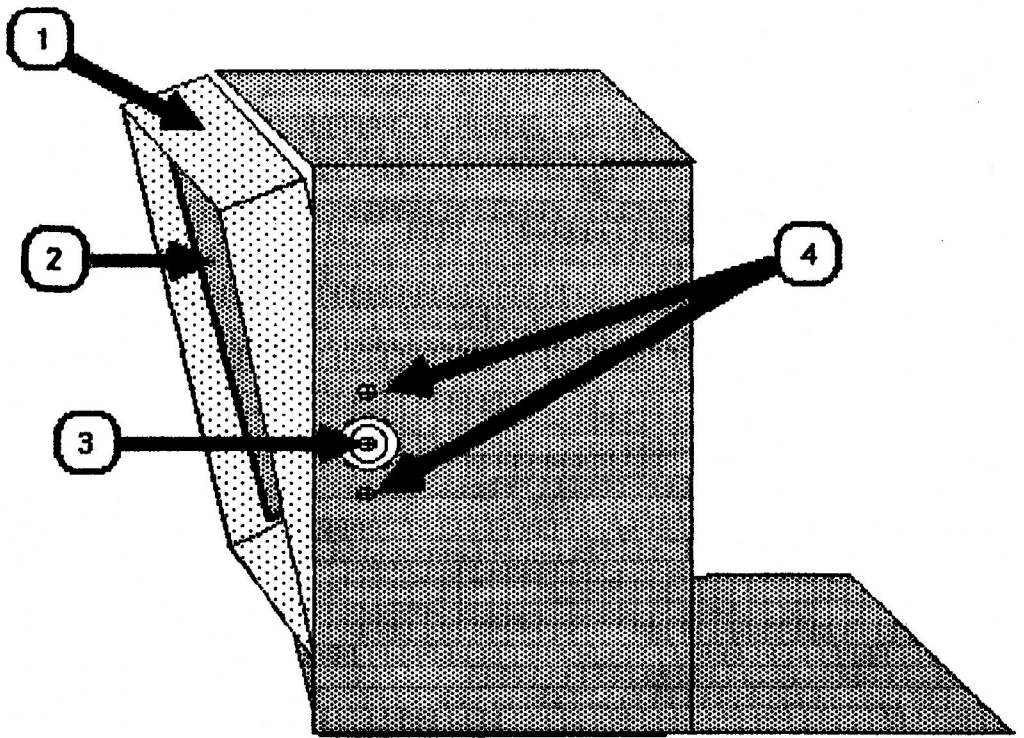


FIGURE 18

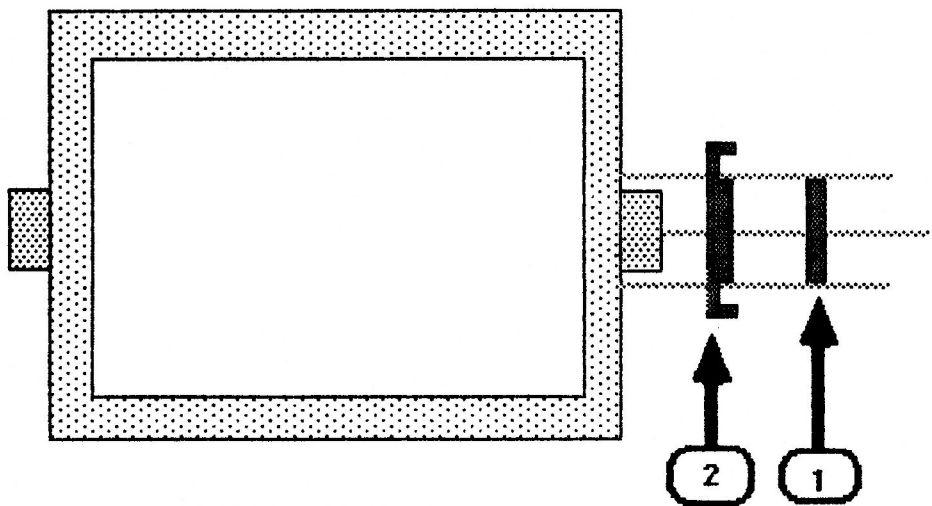


FIGURE 19



## Removing the Mask

1. Disconnect the AC power cord.
2. Remove the rear enclosure.
3. Discharge and remove the CRT.

**NOTE:** The mask is shown in Figure 18, #1. The metal parts that come off when removing the mask are not considered part of the mask.

4. Follow the instructions below for one side of the mask, and then the other.
  - a) Support the CRT bracket (Figure 18, #2) while you loosen the axle screw (Figure 18, #3) until it clears the bracket. Set the bracket aside.
  - b) Completely remove the axle screw (Figure 18, #3).
  - c) Remove the two screws shown in Figure 18, #4.
5. Pull the mask forward and out of the monitor chassis.
6. Remove the metal ring (Figure 19, #1) and bracket (Figure 19, #2) from the mask axles on both sides of the mask.

## Replacing the Mask

1. Place the metal brackets (Figure 19, #2) and rings (Figure 19, #1) back onto both mask axles.
2. Hold the brackets and rings in place as you slide the mask back into the chassis.
3. Follow these instructions for both sides of the mask:
  - a) Replace the two screws shown in Figure 18, #4.
  - b) Place the CRT bracket (Figure 18, #2) inside the mask with the screw holes adjacent to the screw holes located at the upper and lower corners of the mask.
  - c) Replace the axle screw (Figure 18, #3).

