VR297 Color Monitor Service Guide

Order Number EK-VR297-SV-001

digital equipment corporation
maynard, massachusetts

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About This Guide

This guide describes how to service your VR297 color monitor in the field. The guide covers the following topics:

Troubleshooting the field replaceable units (FRUs)
Adjusting the video monitor
Removing and replacing FRUs

Appendixes provide the following information:

Related documentation
Alignment screens

VR297 Color Monitor

The VR297 color monitor has a 432 mm (17-inch), direct-view, antiglare screen with contrast enhancement. The monitor's built-in tilt-swivel assembly lets the user adjust the screen for viewing comfort. When connected to a host computer system, the monitors can display information you send to the host system and information the host system sends to you.

Tools and Equipment

You need the following tools and equipment to service the VR297 video monitor:

Table 1 Tools and Equipment

Tools and Equipment	Part Number
Terminal technician tool kit	
50 Hz (240 Vac)	29-23270-00
60 Hz (120 Vac)	29-23268-00
Static protection kit	29-26246-00
Safety goggles	29-16141-00
Gloves	29-16146-00
Color video service kit (without power pack)	A2-S0099-01
Power packs	
90 to 110 Vac, 50 Hz	29-25448
104 to 126 Vac, 60 Hz	29-25449
198 to 242 Vac, 50 Hz	29-25450

Recommended Spares List

The following is the recommended spares list for the VR297 color monitor:

Table 2 VR297 Recommended Spares List

Spares	Part Number	
	Digital	Sony
FRUs		
A board (video amp)	29-27797	A-1296-461-A
B board (EMI filter)	29-27798	A-1130-505-A
C board (arc suppression)	29-27799	A-1330-733-A
D board (deflection)	29-27800	A-1345-899-A
G board (switching regulator unit)	29-27801	A-1477-873-A
H/J control block assembly	29-27802	A-1477-357-A
K board (high voltage assembly)	29-27804	A-1465-154-A

Table 2 (Cont.) VR297 Recommended Spares List

Spares	Part Number	
	Digital	**Sony**
L board (convergence)	29-27803	A-1235-011-A
H STAT control	29-27805	1-237-344-11
Other Parts *		
Bezel (plastic)	29-27809	X-4381-964-1
Cable assembly	29-27808	A-1499-505-A
Cable clamps	29-27817	A-1499-499-A
Carton	99-08577	–
Coaxial cable, video inter.	29-27806	A-1499-495-A
Connector panel assembly	29-27811	A-1429-235-A
D shield	29-27813	4-381-997-01
Main harness	29-27807	1-937-755-11
PCB plastic parts	29-27816	A-1499-498-A
Perforated metal shield	29-27814	4-384-359-01
Pot alignment tool	29-27815	4-382-826-01
Rear cabinet	29-27810	4-381-947-11
Safety covers	29-27812	A-1499-604-A
Screws	29-27818	A-1499-500-A
Tilt-swivel assembly	29-27819	X-4381-961-1

*Normally not replaced during field repairs.

Conventions

The following conventions are used in this guide:

Warning	Provides information to prevent personal injury.
Caution	Provides information to prevent damage to the equipment.
Note	Provides general information you should be aware of.
PN	Part number.

1
Troubleshooting

This chapter describes how to troubleshoot VR297 monitor problems by using a set of flowcharts. Each flowchart is for a different type of problem. The flowcharts guide you through the steps to isolate the cause of a problem.

1.1 Before You Start

This section covers the basic steps in troubleshooting any VR297 monitor problem. These steps will help you do your job in the field more easily and effectively. Section 1.2 provides the actual flowcharts for troubleshooting specific problems.

The flowcharts instruct you when to perform checks on the monitor, replace parts, or make adjustments. If you complete all the steps in a flowchart and the problem still exists, replace the whole monitor.

- If you are going to service a display-quality problem, ask the customer to let the monitor warm up for at least 20 minutes before you arrive, if possible.
- Always troubleshoot the most obvious symptom, but remember that one symptom may indicate multiple failures. The flowcharts assume that only one assembly has failed or only one problem exists.

NOTE

Magnetic fields affect the monitor's performance and can give a false indication of a monitor failure. Place the monitor away from:

- **Electromagnetic devices, such as other monitors**
- **Magnetized objects, such as filing cabinets and steel beams in walls**

Learn About the Problem

Talk to the operator to get a history of the problem. The operator often has detailed knowledge about the problem.

Identify the Problem

Identify the problem before you remove field replaceable units (FRUs). For example, the screen display often indicates which problem is occurring.

