

🍏 Apple Technical Procedures

Apple Macintosh Portrait Display "Series B"

Section 2 – Take-Apart

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Note: If a step is underlined, detailed instructions for that step can be found elsewhere in the section.

o REAR COVER

Note: The following Take-Apart procedures are for the "Series B" (European) version of the Macintosh Portrait Display only. To differentiate between monitors, check the product name at the top of the manufacturer's label on the rear cover.

WARNING: *The Macintosh Portrait Display "Series B" contains high voltage and a high-vacuum picture tube. To prevent serious personal injury and property damage, be sure you read and understand the safety precautions in Section 8, CRT Safety, under the You Oughta Know tab before you remove the back cover. **Failure to follow the safety rules could result in serious injury.***

Materials Required

Medium Phillips screwdriver

Remove

1. Switch off the monitor and disconnect the AC power cord and video cable.
2. Place the monitor face down on a soft, protective surface to avoid damaging the CRT screen.

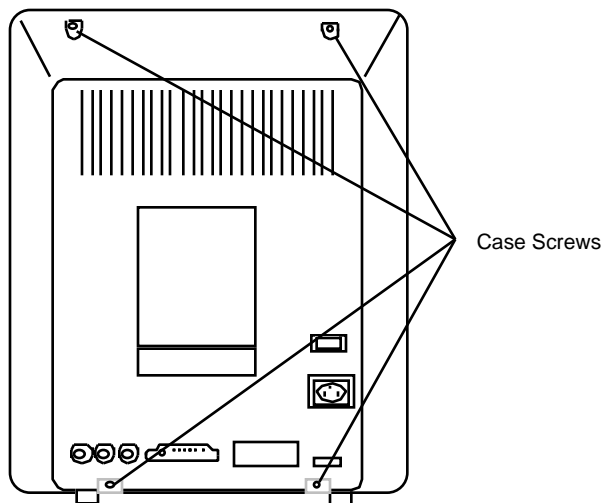


FIGURE 1

3. Remove the four case screws (Figure 1) from the rear cover.
4. Lift the rear cover off the bezel and set it aside.

Replace

1. Carefully set the monitor face down on a soft, protective surface.
2. Slide the rear cover onto the bezel, and replace the four case screws (**Figure 1**) .
3. Carefully set the monitor upright.

o ELECTROMAGNETIC INTERFERENCE (EMI) SHIELD

The EMI shield consists of two metal panels secured to the top and bottom of the monitor chassis. **Only the top panel must be removed to discharge the Portrait Display monitor and access most of its replaceable modules and parts.** The bottom panel must be removed if you are replacing the video board, main deflection board, CRT assembly, LED cable assembly, or bezel.

Most monitor adjustments can be performed without removing the EMI shield.

Materials Required

Small Phillips screwdriver

Remove

1. Remove the rear cover.
2. Place the monitor upright on the protective pad.

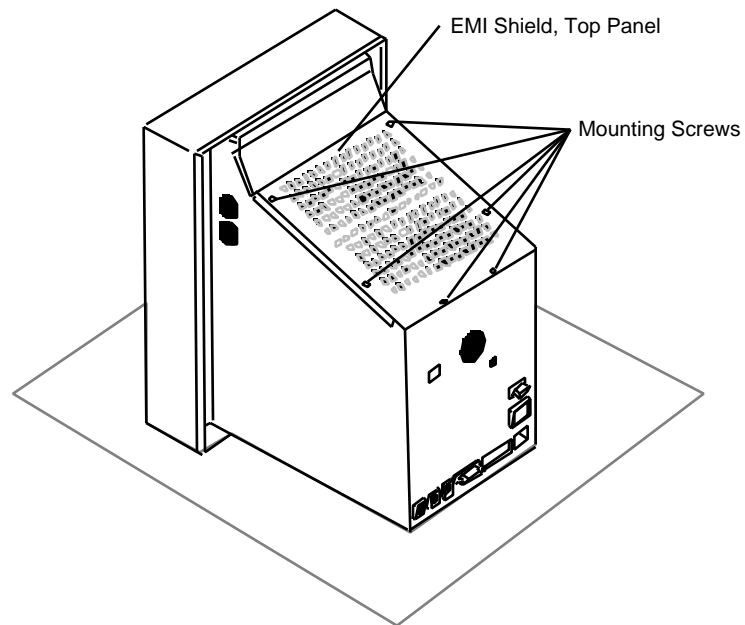


FIGURE 2

3. Remove the six screws that secure the top panel of the EMI shield to the chassis (**Figure 2**). Pull the top panel off the chassis.
4. Discharge the cathode-ray tube (CRT).

Note: Perform steps 5 and 6 for removing the bottom panel of the EMI shield only if you are replacing the video board, main deflection board, CRT assembly, LED cable assembly, or the bezel.

5. Carefully place the monitor on its side, with the bottom of the monitor facing you.

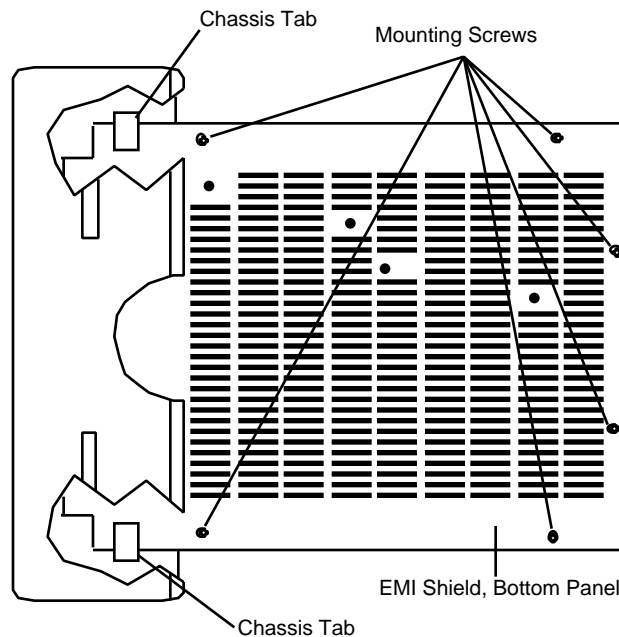


FIGURE 3

6. Remove the six screws that secure the bottom panel of the EMI shield to the chassis (Figure 3). Pull the bottom panel off the chassis.

Replace

Note: Perform steps 1 and 2 only if you have removed the bottom panel of the EMI shield.

1. Carefully place the monitor on its side on a soft, protective surface, with the bottom of the monitor facing you.
2. Push the notched end of the bottom panel under the two chassis tabs as shown in Figure 3. Then align the holes in the bottom panel and the chassis, and install the six mounting screws.

3. Place the monitor upright on the protective pad.

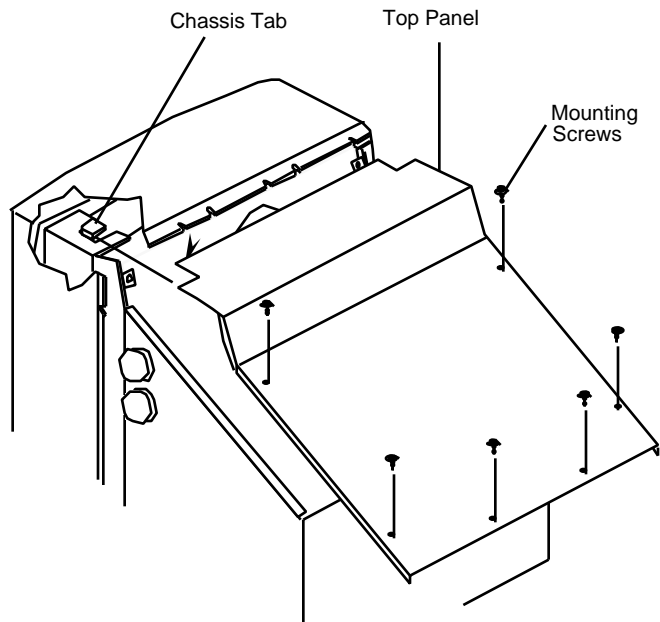


FIGURE 4

4. Push the notched end of the top panel under two chassis tabs as shown in **Figure 4**. Align the holes in the top panel and chassis, and install the six mounting screws.
5. Replace the rear cover.

o DISCHARGING THE CATHODE-RAY TUBE (CRT)

The Macintosh Portrait Display is equipped with a bleeder resistor that automatically drains the charge from the CRT when the power is shut off. **Follow the discharge procedure below to ensure your safety in the event that the resistor has failed and the anode is still fully charged.**

Materials Required

Safety goggles
Foam pad (ungrounded)
Needlenose pliers
Alligator lead
New CRT discharge tool (part number 076-0381)

WARNING: Before starting, read the safety precautions and the CRT discharge procedure in Section 8, CRT Safety, under the You Oughta Know tab. Alternative instructions for discharging the CRT using the older version of the discharge tool (and/or a screwdriver) are given in that section.

WARNING: To prevent serious injury, before discharging the CRT never touch the yoke wires, the anode wire, the anode connector, the three high-voltage resistors on the dynamic focus board, or the flyback transformer (see Figure 5).

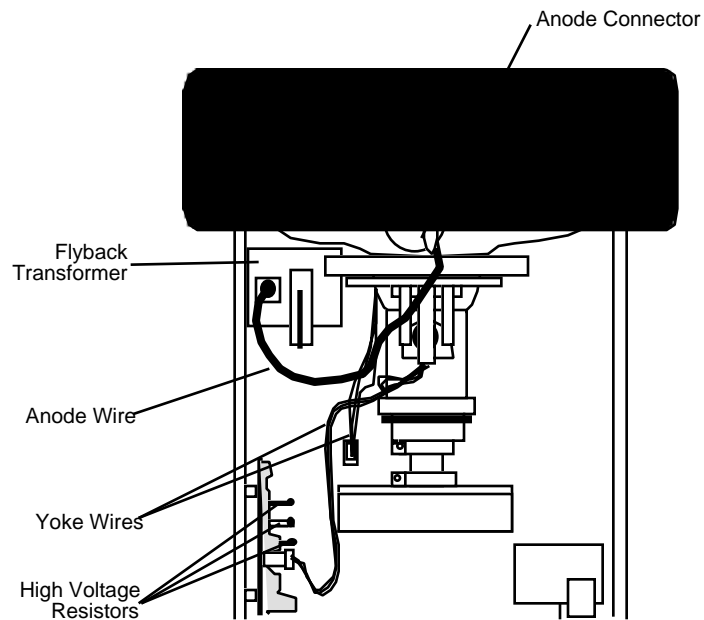


FIGURE 5

Discharge Procedure

1. Remove your grounding wriststrap and jewelry and put on safety goggles before beginning!
2. Remove the rear cover and the top panel of the EMI shield.
3. Set the monitor upright on the ungrounded foam pad, with the back facing you.

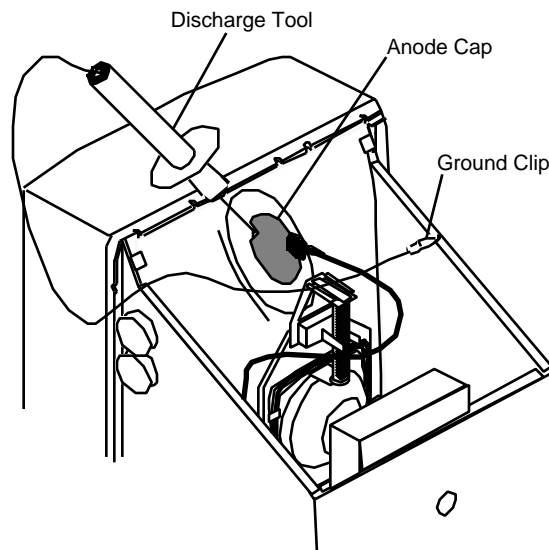


FIGURE 6

4. Attach the clip of the CRT discharge tool to any metal part of the chassis (**Figure 6**).
5. Put one hand behind your back, and grasp the handle of the discharge tool with your other hand.