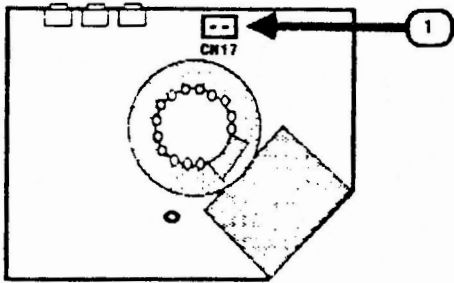


FIGURE 20

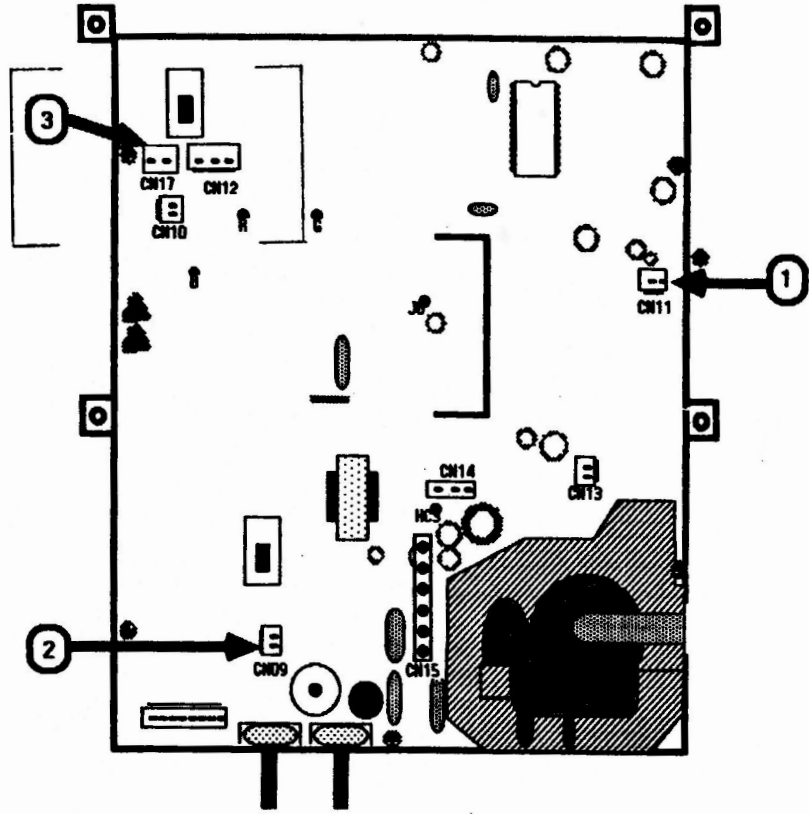


FIGURE 21

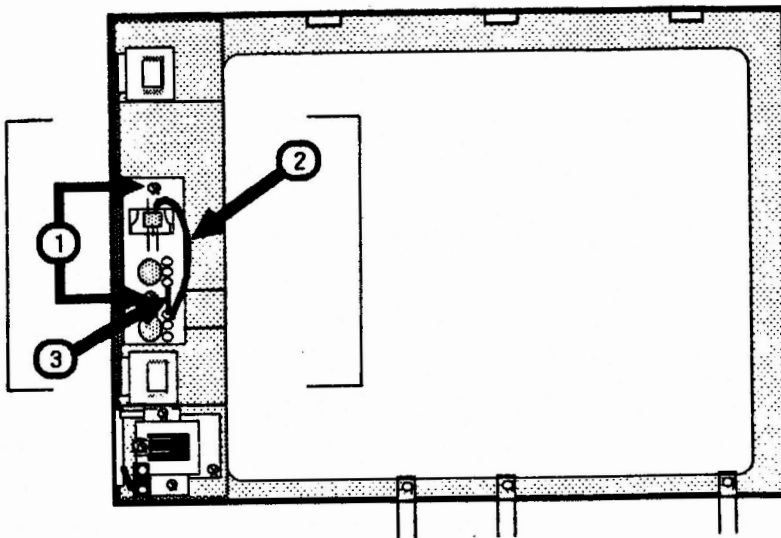


FIGURE 22

## Removing and Replacing the Brightness and Contrast Control Knobs

1. Insert a flatblade screwdriver under the knob and gently pry until it is loose enough to pull off by hand.
2. To replace the knob, line up the inside of the knob with the shaft that it fits onto and slide it all the way onto the shaft.

## Removing the Brightness/Contrast Control

1. Disconnect the AC cord.
2. Remove the brightness and contrast knobs.
3. Remove the rear enclosure.
4. Follow steps 4 through 8 of "Discharging the CRT."
5. As you face the back of the monitor you will see two potentiometers (brightness and contrast) and one slide switch (green only) attached to a metal plate located on the left side of the monitor. Use a pair of diagonal cutters to cut any cable ties binding the wires of those three components together.
6. Disconnect the following the connectors:
  - a) CN17 (CRT socket board) -- Figure 20, #1  
**NOTE:** On the AppleColor Monitor 100 Rev. A, CN17 is located on the logic board (Figure 21, #3).
  - b) CN11 (logic board) -- Figure 21, #1
  - c) CN09 (logic board) -- Figure 21, #2
7. Carefully bring the wires outside of the chassis.
8. Remove the two screws (Figure 22, #1) that mount the metal plate to the front bezel and remove the plate.
9. If you are removing the brightness control from an AppleColor Monitor 100 Rev. 0, locate the wire (Figure 22, #2) that connects the brightness pot to the slide switch. Desolder and remove the wire from the brightness pot contact. If you are removing the contrast control, skip to step 11.

**NOTE:** The wire is not present on the AppleColor Monitor 100 Rev. A. Instead, there is a resistor connecting the brightness pot to the contrast pot (Figure 22, #3). If you are removing the brightness control, desolder the end of the resistor attached to the brightness pot. If you are removing the contrast control, desolder and remove the end of the resistor attached to the contrast pot.

11. Turn the plate around and remove the mounting nut and the potentiometer.

### **Replacing the Brightness/Contrast Control**

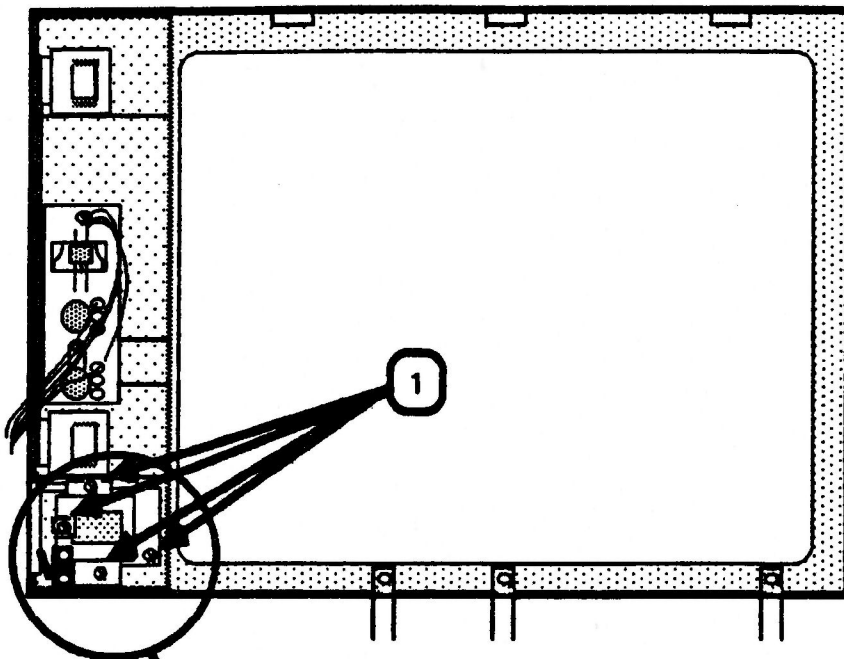
1. Slide the pot shaft back through its fit-through on the mounting plate.
2. Orient the pot with the contacts facing in the same direction as they are on the brightness/contrast pot and replace the mounting nut.
3. If you are replacing the brightness control, solder the wire that was previously removed to the single contact. (On the AppleColor Monitor 100 Rev. A, resolder the resistor wire to the pot from which it was disconnected).
4. Mount the plate back onto the front bezel.
5. Tie the wires together with new cable ties if you have them. Also, tie the three sets of wires to the wires extending from the On/Off switch.
6. Route the wires back through the cable clamp located just in front of the power transformer.
7. Connect the following connectors:
  - a) CN17 (CRT socket board) -- Figure 20, #1  
(On the AppleColor Monitor 100 Rev. A, CN17 connects to the logic board -- Figure 21, #3).
  - b) CN11 (logic board) -- Figure 21, #1
  - c) CN09 (logic board) -- Figure 21, #2
8. Replace the rear enclosure.
9. Replace the knobs.