Isolate the Problem

After you clearly identify a problem, check the list of problem types at the beginning of Section 1.2. Select the type that best describes your problem. Go to the flowchart for that problem. Turn off the power before disconnecting or replacing any FRU.

WARNING

If you smell burning components, press the monitor power switch off (O), wait 10 seconds, then disconnect the power cord.

Correct the Problem

Complete all the steps in the troubleshooting flowchart(s) for your problem. When you are finished, display the host system's alignment test patterns to make sure no other problem exists. To display the test patterns, refer to the host system's service manual.

1.2 Troubleshooting the Problem

This section provides flowcharts for troubleshooting different types of monitor problems. The flowcharts make two assumptions:

- If FRUs were replaced, the correct procedures in Chapter 3 were followed.
- Adjustment procedures were performed as necessary.

Problems may come from two sources—your host system or your monitor.

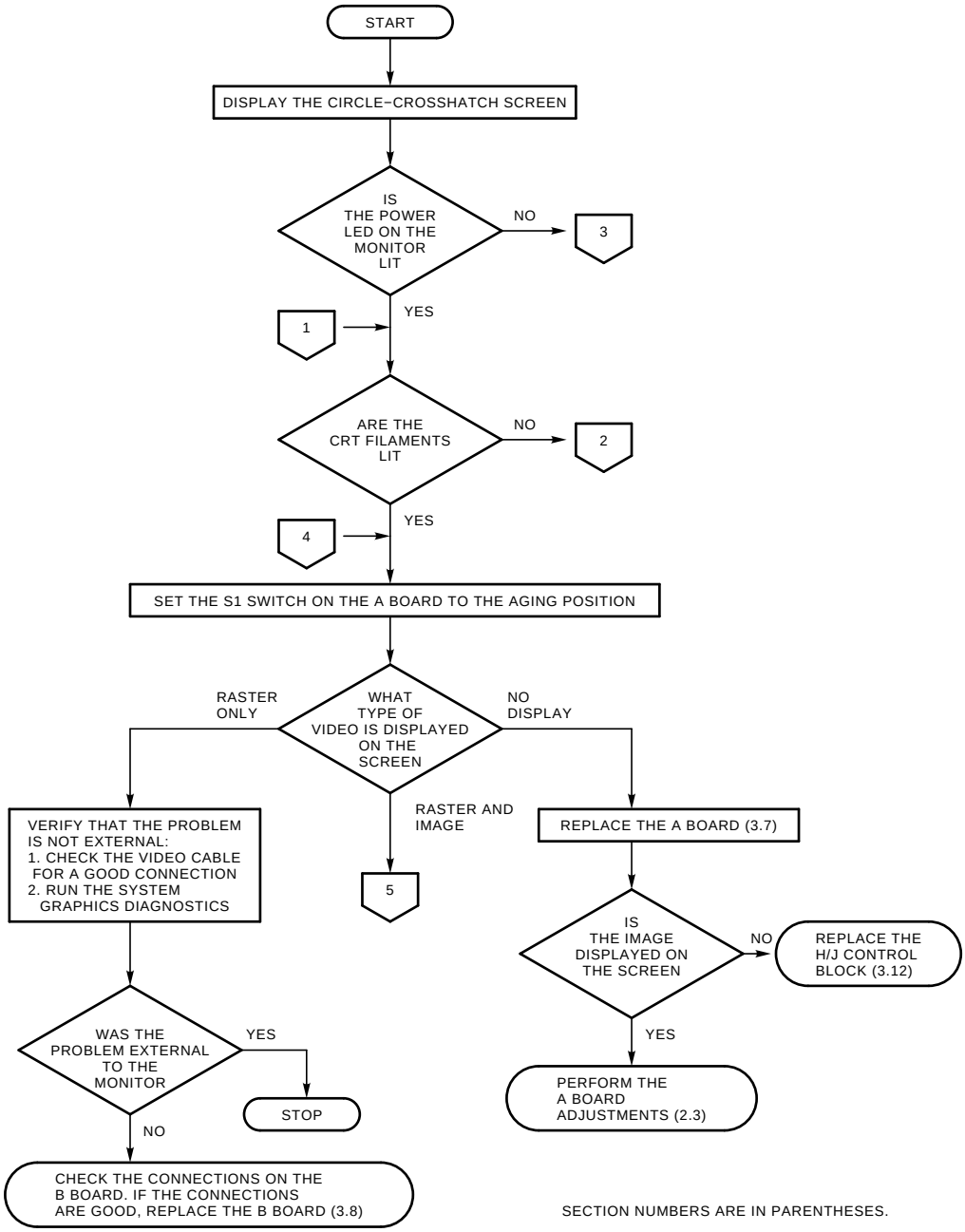
Types of Problems

The following flowcharts cover seven types of monitor problems:

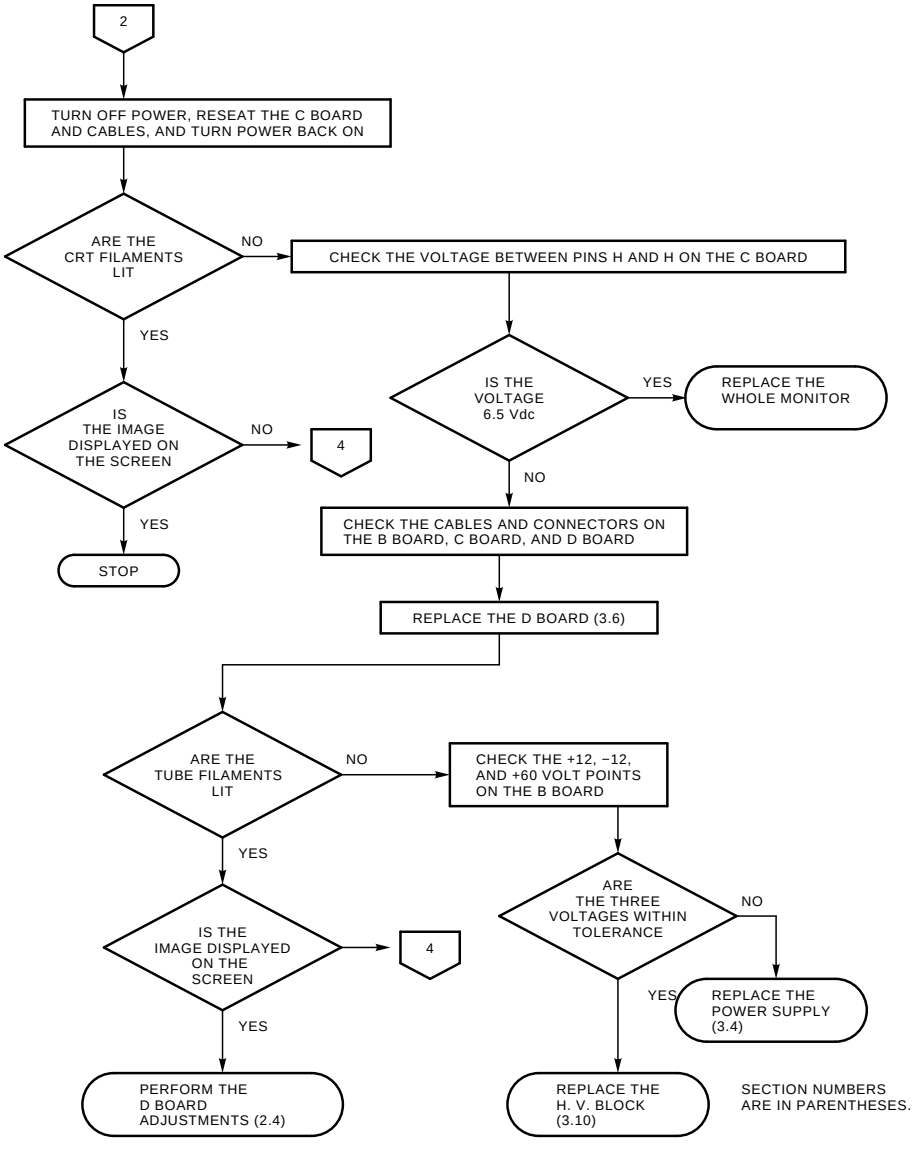
If you have this problem . . .	See this section . . .
A blank screen, no video or raster	1.2.1
Incorrect color display problems	1.2.2
Purity problems	1.2.3
Misconvergence	1.2.4
Geometric distortion	1.2.5
Excess luminance	1.2.6
Bright area at left margin	1.2.7

NOTE
If you replace a video amplifier module, deflection module, or the power supply, perform all the necessary adjustments (Chapter 2).