WARNING: Use only one hand when discharging the CRT to prevent forming a path of current through your body should your hand slip and touch the metal part of the discharge tool during the discharge procedure.

6. Hold the CRT discharge tool to the tube surface, and insert its probe under the anode cap (**Figure 6**) until it touches the anode ring.
7. Remove the probe of the CRT discharge tool from under the anode cap and detach its clip from the metal chassis.

Note: If the bleeder resistor fails, a secondary charge could build up over time, even after you have discharged the CRT. To dissipate any residual charge, establish an ongoing ground by clipping one end of an alligator lead to the chassis frame and the other end to the anode aperture.

Anode Cap

For some procedures, you may have to remove the anode cap (**Figure 7**). After you have discharged the CRT, peel back the anode cap until you can see the anode "ring" (or connector) at the center. Using needlenose pliers, compress the two prongs on the connector to free it from the anode aperture.

To replace the anode cap, press together the two prongs of the anode connector so that you can insert it into the aperture. Tug on the anode wire to make sure it is firmly seated, and then press down around the edges of the rubber anode cap to ensure a firm seal.

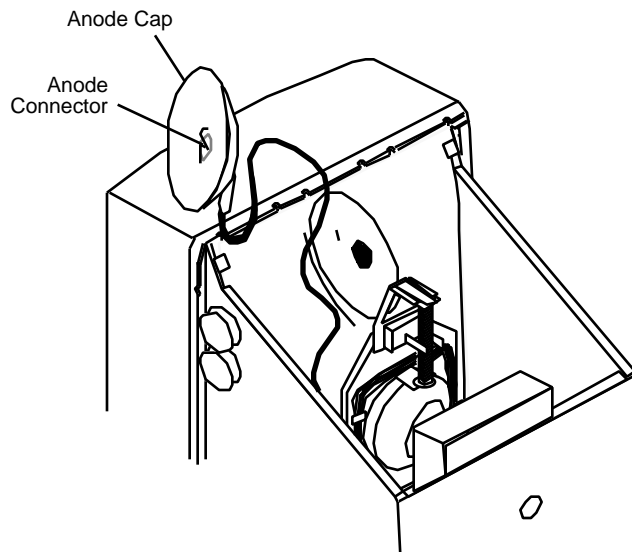


FIGURE 7

o CONTRAST BRIGHTNESS BOARD

Materials Required

Small Phillips screwdriver
Medium flat-tip screwdriver
Small adjustable wrench

Remove

1. Remove the rear cover and top panel of the EMI shield.
2. Discharge the CRT.
3. Place the monitor upright on a grounded workbench pad and put on your grounding wriststrap. (Never put on the grounding wriststrap until after you have discharged the CRT.)
4. Disconnect the following connectors from the contrast brightness board (**Figure 8**) :
 - 2-wire, 3-pin connector
 - 4-wire connector

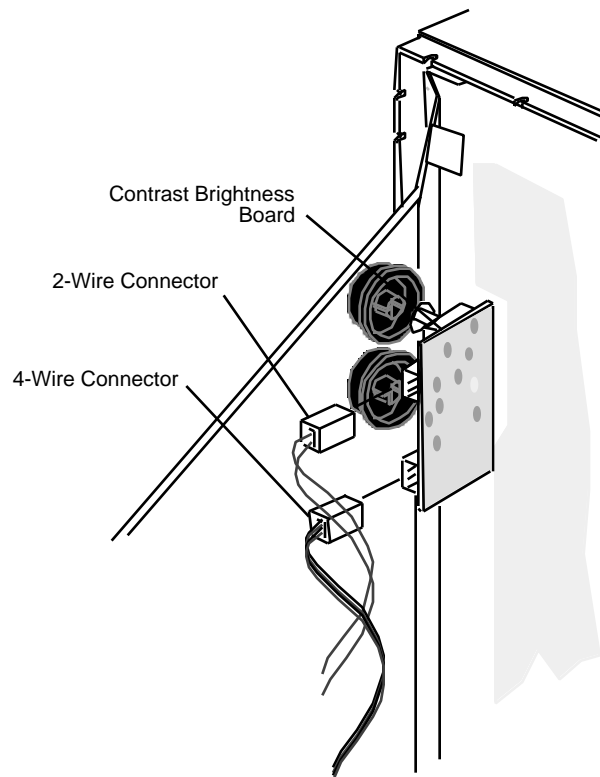


FIGURE 8

5. Pull off the two plastic control knobs (**Figure 9**) . Keep the knobs to install them on the replacement board.
6. Using an adjustable wrench, loosen and remove the two hex nuts from the two adjustment knobs, and remove the contrast brightness board (**Figure 9**) .

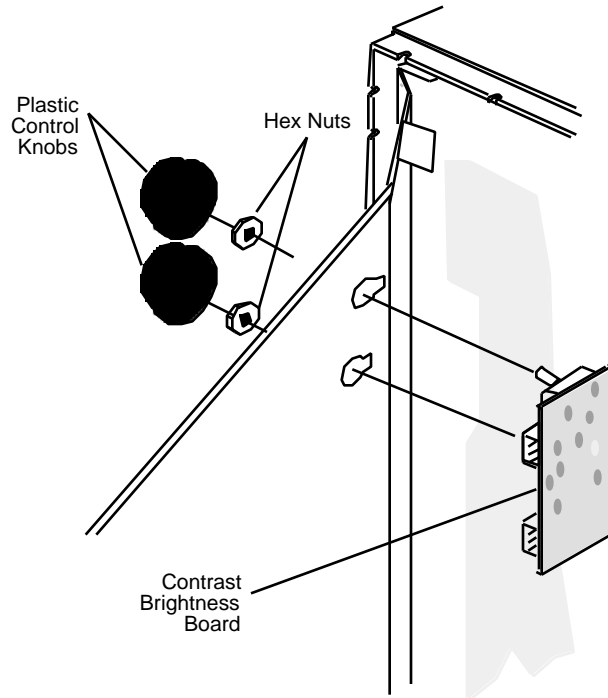


FIGURE 9

Replace

1. Replace the contrast brightness board (**Figure 9**) **on the chassis**, and install the two hex nuts. Tighten the nuts with an adjustable wrench.
2. Replace the two control knobs (**Figure 9**) .

3. Reconnect the following connectors to the contrast brightness board (Figure 10) .

- 4-wire connector
- 2-wire, 3-pin connector

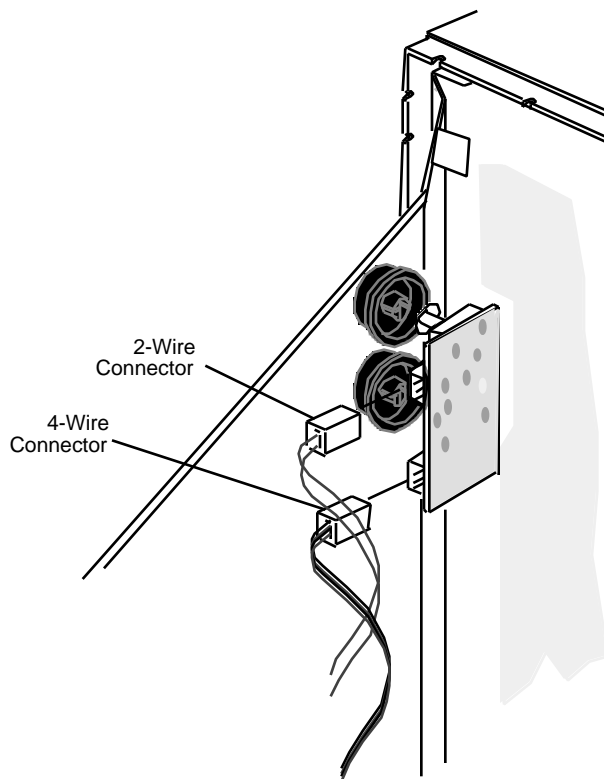


FIGURE 10

4. Replace the top panel of the EMI shield.

5. Replace the rear cover.

o DYNAMIC FOCUS BOARD

Remove

1. Remove the rear cover and the top panel of the EMI shield, and and install the two hex nuts.
2. Place the monitor upright on a grounded workbench pad and put on your grounding wriststrap (put on the wriststrap **only** after discharging the CRT).

WARNING: When removing connectors from the dynamic focus board, be careful not to touch resistors R517, R518, or R520 (**Figure 11**). These are high-voltage resistors.

3. Disconnect the following connectors from the dynamic focus board (**Figure 11**) :
- Single-wire connector (labelled CO on the dynamic focus board)
 - 2-wire, 4-pin connector (labelled CP)
 - 2-wire connector (labelled CQ)
 - 6-wire connector (labelled CI)

Note: To disconnect connector CQ you must first depress its two plastic release tabs.

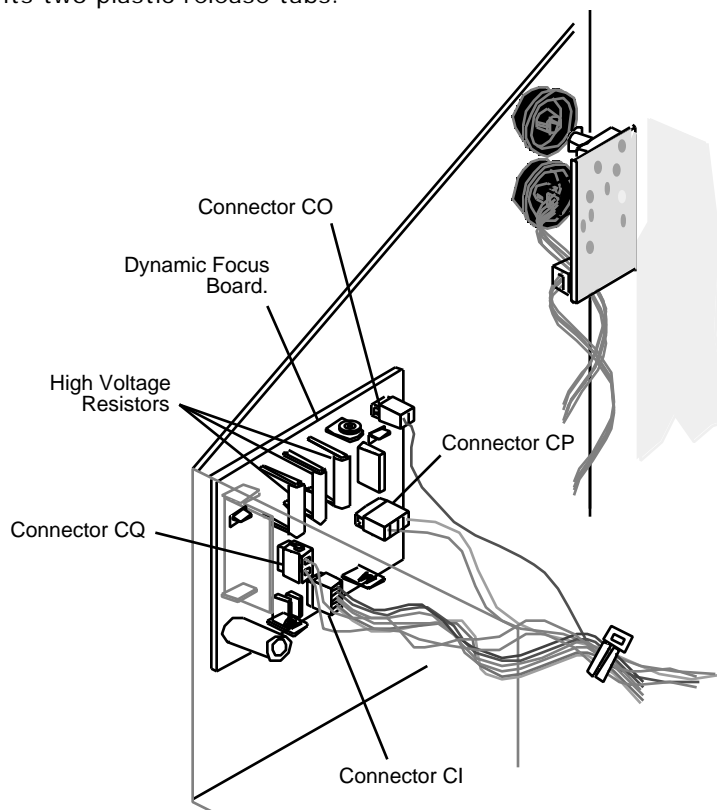


FIGURE 11

4. Pull up on two plastic mounting tabs (**Figure 12**) to release the dynamic focus board from the chassis. Carefully lift out the board.