### **Removing the Green Only Switch**

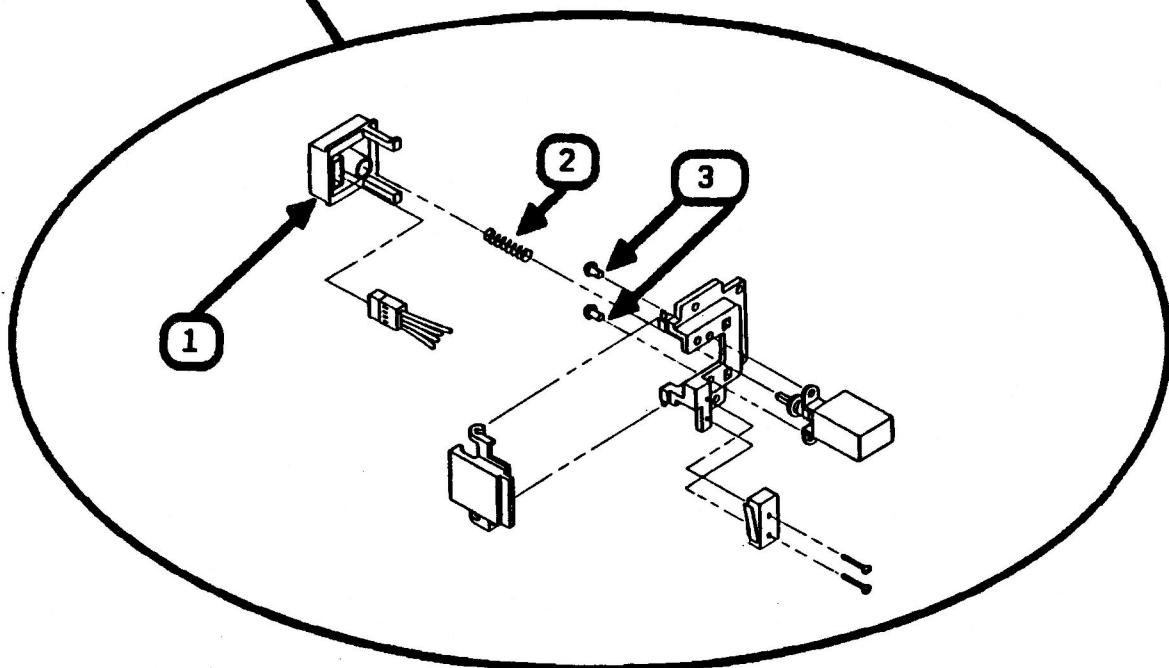
1. Follow Steps 1 through 7 of **"Removing the Brightness/Contrast Control."**
2. If you are working on an AppleColor Monitor 100 Rev. 0, desolder and remove the wire connecting the green only switch to the brightness pot. (On the AppleColor Monitor 100 Rev. A, there is no wire on the green only switch).
3. Remove the two Phillips screws that attach the button to the metal plate. They are located at either side of the switch.

### **Replacing the Green Only Switch**

1. Place the switch back into its fit-through on the mounting plate. The soldered contacts should be at the top.
2. Replace the two mounting screws.
3. Slide the green button back onto its shaft.
4. Solder the wire previously removed back onto outermost switch contact. **(For AppleColor Monitor 100 Rev. A, skip this step -- there is no wire.)**
5. Follow steps 4 through 9 of **"Replacing the Brightness/Contrast Control."**



**FIGURE 23**



**FIGURE 24**

## Removing the Power Button/Switch

1. Disconnect the AC power cord.
2. Remove the rear enclosure.
3. Follow steps 4 through 8 of "Discharging the CRT."
4. Locate the plastic mounting plate circled in Figure 23. Remove the four Phillips screws (Figure 23, #1).
5. The power button (Figure 24, #1) is attached to the plastic mounting plate by two legs at the top of the button. To release the button, push the two legs inward as you pull the button away from the mounting plate.

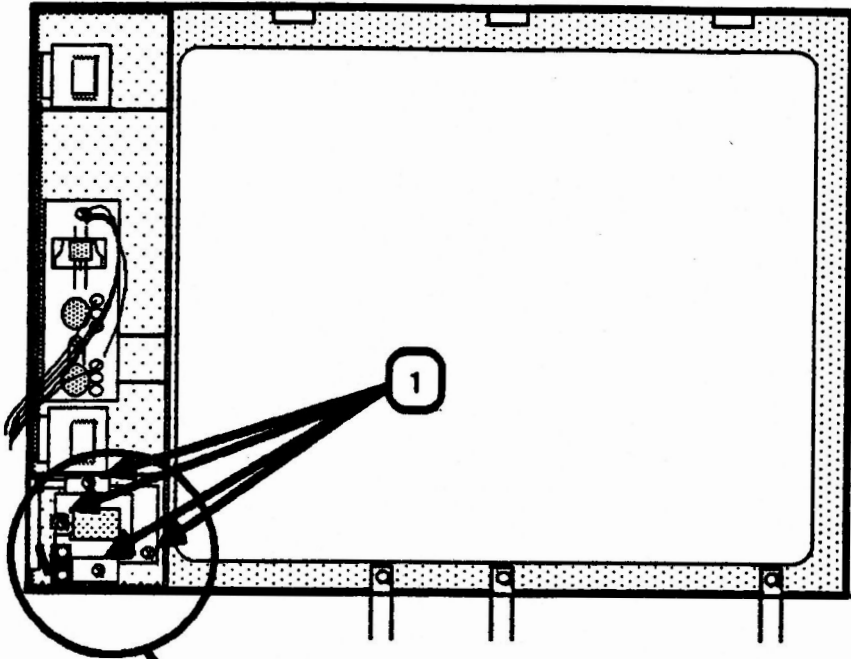
**NOTE:** If you are removing the power switch, go to Step 7.

6. Locate the tiny PC board on the inside of the power button. This is the LED. It is attached to the button by two small Phillips screws. Remove the screws to separate the PC board from the power button.
7. Remove the small spring (Figure 24, #2) located on the power switch shaft.
8. Remove two Phillips switch mounting screws (Figure 24, #3) located at either side of the power switch shaft.
9. Follow the power switch wires back to their connector (CN02) on the component side of the power supply board. Disconnect CN02 and completely remove the switch.

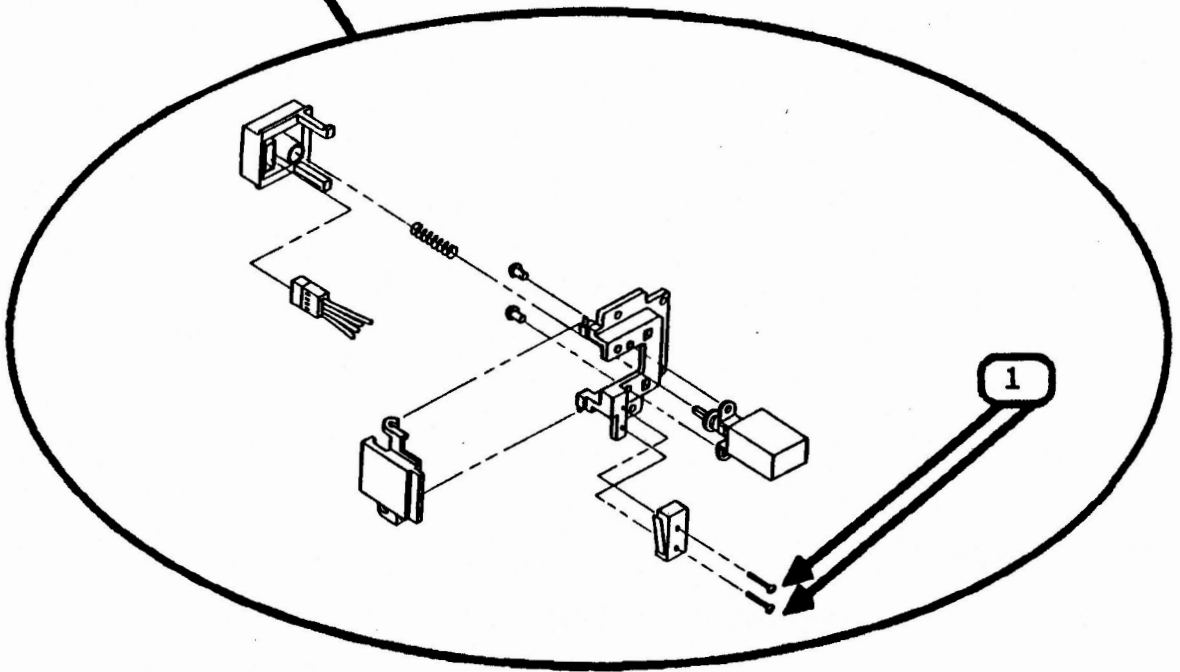
**NOTE:** If CN02 is too difficult to remove, follow steps 6 and 7 of "Removing the Power Supply Board" for easier access to the connector.

## Replacing the Power Button/Switch

1. Orient the plastic mounting plate as it is shown in Figure 24.
2. Insert the switch into the plastic mounting plate with the wires on the right.
3. Place the spring back on the shaft of the switch (Figure 24, #2.) and replace the switch mounting screws.



**FIGURE 25**



**FIGURE 26**



4. Hold the spring in place while you insert the power button legs back through the fit-throughs in the plastic plate. The spring fits into the hole in the back of the switch.

#### **Removing the Tilt Motor Button/Switch**

1. Disconnect the AC power cord.
2. Remove the rear enclosure.
3. Follow steps 4 through 8 of "**Discharging the CRT.**"
4. Locate the plastic mounting plate circled in Figure 25. Remove the four mounting screws (Figure 25, #1).
5. Remove the two screws (Figure 26, #1) that secure the switch to the plastic plate.
6. Follow the tilt switch wires to where they connect to the power supply board by connector CN07. Disconnect CN07 from the power supply board.

**NOTE: If CN07 is too difficult to remove, follow steps 6 and 7 of "Removing the Power Supply Board" for easier access to CN07. Then continue with the next step.**

7. Pull the tilt button back and away from the plastic plate until it snaps off.

#### **Replacing the Tilt Motor Button/Switch**

1. Snap the tilt button back on to its hinges.
2. Replace the two mounting screws that secure the switch to the plastic plate.
3. Connect the switch connector (CN07) to the power supply board.
4. Replace the four mounting screws to secure the plastic plate to the front bezel.

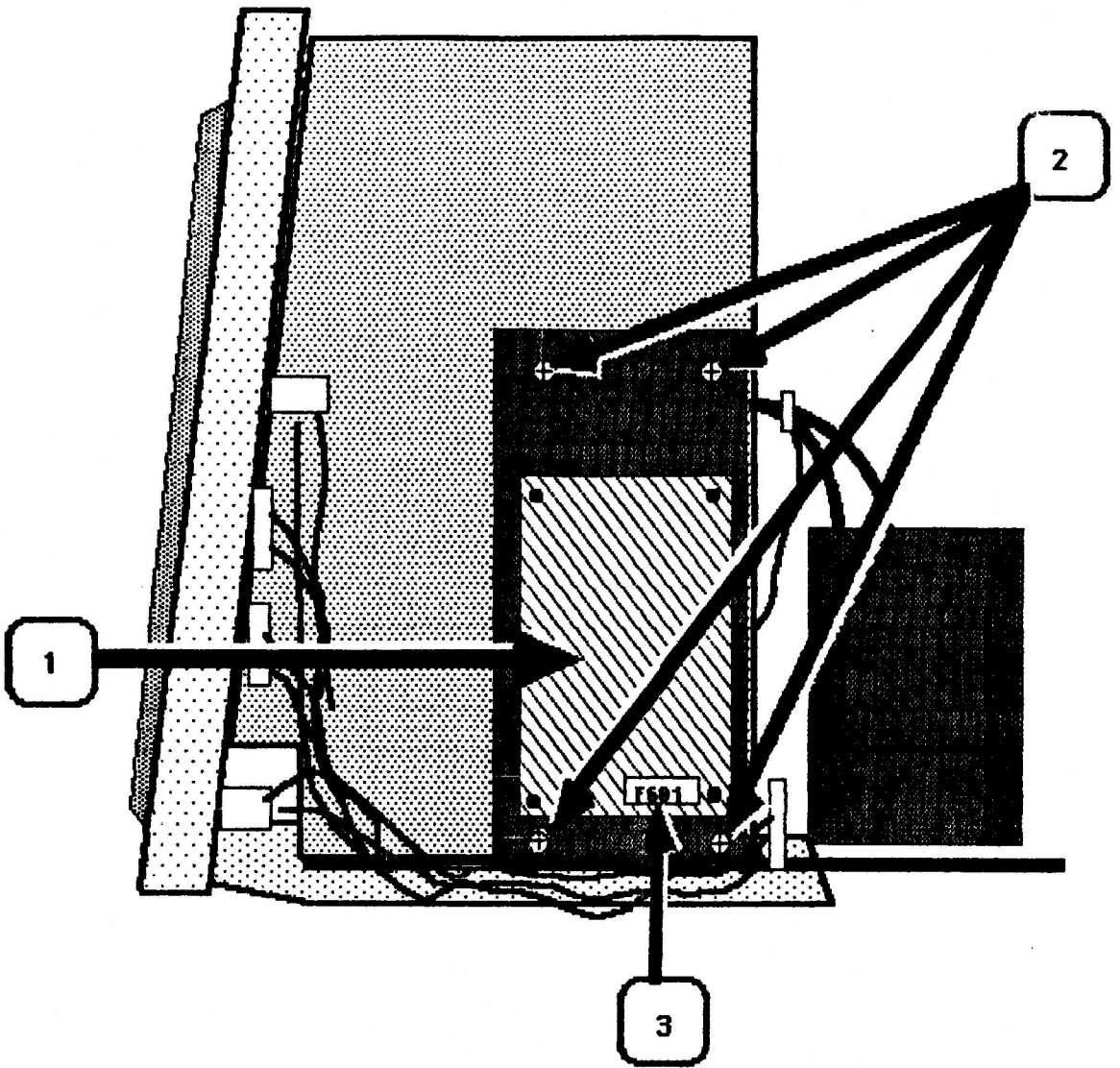


FIGURE 27

## Replacing the Power Supply Fuse (F601)

The power supply fuse (F601) is mounted on the component side (inside) of the power supply board (Figure 27, #1). You do not have to remove the board completely in order to replace the fuse. The following procedures tell how to replace the power supply fuse (F601).

**NOTE:** Fuse F601 should be replaced with a 250V 2A Slow Blow fuse whenever you service a color monitor with a serial number below 025769.

1. Disconnect the AC power cord.
2. Remove the rear enclosure.
3. Follow steps 4 through 8 of "Discharging the CRT."
4. Remove the four screws (Figure 27, #2) from the power supply mounting plate.
5. Pull the bottom of the mounting plate up and over the wires leading to the control panel to gain access to the fuse.

Figure 27, #3 shows the location of the fuse (F601) from the solder side (outside) of the power supply board.

6. Pry the fuse out of the fuse holder (away from the board).

**CAUTION:** DO NOT TRY TO SLIDE THE FUSE SIDEWAYS. YOU MAY BREAK THE FUSE HOLDER.

7. Snap in the 250V 2A Slow Blow Fuse.
8. Reposition the power supply mounting plate flush against the chassis.
9. Replace the four mounting screws.
10. Replace the rear enclosure.