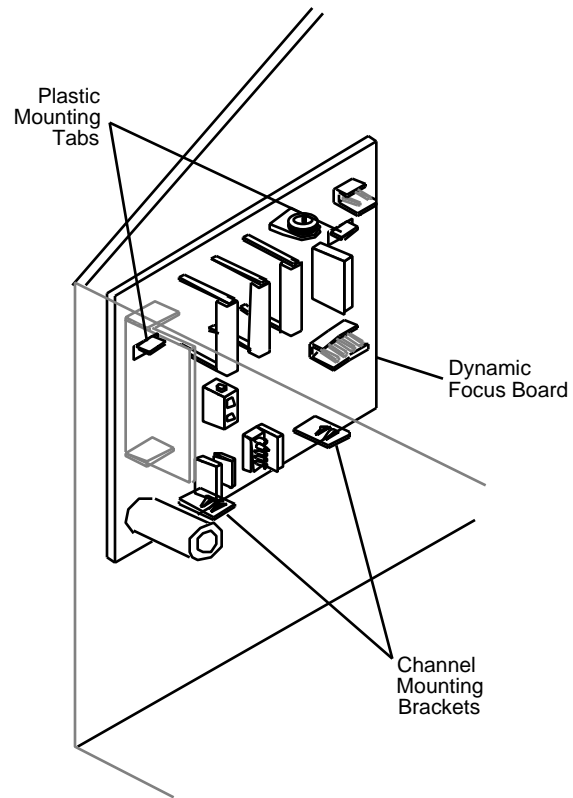


FIGURE 12

Replace

1. Place the dynamic focus board onto the two chassis mounting brackets (**Figure 12**). Be sure the two notches along the bottom of the board are placed between channel locks on the mounting brackets.
2. Align the two plastic mounting tabs with the mounting holes in the top of the board (**Figure 12**). Pull back on the top of the board until it snaps securely onto the mounting tabs.

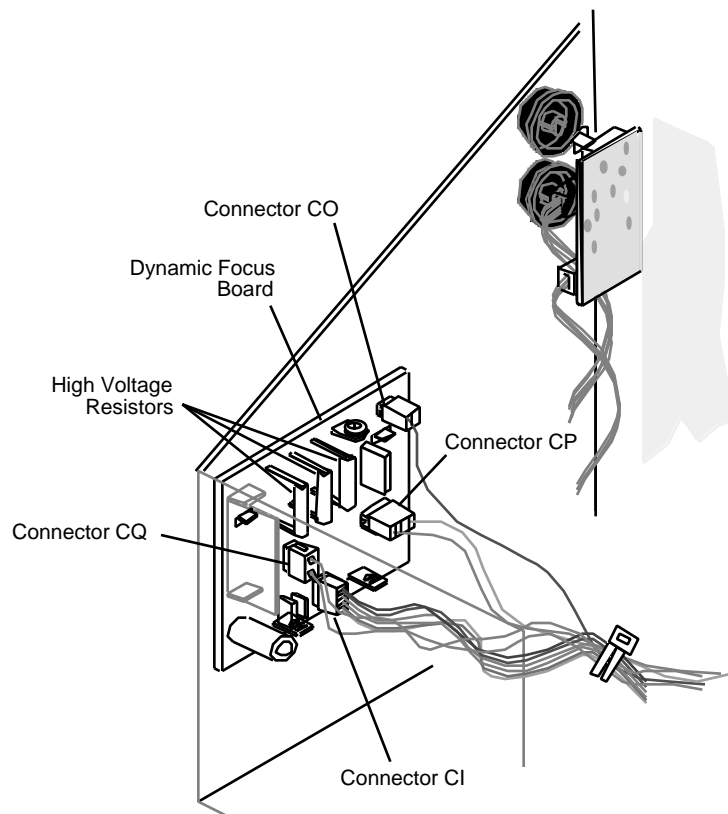


FIGURE 13

3. Reconnect the following connectors to the dynamic focus board (Figure 13) :
 - 6-wire connector to CI
 - 2-wire connector to CQ (push until its two plastic release tabs lock in place)
 - 2-wire, 4-pin connector to CP
 - Single-wire connector to CO
4. Replace the top panel of the EMI shield.
5. Replace the rear cover.

o ON/OFF SWITCH ASSEMBLY

Materials Required

Small Phillips screwdriver
Medium flat-blade screwdriver

Remove

1. Remove the rear cover and the top panel of the EMI shield, and discharge the CRT.
2. Place the monitor upright on a grounded workbench pad and put on your grounding wriststrap (put on the wriststrap **only after** discharging the CRT).
3. Pull the plastic knob off the on/off switch (**Figure 14**).

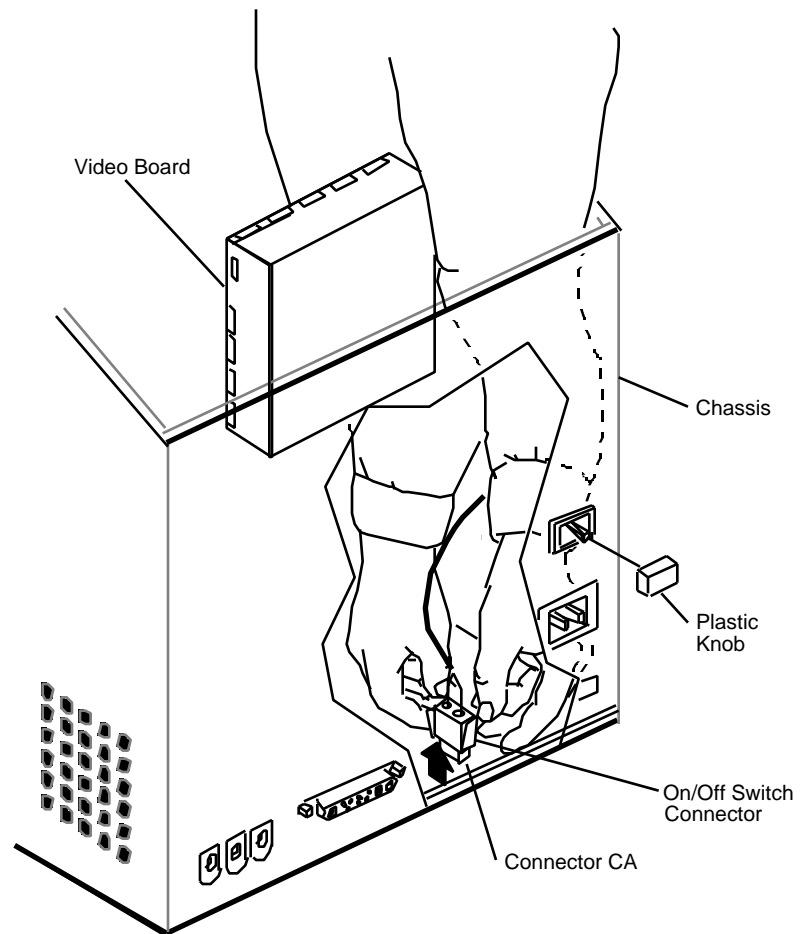


FIGURE 14

WARNING: The neck of the CRT can be easily damaged. Be careful not to apply excessive pressure on the video board when removing the on/off switch connector.

4. Disconnect the 2-wire, on/off switch connector (**Figure 14**) from the connector labelled **CA** on the main deflection board. (Suggestion: To remove the on/off switch connector, insert your right hand around and beneath the video board as shown in **Figure 14**, and insert your left hand between the video board and the rear of the chassis. Be sure to release the tabs on the sides of the connector.)
5. Disconnect the power input connector (**Figure 15**) from the connector on the on/off switch board.

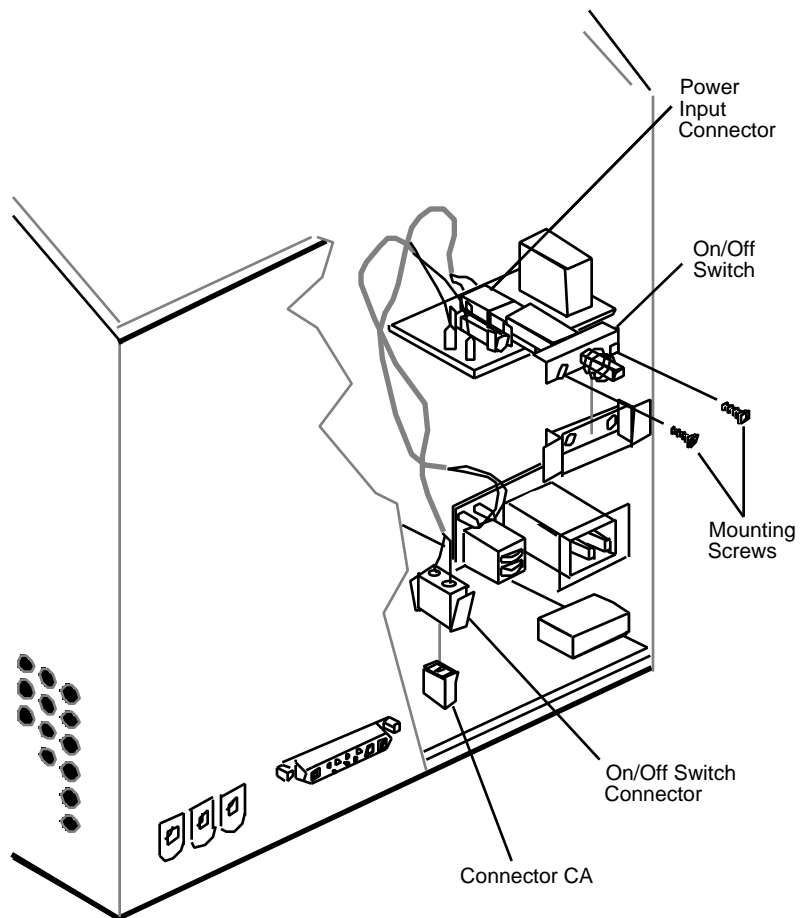


FIGURE 15

6. Remove two mounting screws (**Figure 15**), and remove the on/off switch from inside the chassis.

Replace

1. Replace the on/off switch on the chassis mounting bracket, and install the two mounting screws (Figure 16) .

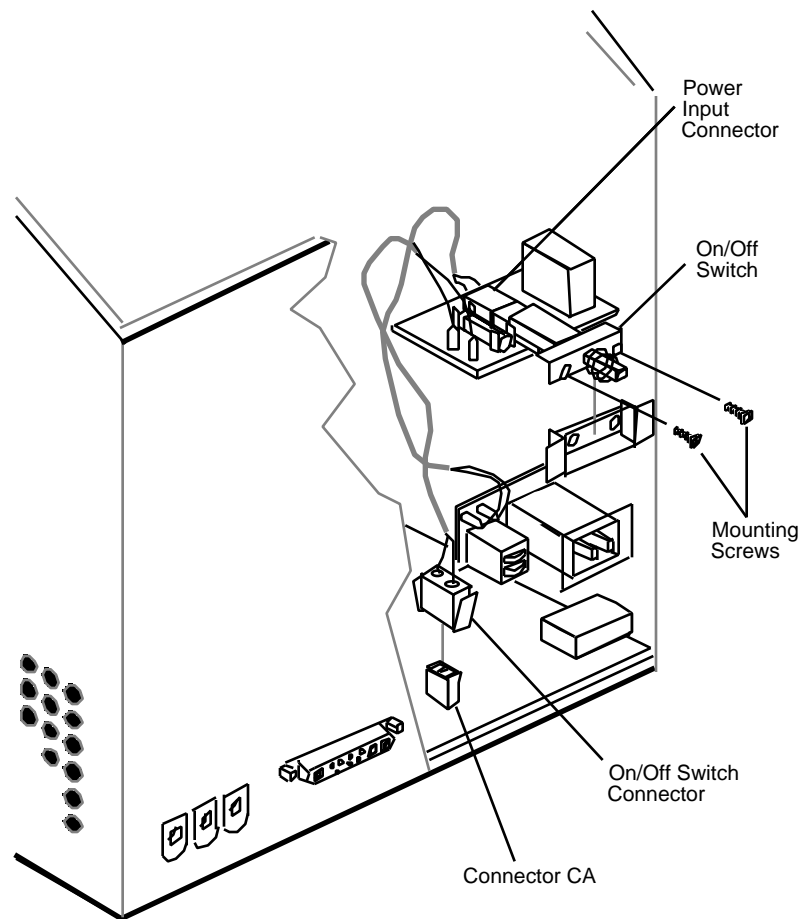


FIGURE 16

2. Connect the power input connector (Figure 16) to the connector on the on/off switch board.
3. Connect the 2-wire, on/off switch connector (Figure 16) to the connector labelled CA on the main deflection board.
4. Replace the plastic knob (Figure 16) on the on/off switch.
5. Replace the top panel of the EMI shield and the rear cover.

o FUSE

Materials Required

Small flat-blade screwdriver

Remove

1. Remove the rear cover and the top panel of the EMI shield, and discharge the CRT.
2. Place the monitor upright on a grounded workbench pad and put on your grounding wriststrap (put on the wriststrap **only after** discharging the CRT).
3. Remove the fuse from the on/off switch board (**Figure 17**) . Gently pry up one end of the fuse with your fingers or a flat-blade screwdriver, and lift the fuse out of the holder.