# AppleColor Monitor 100 Technical Procedures

## Section 3

### Adjustments

#### Contents:

Logic Board Adjustments.....	3.3
Introduction.....	3.3
Materials Needed.....	3.3
Set Up Procedure.....	3.5
Evaluating the Video Test.....	3.7
Vertical Adjustments.....	3.9
Horizontal Adjustments.....	3.9
Focus Adjustment.....	3.9
Color Adjustments.....	3.11
Color Bar Check.....	3.11
White Balance.....	3.11

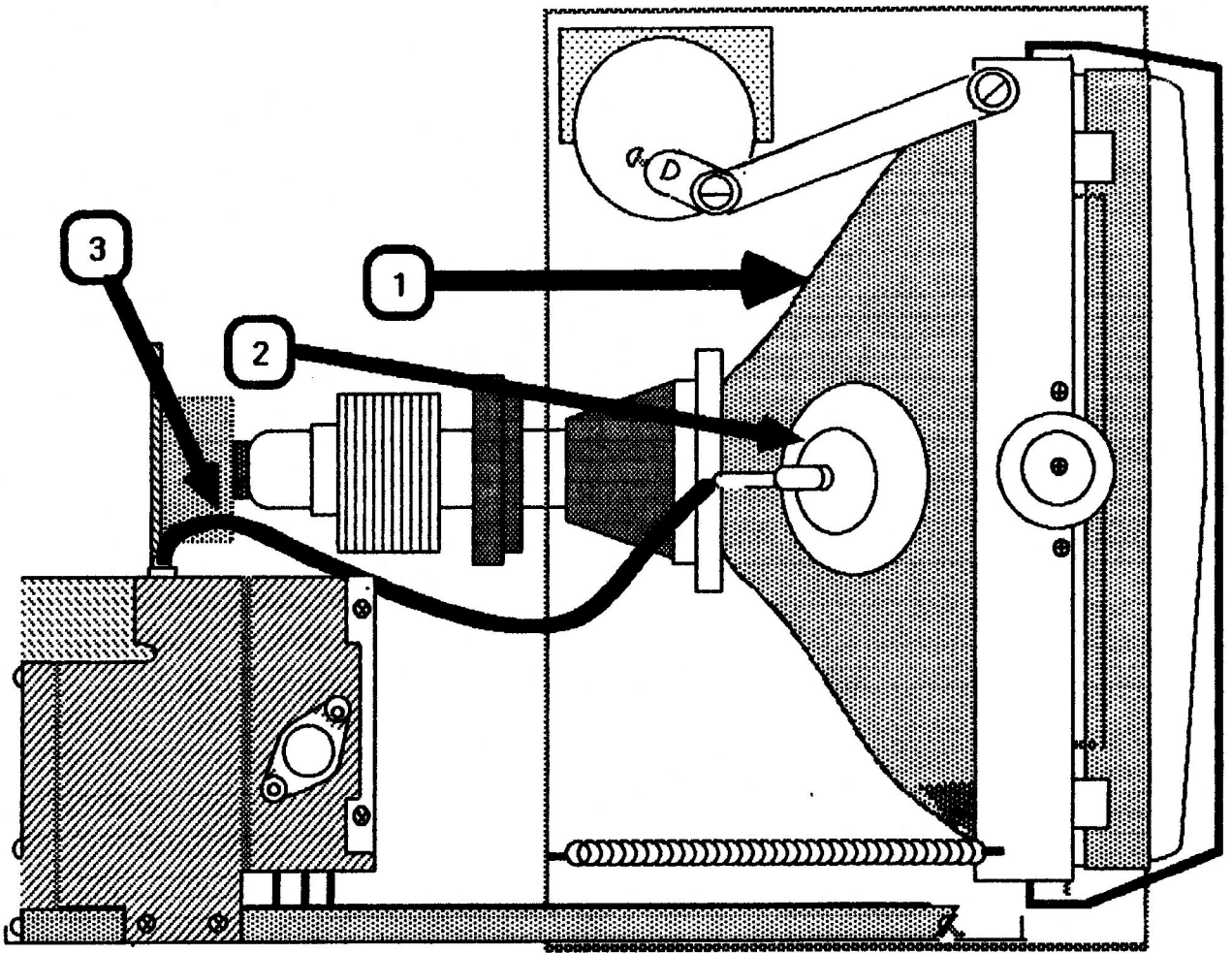


FIGURE 1

## LOGIC BOARD ADJUSTMENTS

### Introduction

After replacement of the logic board in the AppleColor Monitor 100 the vertical height and/or the vertical hold may need adjustment. It is important that you read all the steps completely before beginning the adjustments, as several of them interact with each other; so if it looks like a step is not working, it's possible that another step will correct the problem.

All yoke assembly adjustments have been preset by the manufacturer. Do not attempt to make any tilt, ring, or geometric adjustments on the AppleColor Monitor 100.

### Materials Needed:

Working AppleColor Monitor 100  
Apple IIe  
Extended 80-Column Text AppleColor Card (P/N 699-0221)  
Apple IIe Diagnostic ROM Card (P/N 661-94086)  
Plastic hex tip iron core adjustment tool (size 0.00)  
Small plastic flatblade screwdriver (tweaker)

**WARNING:** There are extremely high voltages on the CRT, the anode, and the anode lead. In these adjustments you will be putting your hand near these high voltage parts. It is **IMPERATIVE** that you watch what you are touching while making any adjustments when the power is on, otherwise injury can result. Avoid touching the CRT, anode, and the anode lead (Figure 1, #1, #2, and #3). Put one hand in your pocket or behind your back while making adjustments! Never hold on to the chassis with your free hand while making adjustments.

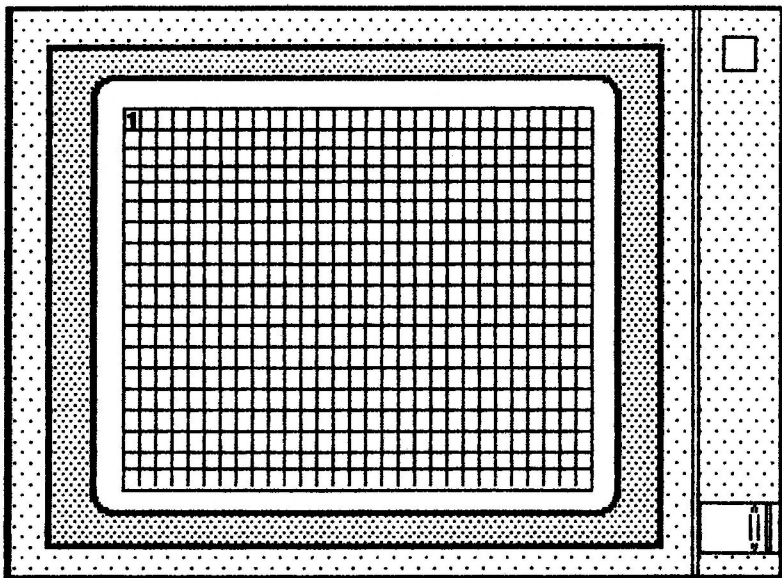


FIGURE 2

## Set Up Procedure

**WARNING: MAKE SURE THE POWER IS OFF ON THE MONITOR AND ON THE APPLE IIe**

1. Remove the rear enclosure (Take-Apart).
2. Connect the AppleColor Monitor 100 to the Apple IIe. If you do not know how to do this, refer to the Extended 80-Column Text Card manual.
3. Insert the Apple IIe ROM card into slot 1 or 2 and make sure that the switch on top of the ROM card is pointing toward the rear of the computer. If you do not know how to do this, refer to the **Diagnostics Section of the Apple IIe Technical Procedures.**
4. Turn on the monitor and the Apple IIe. If the menu does not appear when the power is turned on, the switch on the ROM card is in the wrong position. Shut off the system, change the switch position, and turn the system back on.
5. Select the Video Tests (V) from the menu, then press the spacebar. You will now see a high resolution pattern on the screen. Numbers 1 and 2 should be alternating in the upper left-hand corner of the screen. (Figure 2.)
6. View the screen and evaluate the vertical alignment and horizontal alignment (see the next page for evaluation procedures). Determine which one needs correction and proceed to the correct adjustment. There is interaction between the two adjustments, so you might have to do both to correct any problems.



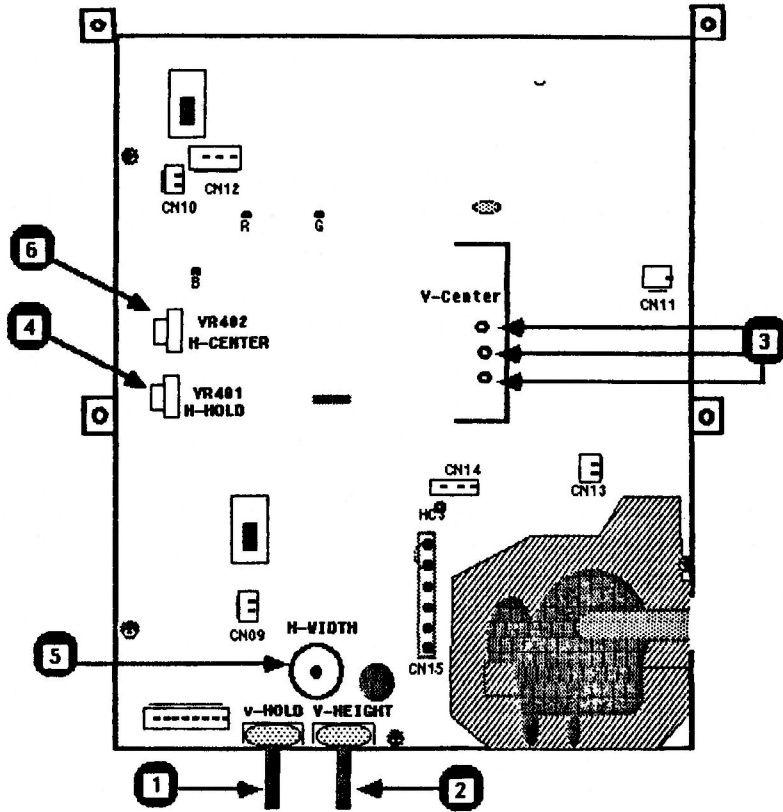


FIGURE 3

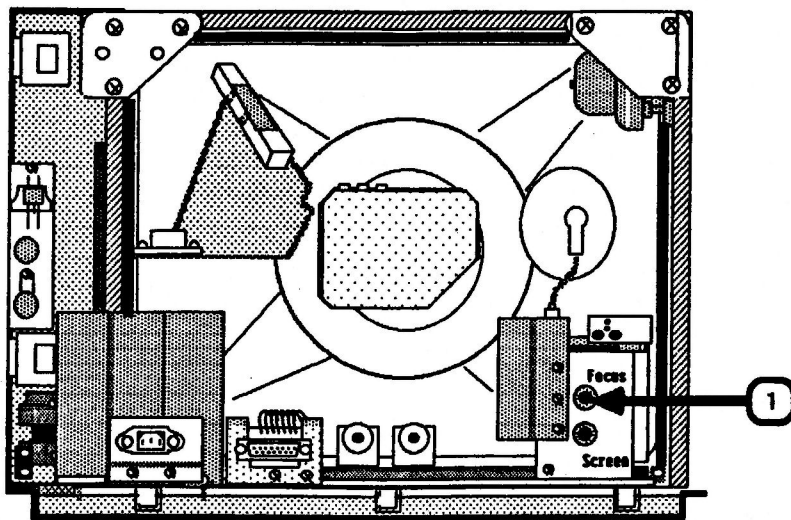


FIGURE 4

## **Vertical Adjustments**

1. **Vertical Hold:** Set the vertical hold control VR301 (Figure 3, #1) to the mechanical center by turning it all the way to the left, then to the right, then back to the center of the range between left and right of its rotation. This should lock the picture on the screen and prevent any rolling.

Turn the monitor off and back on, to make sure the vertical hold is secure.

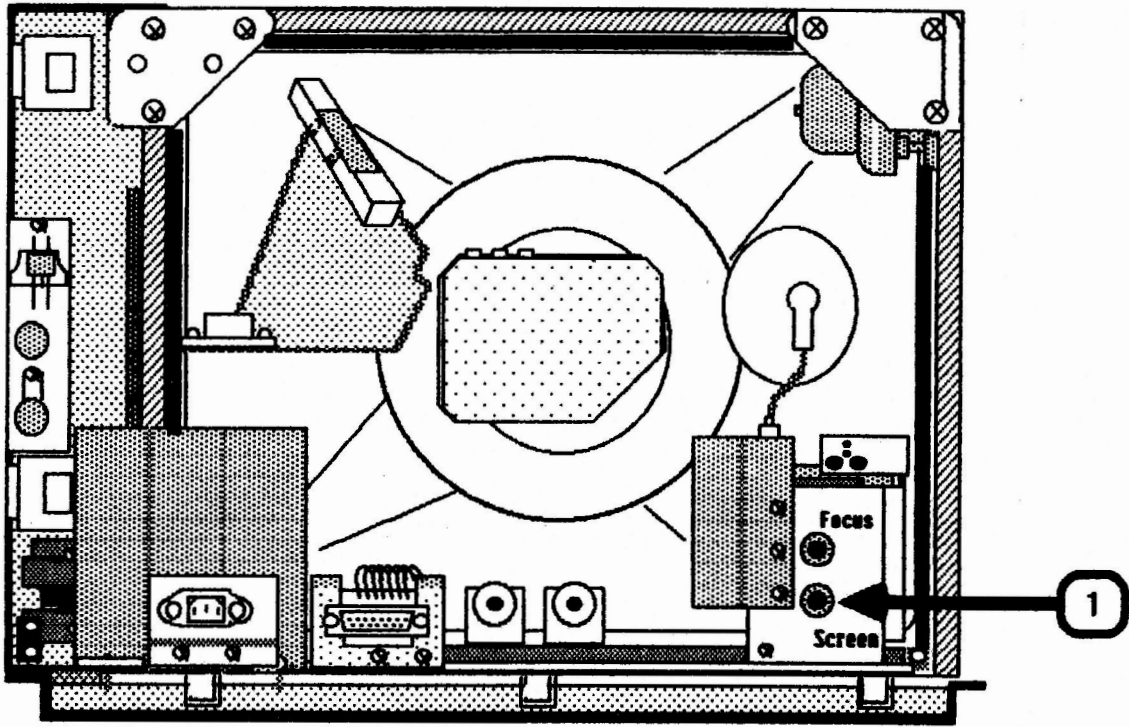
2. **Vertical Height:** If the vertical height of the image is incorrect, then adjust V-HEIGHT VR302 (Figure 3, #2) until the picture is about 1/4 inch away from the top and bottom edges of the screen.
3. **Vertical Center:** If the vertical position of the entire image is off, carefully connect the H-C4 connector (Figure 3, #3) to the best position pin to correct this problem. (On the AppleColor Monitor 100 Rev. A, the three pins are not as perfectly aligned as those shown in Figure 3, #3). BE CAREFUL, IT IS CLOSE TO THE CRT NECK!

## **Horizontal Adjustments**

1. **Horizontal Hold:** If the picture on the tube is not locked and is tearing, adjust H-HOLD R402 (Figure 3, #4).
2. **Horizontal Width:** The image should be about 1/4 inch away from each side of the screen. If the width of the image looks too narrow or too wide, adjust the H-WIDTH L406 (Figure 3, #5) until you have the desired width.
3. **Horizontal Center:** If the image is too far to one side of the screen, adjust H-CENTER VR402 (Figure 3, #6) until the image is centered.

## **Focus Adjustment**

If the picture on the screen is blurry adjust the FOCUS pot, which is located at the back of the flyback transformer. (Figure 4, #1.)



**FIGURE 5**

## COLOR ADJUSTMENTS

### Color Bar Check

1. Insert the Extended 80-Column Text/AppleColor Card into the auxiliary slot of the Apple IIe. If you do not know how to do this, refer to the user's manual for the card.
2. Locate the two DIP switches on the Extended 80-Column Card and switch both levers to the lower (bottom) position.
3. Replace the Apple IIe lid.
4. Insert the Extended 80-Column Text AppleColor Card "Demo Drivers Diskette" (ProDOS Based) into the disk drive.
5. Turn on the Apple IIe.
6. Turn on the AppleColor Monitor 100.
7. When the menu appears, press the down arrow on the keyboard to select "**DHR.COLORS**", then press "**RETURN**".