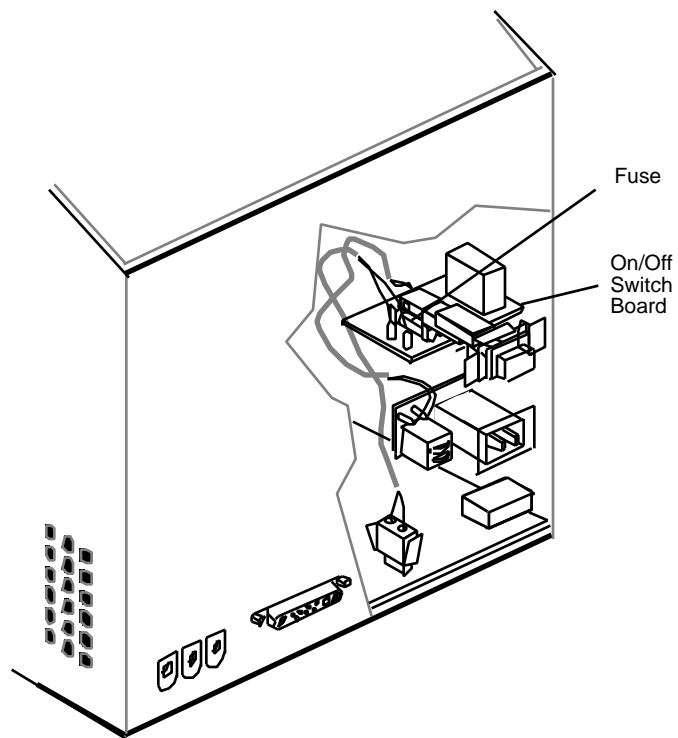


FIGURE 17

Replace

1. Using your fingers, carefully snap the new fuse into the fuse holder (**Figure 17**) .
2. Replace the top panel of the EMI shield, and replace the rear cover.

o AC INPUT/FILTER ASSEMBLY

Materials Required

Medium Phillips screwdriver

Remove

1. Remove the rear cover and the top panel of the EMI shield, and discharge the CRT.
2. Place the monitor upright on a grounded workbench pad and put on your grounding wriststrap (put on the wriststrap **only** after discharging the CRT).
3. Remove the on/off switch assembly.

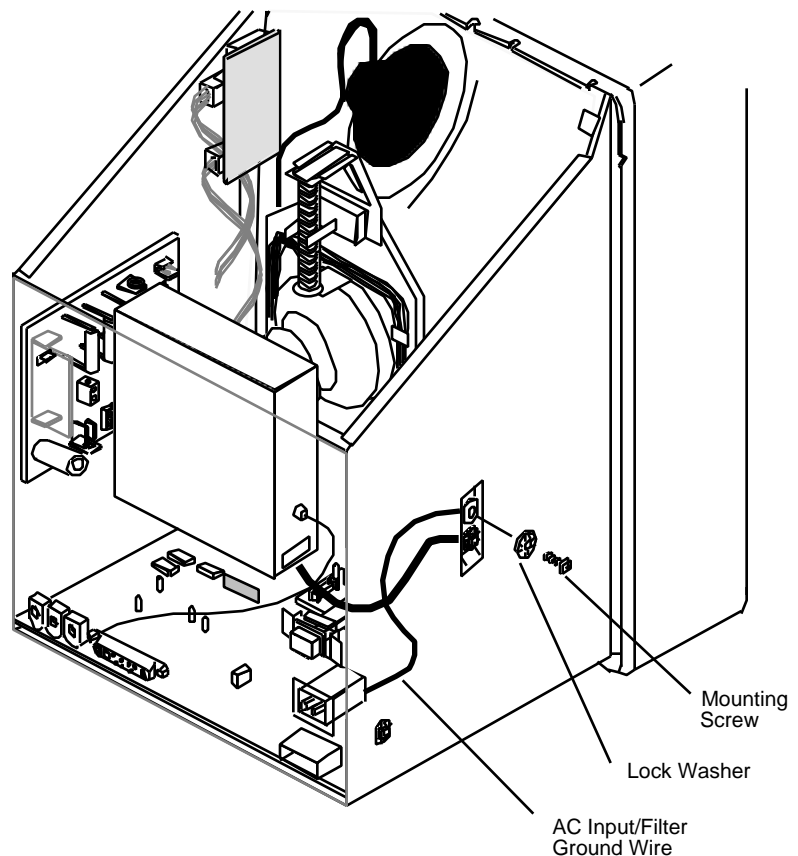


FIGURE 18

4. Remove the screw, lock washer, and AC input/filter ground wire from the ground bracket (**Figure 18**).

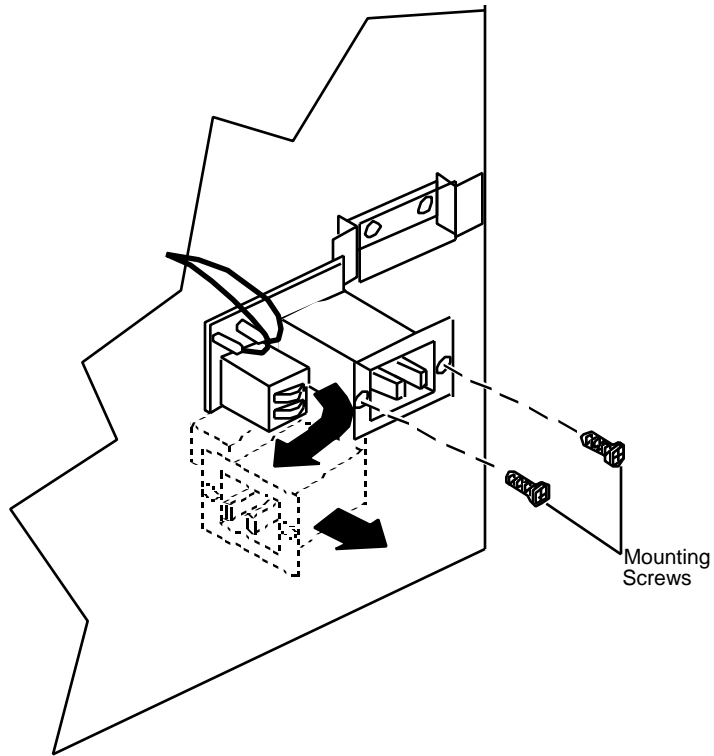


FIGURE 19

5. Remove the two mounting screws, and carefully remove the AC input/filter assembly through the mounting hole in the chassis (**Figure 19**). To remove the input/filter assembly, turn it left (clockwise) as you pull it through the mounting hole.

Replace

1. Install the new AC input/filter assembly on the chassis mounting bracket with two screws (**Figure 19**). To install the input/filter assembly, first insert the cables and filter board through the chassis mounting hole, and then turn the assembly to the right (counterclockwise) to insert the AC inlet.
2. Install the AC input/filter ground wire on the chassis ground bracket with a lock washer and a screw (**Figure 18**).

3. Replace the on/off switch assembly.
4. Replace the top panel of the EMI shield.
5. Replace the rear cover.

o VIDEO BOARD

Materials Required

Medium Phillips screwdriver
Small needlenose pliers
Soldering iron and solder
Plastic tie-wrap

Remove

1. Remove the rear cover, and remove the top and bottom panels of the EMI shield.
2. Discharge the CRT, and remove the anode cap.
3. Place the monitor upright on a grounded workbench pad and put on your grounding wriststrap (put on the wriststrap **only** after discharging the CRT).
4. Remove the screw, lock washer, and large black video ground cable from the ground bracket (Figure 20) .

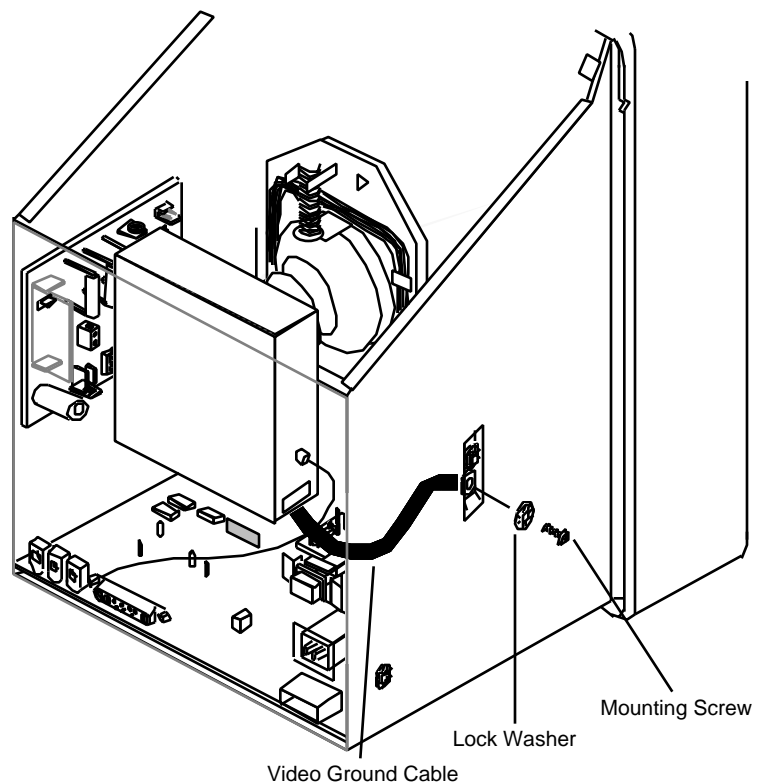


FIGURE 20

5. Disconnect the 4-wire connector from the contrast brightness board (Figure 21) . Open the two tie wraps to the left of the neck of the CRT.

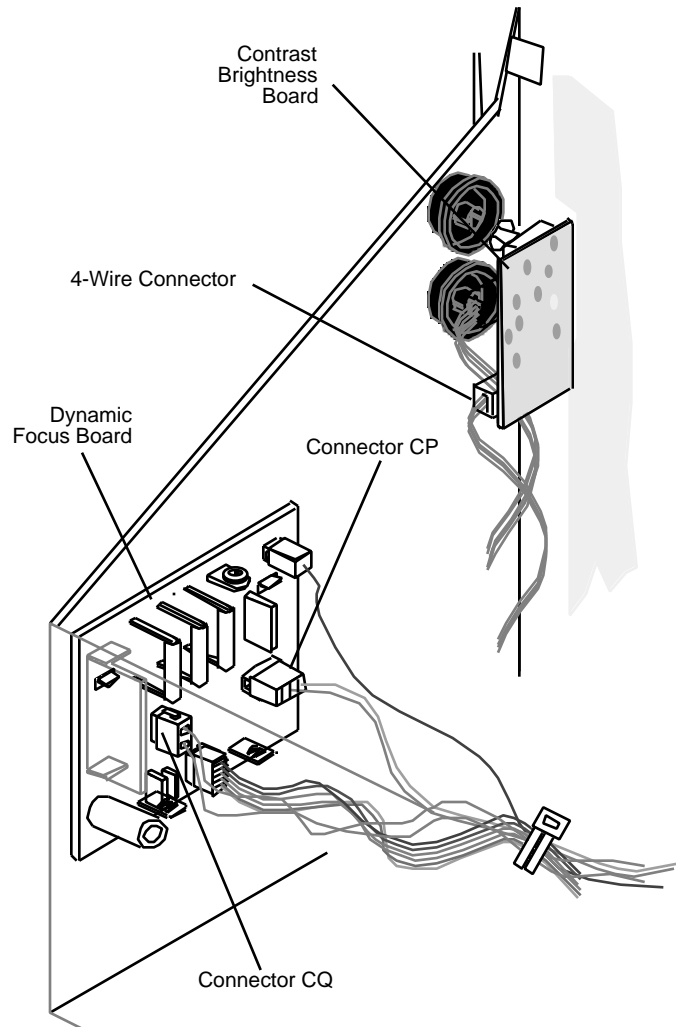


FIGURE 21

6. Disconnect the following connectors from the dynamic focus board (Figure 21) :
 - 2-wire, 4-pin connector (labelled CP)
 - 2-wire connector (labelled CQ)

Note: To disconnect connector CQ you must first depress its two plastic release tabs.