The monitor will display 16 color bars with the name of the color beneath each bar.

8. Make sure that the colors match their names. If they do not match, follow the procedures below to adjust the color.

### White Balance

Proper color adjustment is achieved by obtaining "white balance." The white balance is obtained by adjusting the screen potentiometer of the flyback transformer along with all the pots located on the CRT socket board. For this procedure you do not need to connect the monitor to the Apple IIe.

#### **WARNING: MAKE SURE THAT THE POWER IS OFF!**

1. Remove the rear enclosure (Refer to **Take-Apart Section**).

**NOTE:** Do not connect the DB-15 video cable to the monitor.

2. Connect the AC power cord to the back of the monitor and to the wall outlet.
3. Turn the SCREEN pot (Figure 5, #1) counterclockwise as far as it will turn.

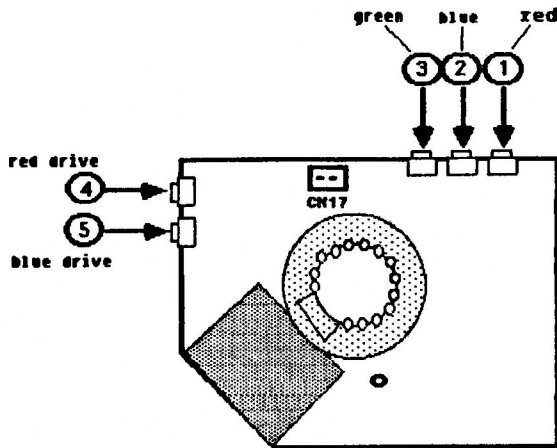


FIGURE 6

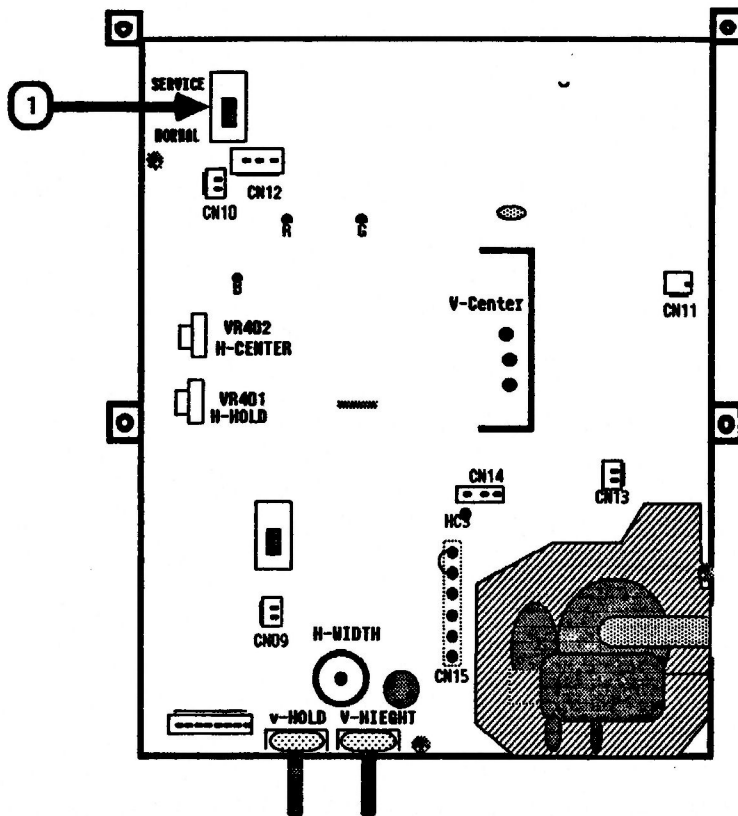


FIGURE 7

4. Adjust the following pots, located on the CRT socket board, to their mechanical centers by turning them all the way to the left, then to the right, then back to the center of the range between left and right:
  - a) VR501 (Red Bias) -- Figure 6, #1
  - b) VR502 (Green Bias) -- Figure 6, #2
  - c) VR503 (Blue Bias) -- Figure 6, #3
  - d) VR504 (Red Drive) -- Figure 6, #4
  - e) VR505 (Blue Drive) -- Figure 6, #5
5. Use the eraser end of a pencil, or another nonconductive tool, to push Switch (SW) 101 (Figure 7, #1) to the SERVICE position.
6. Turn on the monitor.
7. Observing the center of the screen, turn the SCREEN pot gradually clockwise until you see a horizontal line.

**NOTE:** Do not turn the SCREEN pot until the line is glowing, but just until you see a fine, solid line.

THE LINE SHOULD APPEAR WHITE. If the line is not white, repeat step 7. Watch closely to see which color appears first. Then, adjust the appropriate bias pot(s) (listed in step 4, above) until that color is defeated (no longer appears). If another color appears, repeat this step until the line is white.
8. Turn the SCREEN pot slightly clockwise to make sure that the line remains white. If it is not white adjust the appropriate color bias pot to obtain a white line.
9. Turn the SCREEN pot counterclockwise until the white line disappears.
10. Turn off the monitor and push switch SW 101 (Figure 7, #1) back to the NORMAL position.
11. Turn the monitor back on and repeat the steps listed in the "Color Bar Check" in this manual.

## INTRODUCTION

This is the troubleshooting section. It consists of a symptom chart, showing the symptom and an action to be taken to rectify the problem. The best way to use this section is:

1. Look on the chart to find the symptom that matches what the defective monitor is doing.
2. Try the recommended action.

### SYMPTOM

### ACTION

-----  
NO RASTER

Replace fuse 601 on the P/S board with a **250V 2A Slow Blow Fuse**.

Check that all connectors are secure on the P/S and logic board.

Replace the Power Switch.

Replace the P/S board.

Replace the logic board.

Replace the power transformer.

Replace the CRT.  
-----

ONE HORIZONTAL  
RASTER LINE  
APPEARS

Check to make sure that SW101 on the logic board is in the NORMAL position.

Replace the logic board.

Replace the CRT.  
-----

ONE VERTICAL  
RASTER LINE  
APPEARS

Replace the logic board.

Replace the CRT.  
-----

RASTER DEFORMED  
ABNORMALLY

Replace the CRT.  
-----

**SYMPTOM****ACTION**

-----  
ABNORMAL RASTER  
WITH WINDING OR  
EXCESSIVE PICTURE  
FLUCTUATION

Replace the logic board.

-----  
SPOT REMAINS  
WHEN UNIT IS  
OFF

Replace the logic board.

-----  
BRIGHTNESS RANGE  
ABNORMAL OR  
PICTURE IS  
FLASHING

Replace the logic board.

Replace the P/S board.

Replace the power transformer.

-----  
RASTER SIZE SMALL  
PICTURE ABNORMALLY  
BRIGHT

See Section 3, "Adjustments."

Replace the logic board.

-----  
NO VERTICAL  
SYNCHRONIZATION

See Section 3, "Adjustments."

Replace the logic board.

-----  
RASTER NOT  
CENTERED

See Section 3, "Adjustments."

Replace the logic board.

Replace the CRT.

-----  
NO PICTURE  
NO CONTRAST

Replace the logic board.

-----  
PICTURE /  
CHARACTERS  
INCLINED

See Section 3, "Adjustments".



**SYMPTOM****ACTION**

-----  
FINE NOISES IN  
PICTURE.  
CHARACTERS  
SHIVER.

Make sure the ground strap is secured  
to the power transformer.

Replace the logic board.  
-----

FIFTEEN OR MORE  
SECONDS FOR  
PICTURE TO  
APPEAR

Replace the CRT.  
-----

PICTURE APPEARS  
DISAPPEARS

Replace the logic board.

Replace the CRT.  
-----

HORIZONTAL  
LINEARITY BAD

Replace the logic board.