7. Disconnect the following connectors from the video board (Figure 22) :

- Video connector
- 7-wire connector

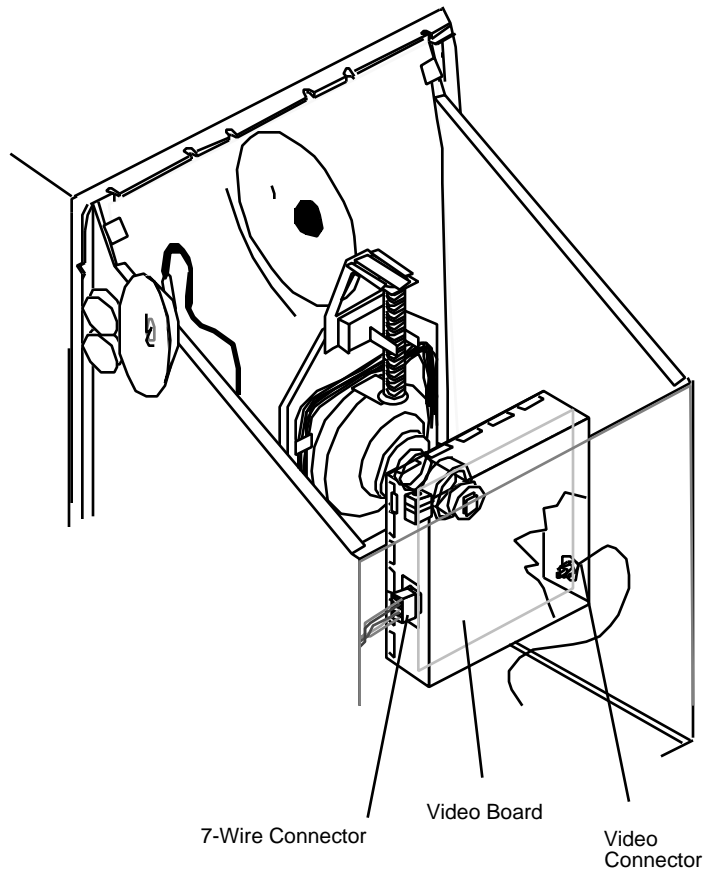


FIGURE 22

8. Carefully place the monitor face down on the protective workbench pad.

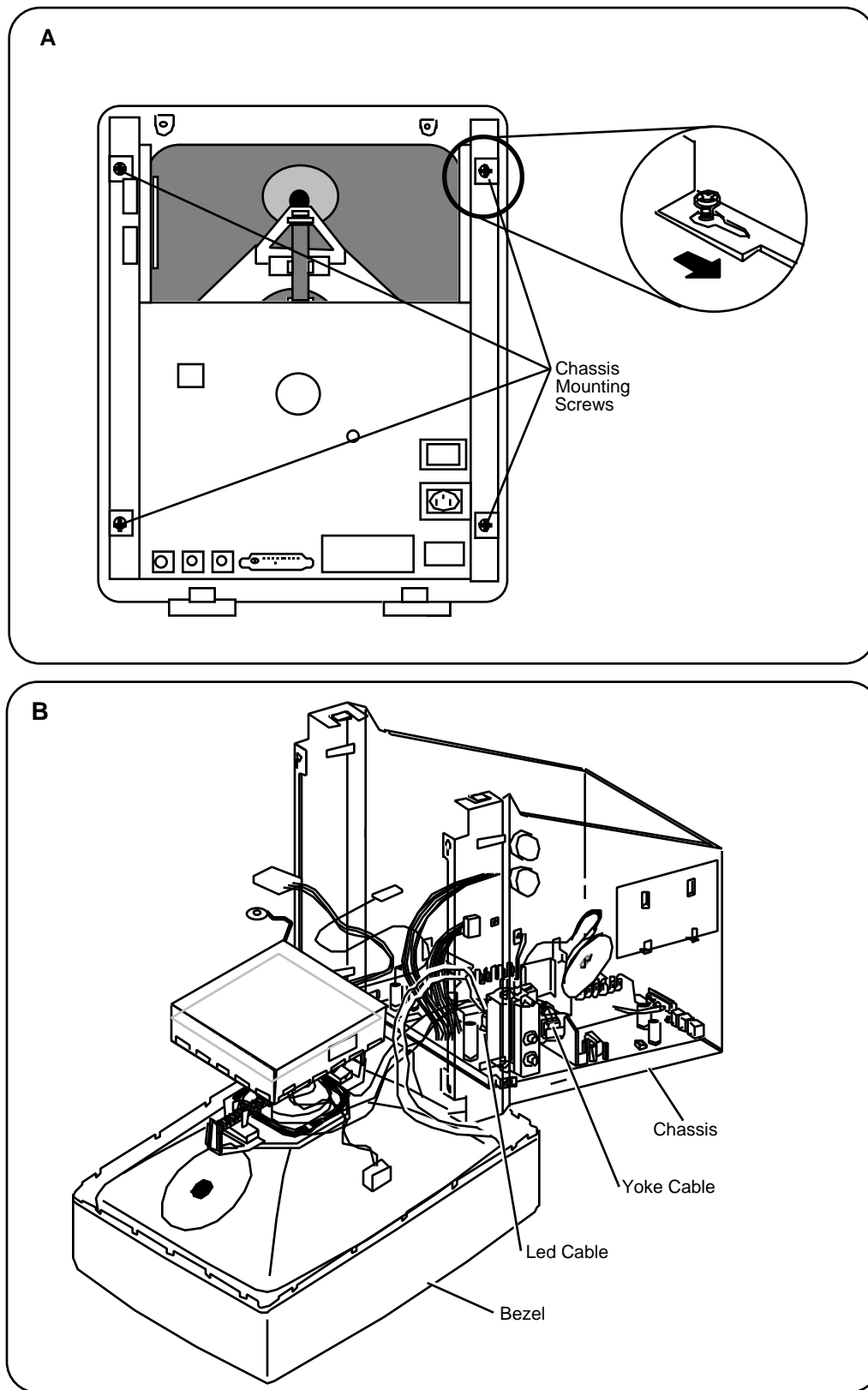


FIGURE 23

CAUTION: When separating the chassis from the bezel, keep in mind that the LED cable and the 4-wire yoke cable are still connected between the chassis and bezel.

9. Separate the chassis and bezel. To do this, refer to **Figure 23** and follow these substeps:
 - a) Loosen (but do not remove) the four chassis mounting screws.
 - b) With the monitor facedown, slide the chassis toward its bottom until the openings in the chassis flanges are aligned with the four screwheads (**Figure 23A**) .
 - c) Carefully lift the chassis off the mounting screws and rest it, right side up, on the edge of the bezel as shown in **Figure 23B** . With your right hand, hold the chassis on the bezel.
 - d) With your left hand, disconnect the following connectors from the main deflection board:
 - LED cable (labelled **CN**)
 - 4-wire yoke cable (labelled **CH**)
 - e) Set the chassis aside on the protective pad.

Note: Stop here if you are performing this procedure only to access the main deflection board, the LED assembly, or the bezel.

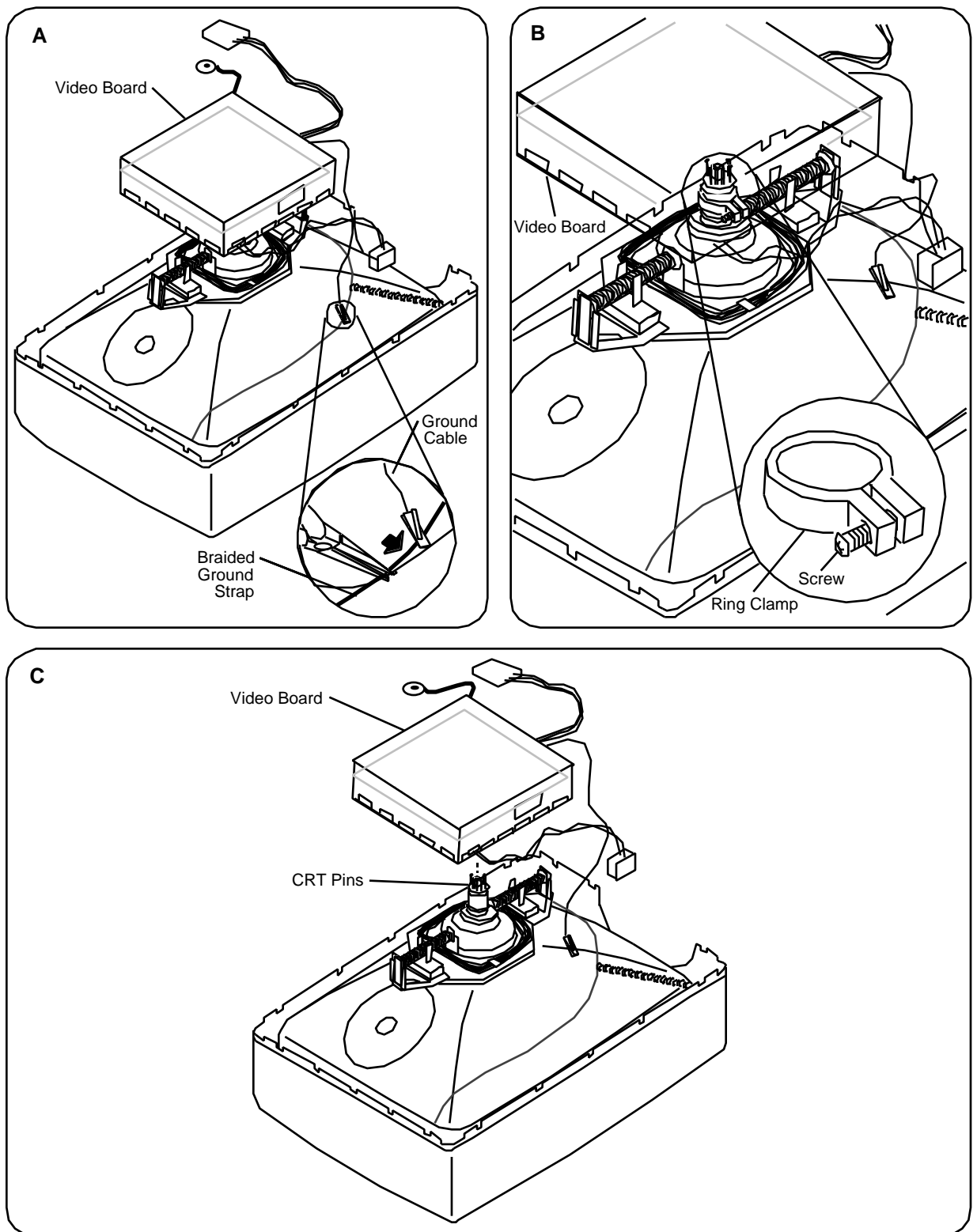


FIGURE 24

10. Disconnect the small black ground cable from the chassis. To do this, pull on the cable and grasp the braided (Aquadag) ground strap with the needlenose pliers. While using the pliers to pull the Aquadag strap away from the CRT with one hand, unhook the ground cable with your other hand (**Figure 24A**) .

WARNING: *Twisting, bending, or applying force to the video board could damage the neck of the CRT. Hold the video board squarely on the neck of the CRT with one hand while loosening the ring clamp screw with the other.*

11. Loosen the screw on the plastic ring clamp that secures the video board to the neck of the CRT (**Figure 24B**) .
12. Remove the video board from the neck of the CRT (**Figure 24C**) . To do this, grab the metal cover with both hands and carefully pull the video board straight back off the CRT.

Replace

1. Install the new video board on the neck of the CRT (**Figure 24C**) . To do this, first check that none of the CRT pins is bent; straighten bent pins with a needlenose pliers. Then align the video board connector with the plastic alignment nipple on the neck of the CRT, and firmly push the video board connector onto the neck of the CRT.

WARNING: *Forcing the video board onto the CRT could damage the neck of the CRT. If the video board does not slide easily onto the CRT, slightly adjust the alignment between the video board and the CRT pins and try again. Also do not overtighten the screw on the ring clamp.*

2. Tighten the screw (**Figure 24B**) on the ring clamp just enough to keep the video board from slipping.
3. Reconnect the small black video ground cable to the Aquadag ground strap on the CRT (**Figure 24A**) . To do this, first bend open the inner tongue of the metal connector at the end of the video ground cable. Then insert the tip of the jeweler's screwdriver between the braided Aquadag ground strap and the body of the CRT. While prying the Aquadag strap away from the CRT, slip the metal connector on the end of the video ground cable over the Aquadag strap. Bend the tongue back to secure the connector to the Aquadag strap.

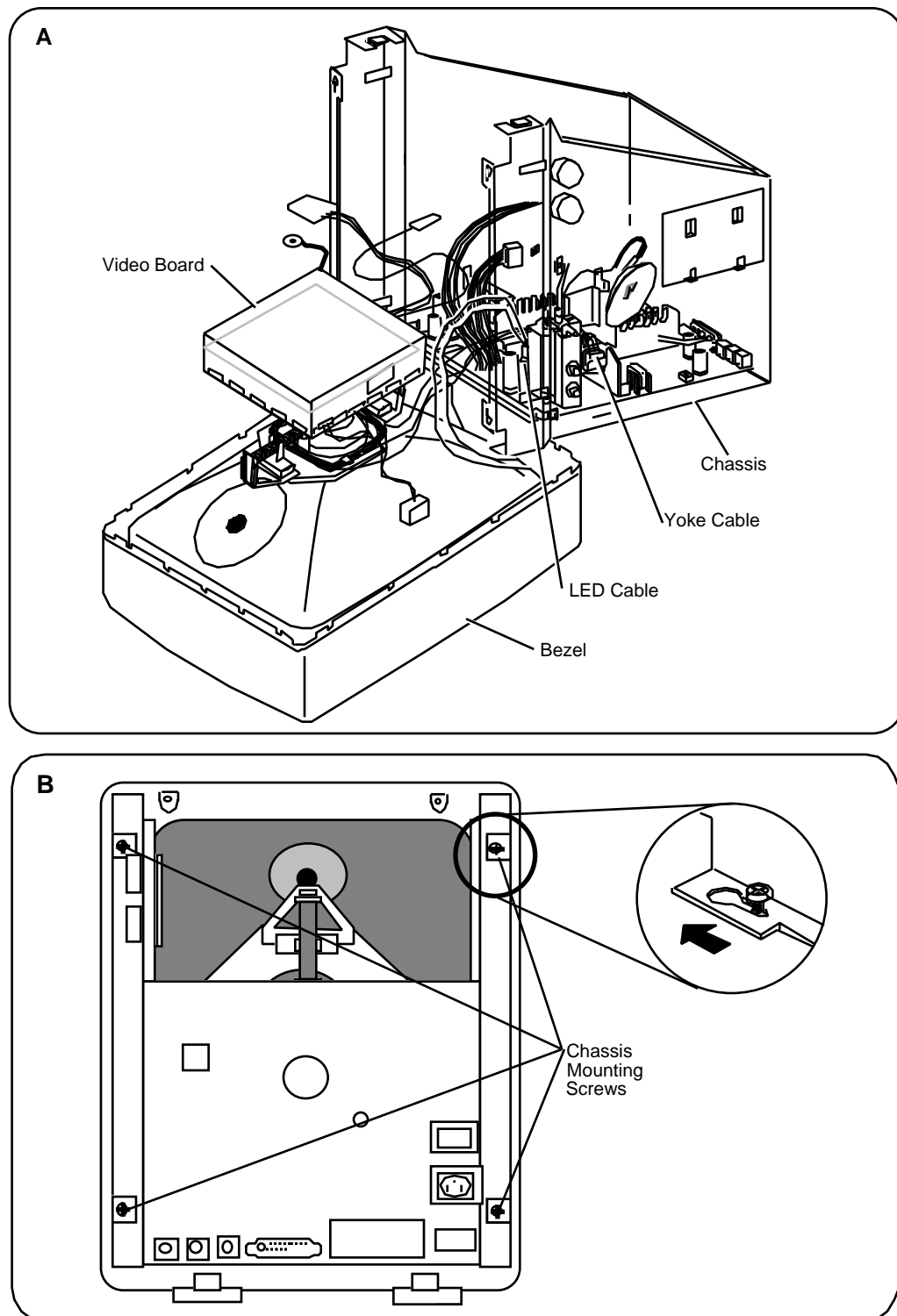


FIGURE 25

4. Replace the chassis on the bezel. To do this, refer to **Figure 25** and follow these substeps:
 - a) Place the chassis right side up on the edge of the bezel as shown in **Figure 25A**. Hold the chassis with your right hand.
 - b) With your left hand, connect the following connectors to the main deflection board:
 - 4-wire yoke cable (to the connector labelled **CH** on the main deflection board)
 - LED cable (to connector **CN**)
 - c) Tuck all loose cables inside the chassis.
 - d) Carefully place the chassis on the bezel. Slip the four holes in the chassis flange over the four chassis mounting screws, and lock the chassis under the mounting screws as shown in **Figure 25B**.
 - e) Tighten the four chassis mounting screws.
5. Carefully place the monitor upright on the protective workbench pad.

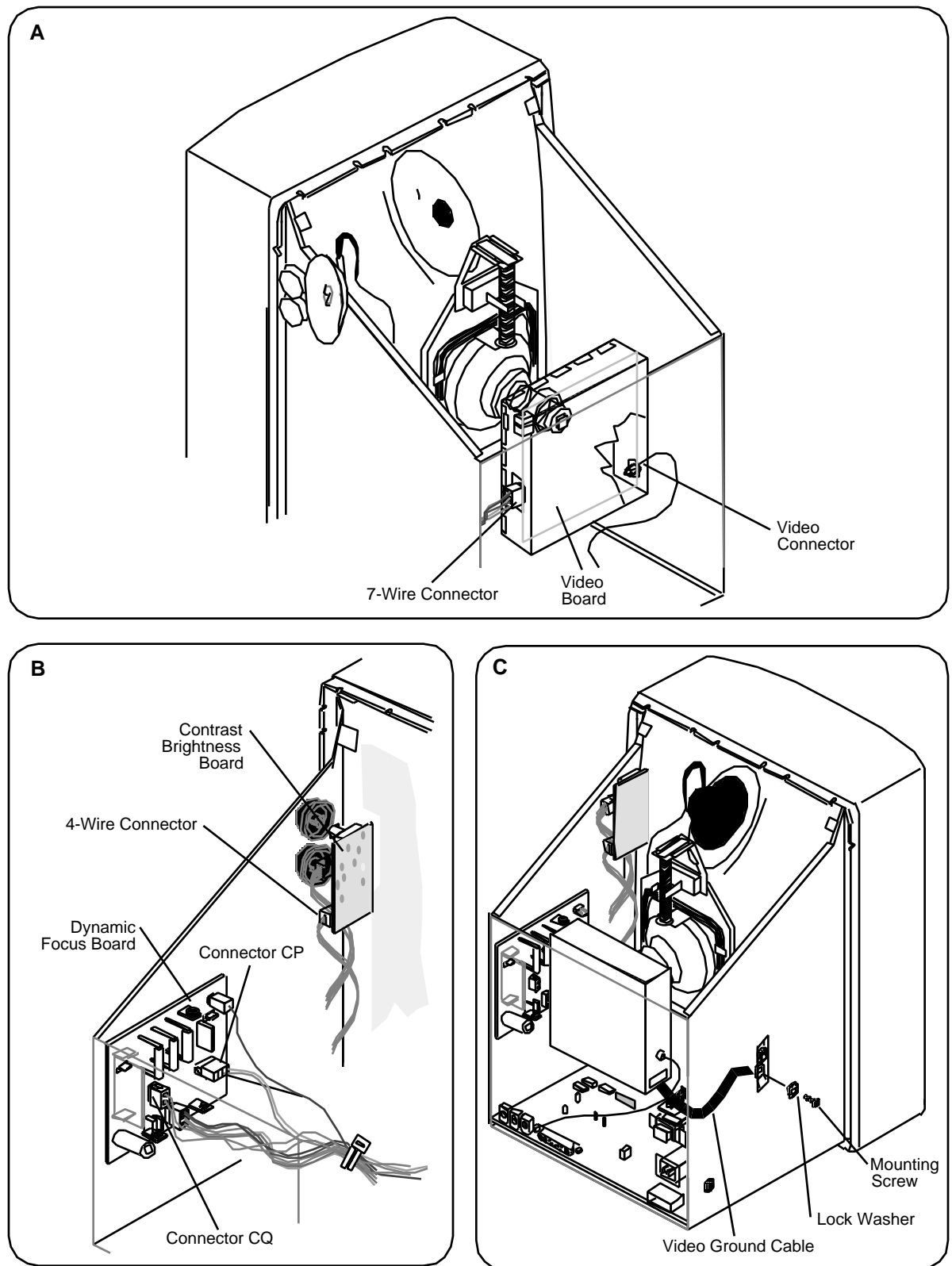


FIGURE 26

6. Reconnect the following connectors to the video board (**Figure 26A**) :
 - 7-wire connector
 - Video connector
7. Reconnect the following connectors to the dynamic focus board (**Figure 26B**) :
 - 2-wire, 4-pin connector (labelled CP)
 - 2-wire connector (labelled CQ)
8. Reconnect the 4-wire connector to the contrast brightness board (**Figure 26B**) . Rebundle the loose video cables with the two tie wraps.
9. Reconnect the large, black video ground cable to the chassis ground terminal with the lock washer and screw (**Figure 26C**) .
10. Replace the bottom and top panels of the EMI shield.
11. Replace the rear cover.

o MAIN DEFLECTION BOARD

Materials Required

Small Phillips screwdriver
Medium Phillips screwdriver
3/8-inch nut driver
Small flat-blade screwdriver

Remove

1. Remove the rear cover, and the top and bottom panels of the EMI shield.
2. Discharge the CRT and remove the anode cap.
3. Place the monitor upright on a grounded workbench pad, and put on your grounding wriststrap. (Never put on the grounding wriststrap until after you have discharged the CRT.)
4. Separate the chassis from the bezel. Refer to the video board Remove procedure.
5. Disconnect the on/off switch connector from the connector labelled **CA** on the main deflection board (**Figure 27**).