Replace the CRT.  
-----

VERTICAL  
LINEARITY BAD

Replace the logic board.

Replace the CRT.  
-----

WON'T FOCUS

Replace the logic board.

Replace the CRT.  
-----

COLORS NOT  
RIGHT

See Section 3, "Adjustments."  
-----

# AppleColor Monitor 100 Technical Procedures

## Section 5

### Illustrated Parts List

The figures and lists below include all piece parts that can be purchased separately from Apple for the AppleColor Monitor 100, along with their part numbers. These are the only parts available from Apple. Refer to your Apple Service Programs manual for prices.

#### Contents:

AppleColor Monitor 100.....	5.3
Monitor Cables.....	5.5

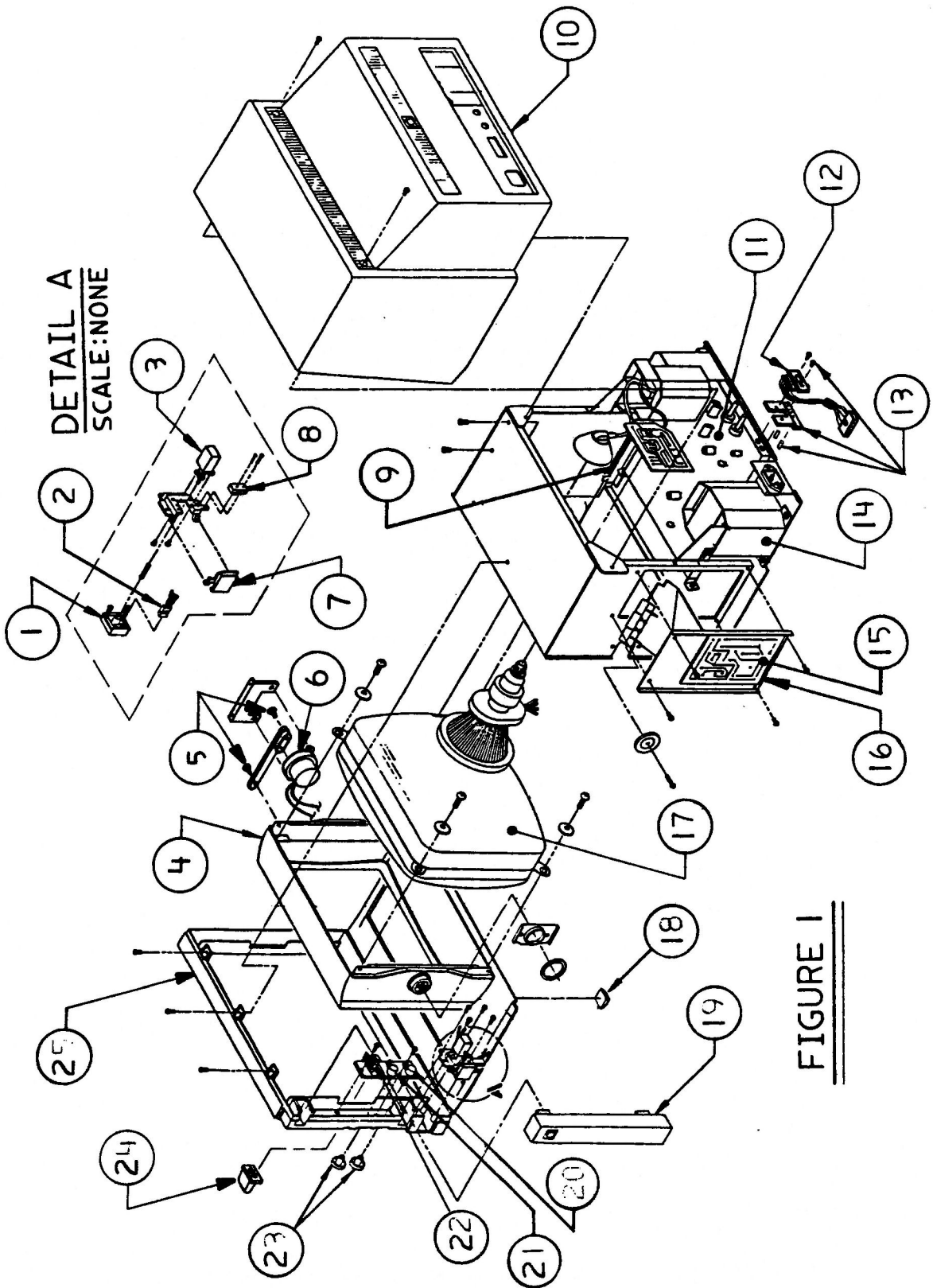


FIGURE 1

**APPLECOLOR MONITOR 100 - (Figure 1)**

<b>Item</b>	<b>Part No.</b>	<b>Description</b>
1	815-0543	Power Switch Bottom
2	970-1000	LED Assembly
3	970-0995	Power Switch
4	815-0549	Mask
5	931-0003	Screw, shldr, brass, RH thread
6	970-0997	Tilt Motor
7	815-0544	Button, Tilt Switch
8	970-0996	Tilt Motor Switch
9	970-0998	Tilt Loading Spring
10	815-0546	Rear Enclosure
11	661-0238	Logic Board, Rev. 0
	661-0292	Logic Board, Rev. A
12	970-0999	DB15 Connector, AppleColor Monitor 100, Rev. 0
	076-0196	DB15 Connector, AppleColor Monitor 100, Rev. A
13	076-0235	Bracket Assembly, DB15 Connector
14	076-8119	Power Transformer
15	740-0204	Fuse, 2A UL, CSA
16	661-0237	Power Supply Board
17	076-8120	CRT/Yoke Assembly
18	865-0020	Rubber Foot
19	815-0545	Control Panel Door
20	970-0990	Brightness Control
21	970-0991	Contrast Control
22	970-0994	Green Only Switch
23	815-0547	Contrast/Brightness Control Knob
24	815-0550	Green Only Button
25	815-0542	Front Bezel

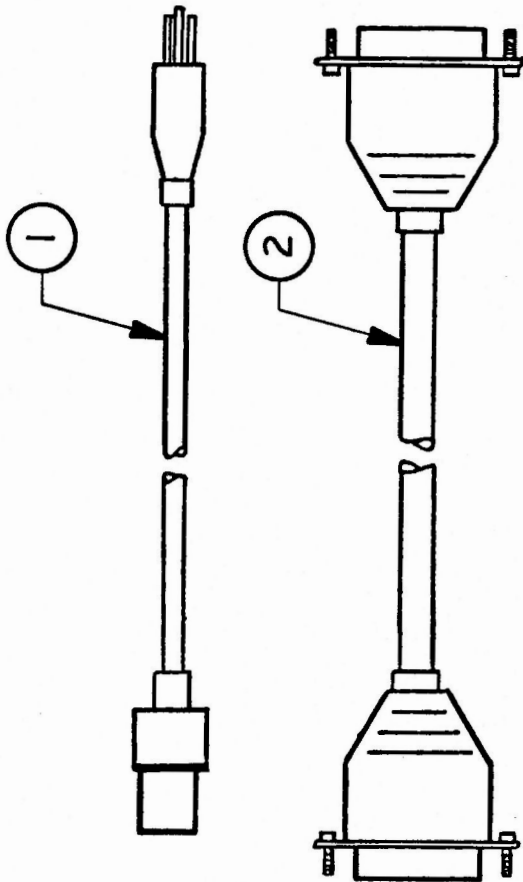


FIGURE 2

**APPLECOLOR MONITOR 100 - CABLES (Figure 2)**

<b>Item</b>	<b>Part No.</b>	<b>Description</b>
1	970-0876	Cable, AC Power Cord, AppleColor Monitor 100
2	590-0536	RGB Video Cable