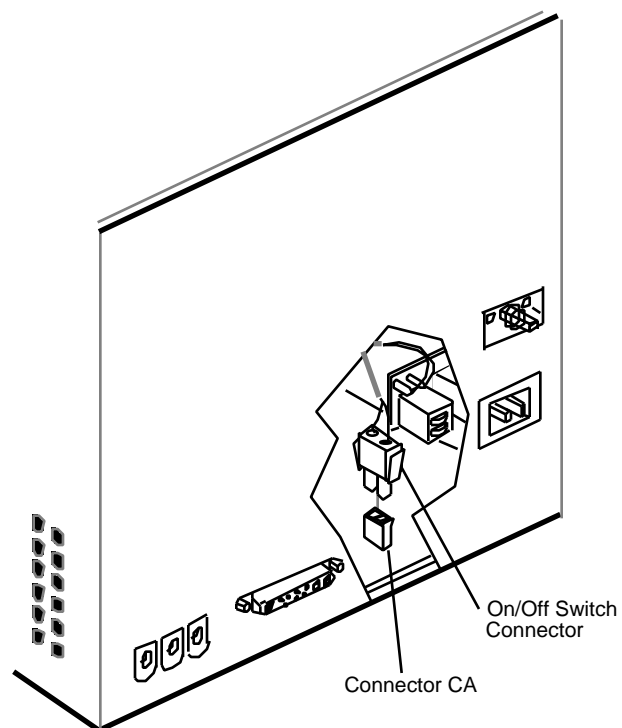


FIGURE 27

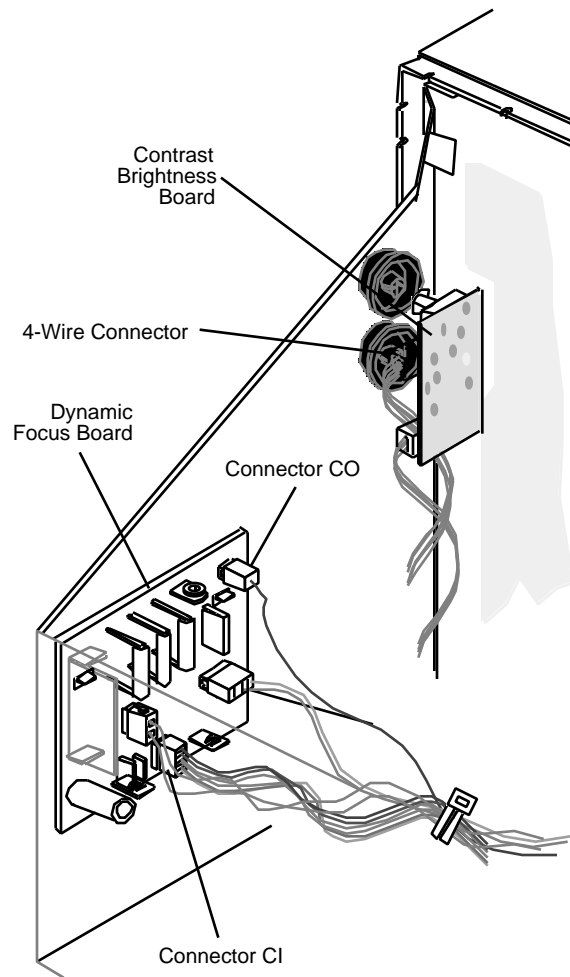


FIGURE 28

6. Disconnect the following connectors from the dynamic focus board (Figure 28) :
 - Single-wire connector (labelled CO)
 - 6-wire connector (labelled CI)
7. Disconnect the 3-pin, 2-wire connector from the contrast brightness board (Figure 28) .

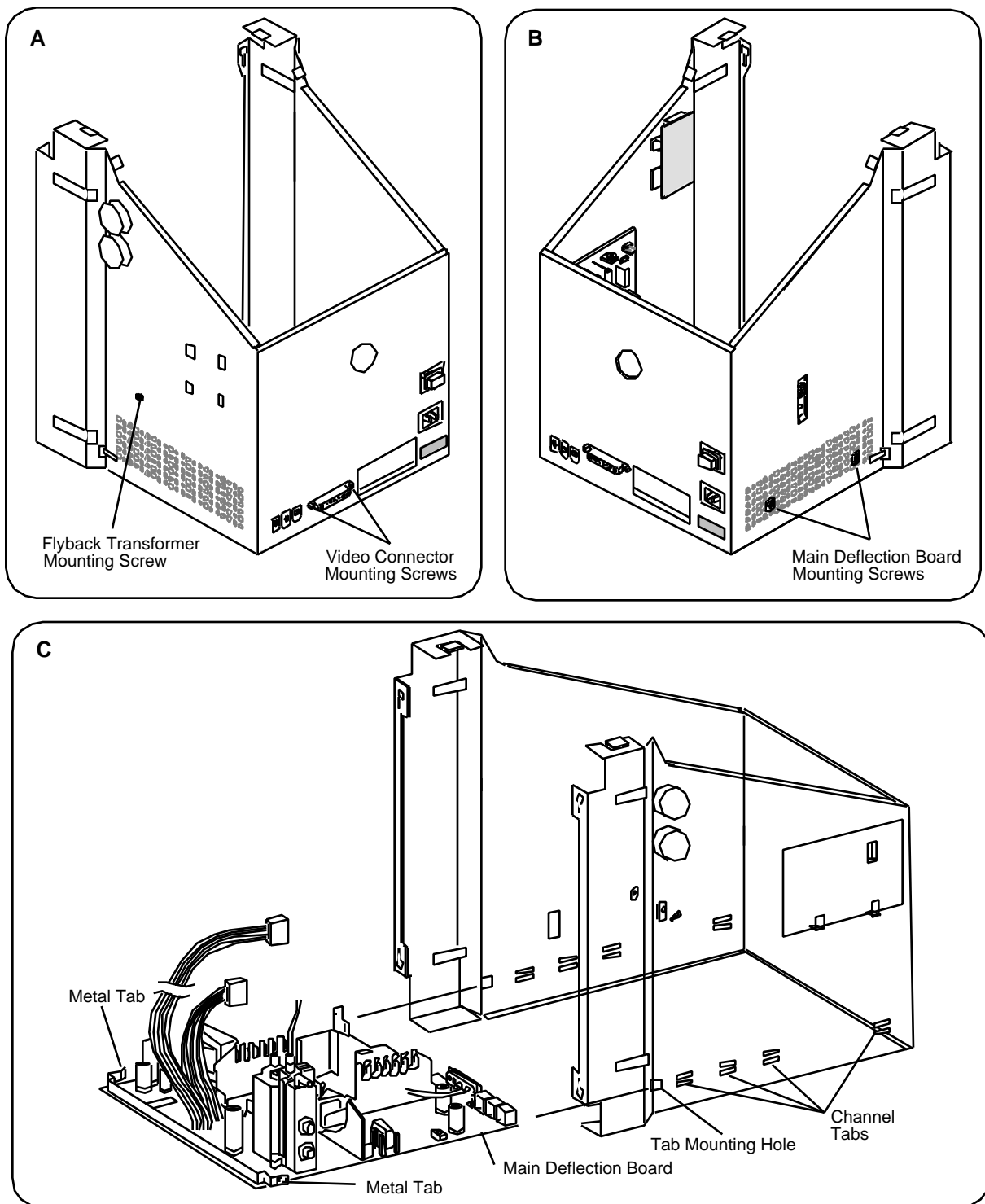


FIGURE 29

8. Remove the screw that secures the flyback transformer to the chassis (**Figure 29A**) .
9. Using the 3/16-inch nut driver, remove the two screws that secure the video connector to the chassis (**Figure 29A**) .
10. Remove two screws and lock washers that secure the main deflection board to the chassis (**Figure 29B**) .
11. Using a flat-blade screwdriver, pry open the two metal tabs and pull the main deflection board out of the chassis (**Figure 29C**) .

Replace

1. Replace the main deflection board on the chassis (**Figure 29C**) . To do this, fit the board between the channel tabs lining both sides of the chassis. Then push the board forward until the video connector extends through the front of the chassis and the two metal tabs snap onto the chassis.
2. Replace the two screws and lock washers that secure the main deflection board to the chassis (**Figure 29B**) .
3. Using the 3/16-inch nut driver, replace the two mounting screws that secure the video connector to the chassis (**Figure 29A**) .
4. Replace the screw that secures the flyback transformer to the chassis (**Figure 29A**) .

5. Connect the 3-pin, 2-wire connector to the contrast brightness board (Figure 30) .

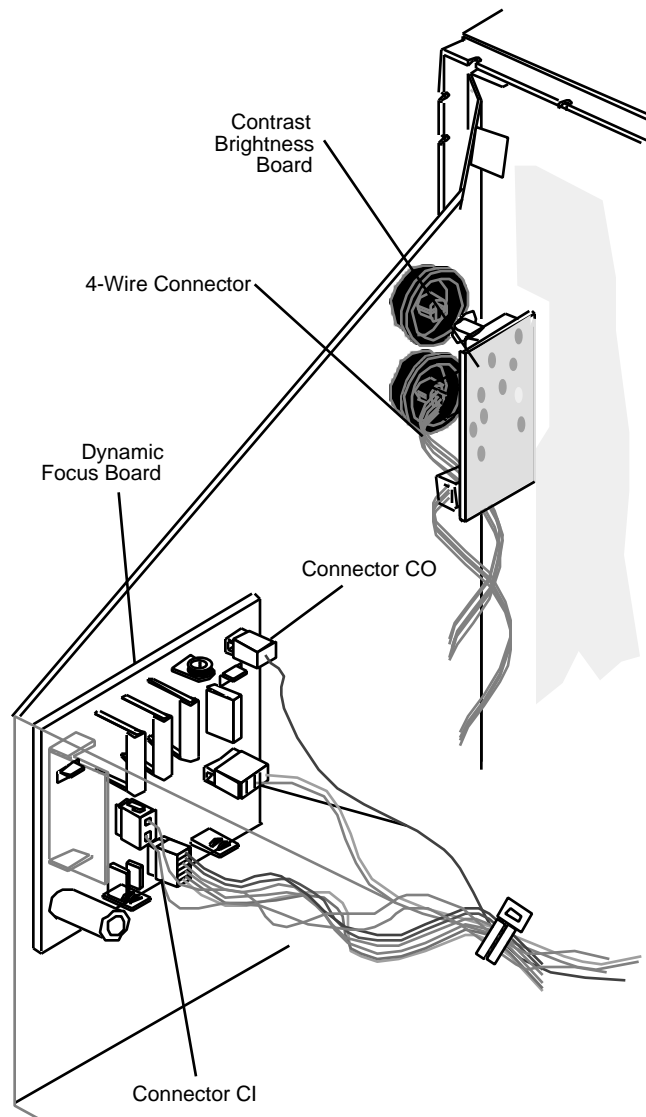


FIGURE 30

6. Connect the following connectors to the dynamic focus board (Figure 30) :
- 6-wire connector (to the connector labelled CI)
 - Single-wire connector (labelled CO)

7. Connect the on/off switch cable to the connector labelled **CA** on the main deflection board (**Figure 31**).

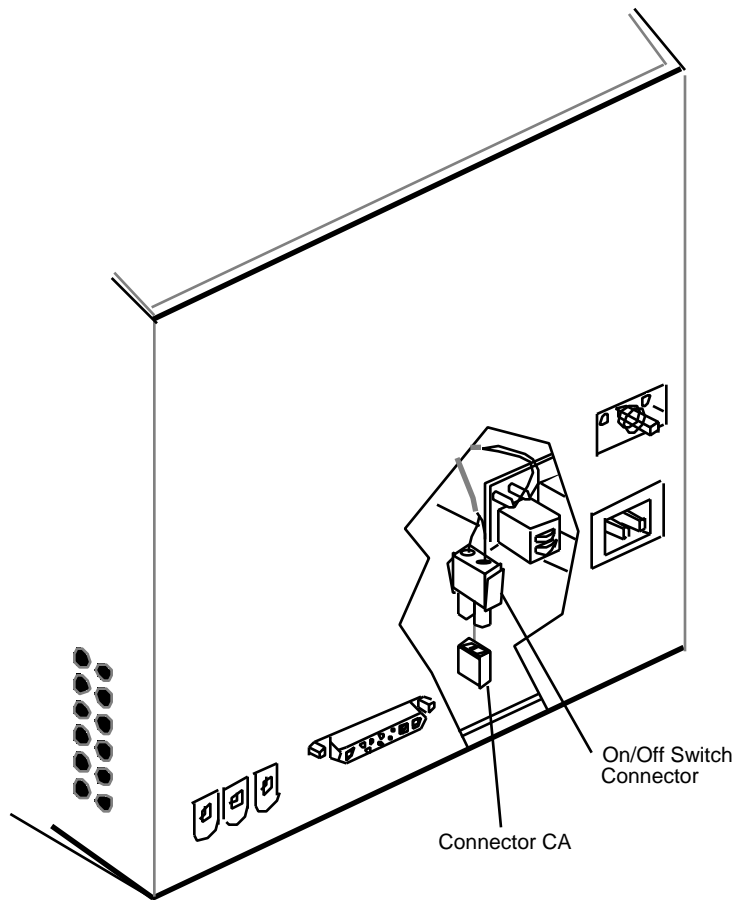


FIGURE 31

8. Replace the chassis. Refer to the video board Replace procedure.
9. Replace the anode cap.
10. Replace the bottom and top panels of the EMI shield.
11. Replace the rear cover.

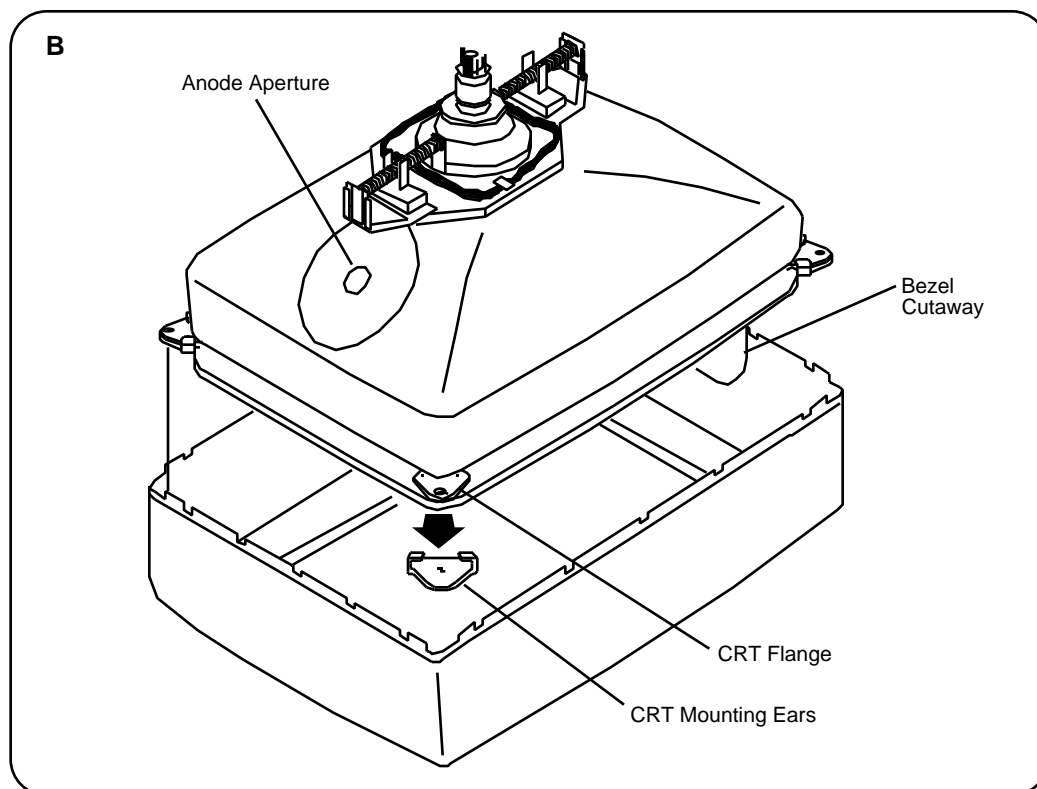
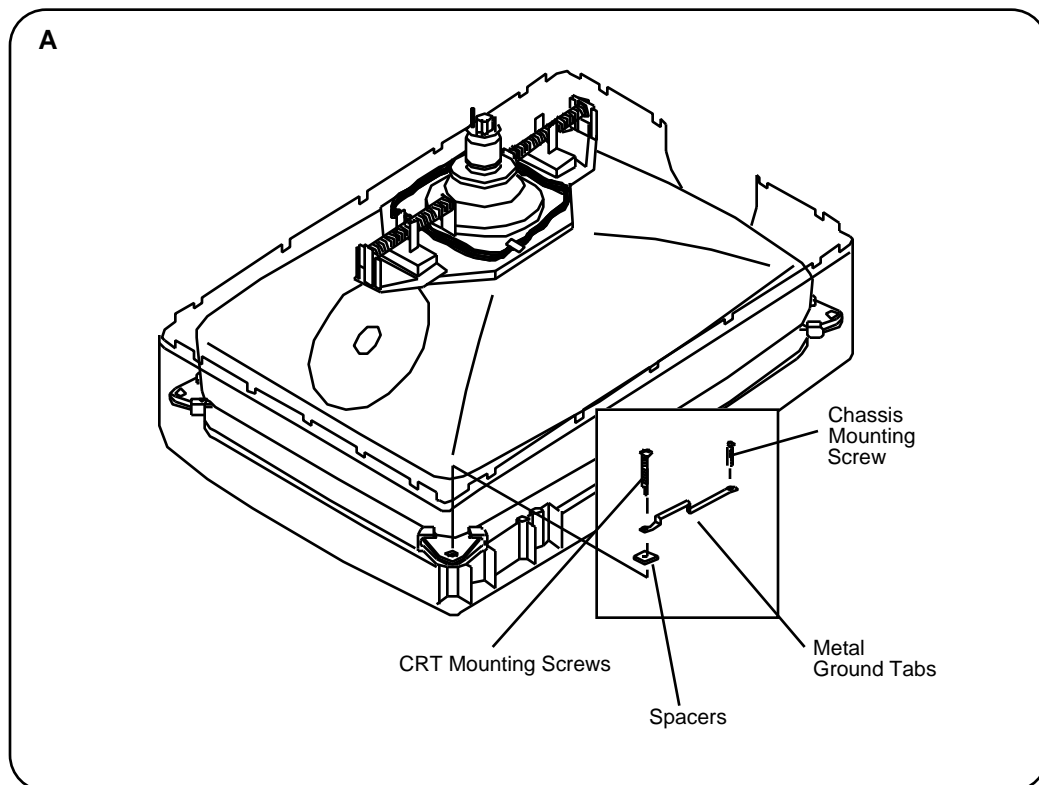


FIGURE 32

o CATHODE-RAY TUBE (CRT)

Materials Required

Medium Phillips screwdriver (magnetic)

Remove

1. Remove the rear cover and the top and bottom panel of the EMI shield.
2. Discharge the CRT and remove the anode cap.
3. Place the monitor upright on a grounded workbench pad, and put on your grounding wriststrap (put on the wriststrap **only after** discharging the CRT).
4. Remove the video board.
5. Remove the four chassis mounting screws (**Figure 32A**) .
6. Remove the four CRT mounting screws, metal ground tabs, and spacers from the corners of the bezel (**Figure 32A**) .

CAUTION: *The neck of the CRT is easily damaged. Do not grab the neck of the CRT to remove it from the bezel. If necessary, have a helper hold down the bezel while you grab the CRT by its edges and remove it.*

7. Lift the CRT out of the bezel. Remove the four CRT mounting ears from the flanged corners of the CRT (**Figure 32B**) .

WARNING: *If you intend to dispose of the CRT, refer to "Disposing of the Cathode-Ray Tube" in Section 8, CRT Safety, under the You Oughta Know tab.*

Replace

1. Place the four CRT mounting ears on the corner flanges of the CRT, and carefully place the CRT inside the bezel as shown in **Figure 32B** . The anode aperture in the CRT should be on the opposite end of the cutaway in the bezel.
2. Install the four spacers, metal grounding tabs, and chassis mounting screws on the corners of the CRT (**Figure 32A**) . Tighten the chassis mounting screws to 1/4 inch above the grounding tabs.

3. Align the mounting ears, flanges, spacers, and tabs with the mounting holes in the bezel, and replace the four CRT mounting screws (Figure 32A) .
Make sure the CRT is positioned in the approximate center of the bezel before tightening the CRT mounting screws.
4. Replace the video board.
5. Replace the anode cap, and the bottom and top panels of the EMI shield.
6. Replace the rear cover.

o LED CABLE ASSEMBLY

Materials Required

Small Phillips screwdriver

Remove

1. Remove the rear cover and the top and bottom panel of the EMI shield.
2. Discharge the CRT and remove the anode cap.
3. Place the monitor upright on a grounded workbench pad, and put on your grounding wriststrap. (Never put on the grounding wriststrap until after you have discharged the CRT.)
4. Remove the video board.
5. Remove the CRT.
6. Remove the mounting screw, and slide the LED cable assembly out of the bezel (Figure 33) .

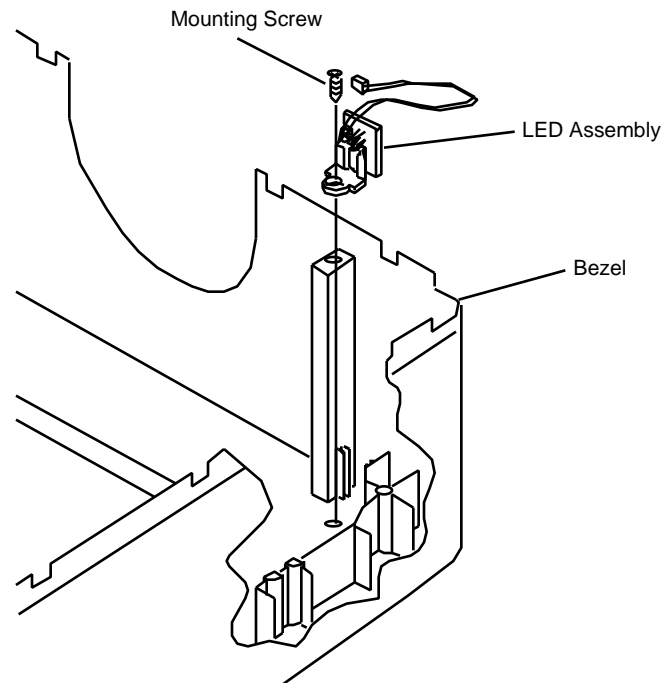


FIGURE 33

Replace

1. Slide the LED cable assembly onto the bezel as shown in **Figure 33** , and replace the mounting screw.
2. Replace the CRT and the main deflection board.
3. Replace the video board.
4. Replace the anode cap.
5. Replace the bottom and top panels of the EMI shield, and the rear cover.

o BEZEL

Remove

1. Remove the rear cover.
2. Replace the top and bottom panels of the EMI shield.
3. Discharge the CRT and remove the anode cap.
4. Place the monitor upright on a grounded workbench pad, and put on your grounding wriststrap. (Never put on the grounding wriststrap until after you have discharged the CRT.)
5. Separate the chassis from the bezel. Refer to the video board Remove procedure.
6. Remove the CRT.
7. Remove the LED cable assembly.

Replace

1. Replace the LED cable assembly.
2. Replace the CRT.
3. Replace the chassis. Refer to the video board Replace procedure.
4. Replace the anode cap.
5. Replace the bottom and top panels of the EMI shield.
6. Replace the rear cover.