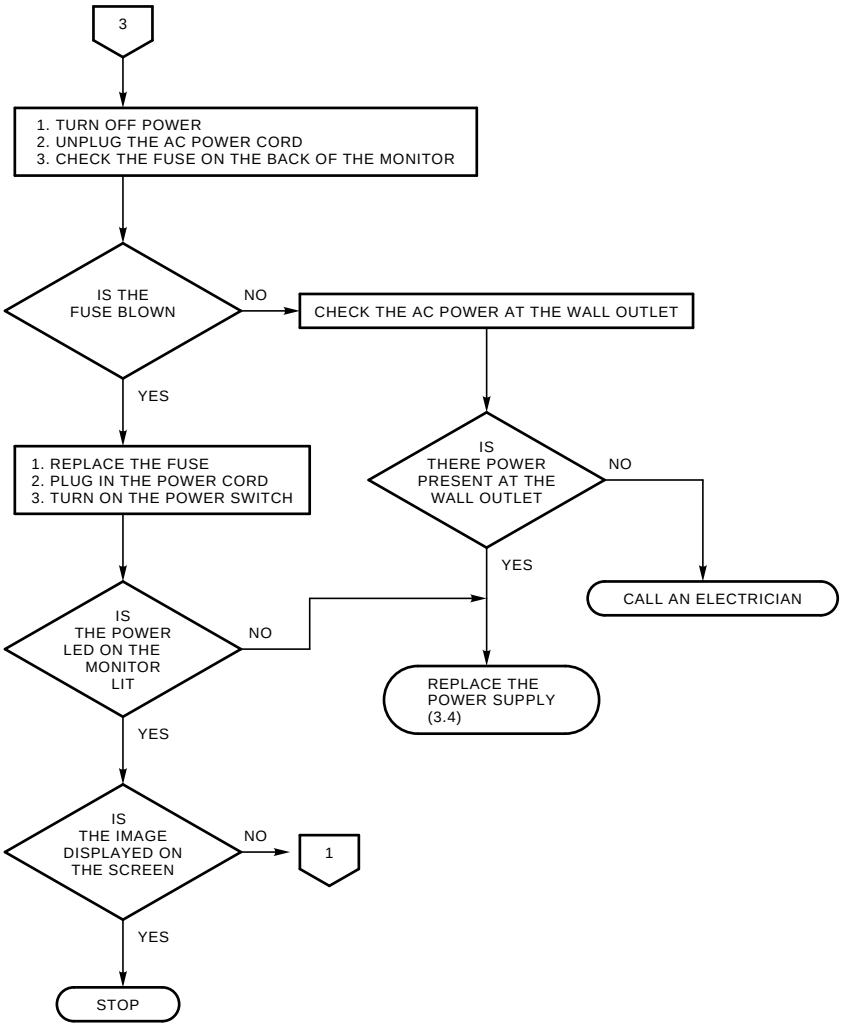
1.2.1 No Display (1 of 4)



No Display (2 of 4)

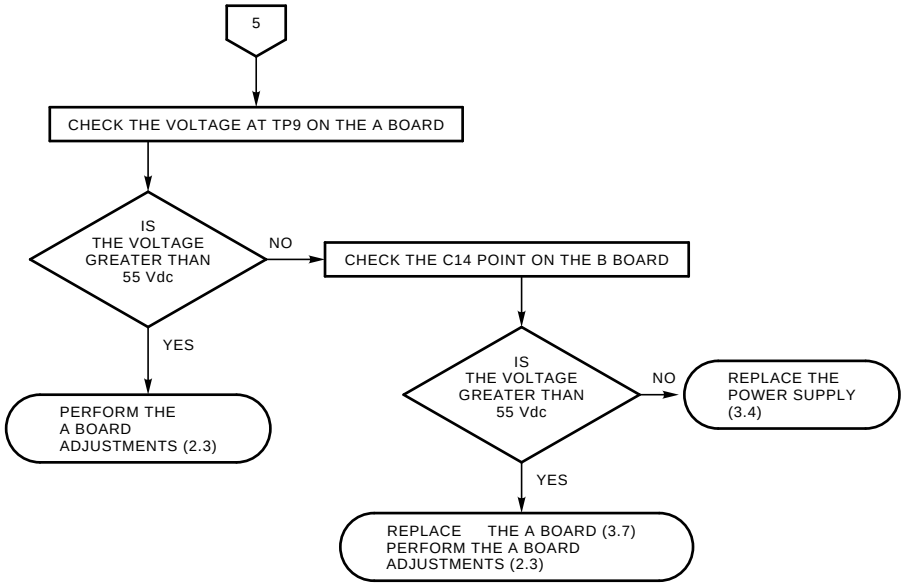


No Display (3 of 4)



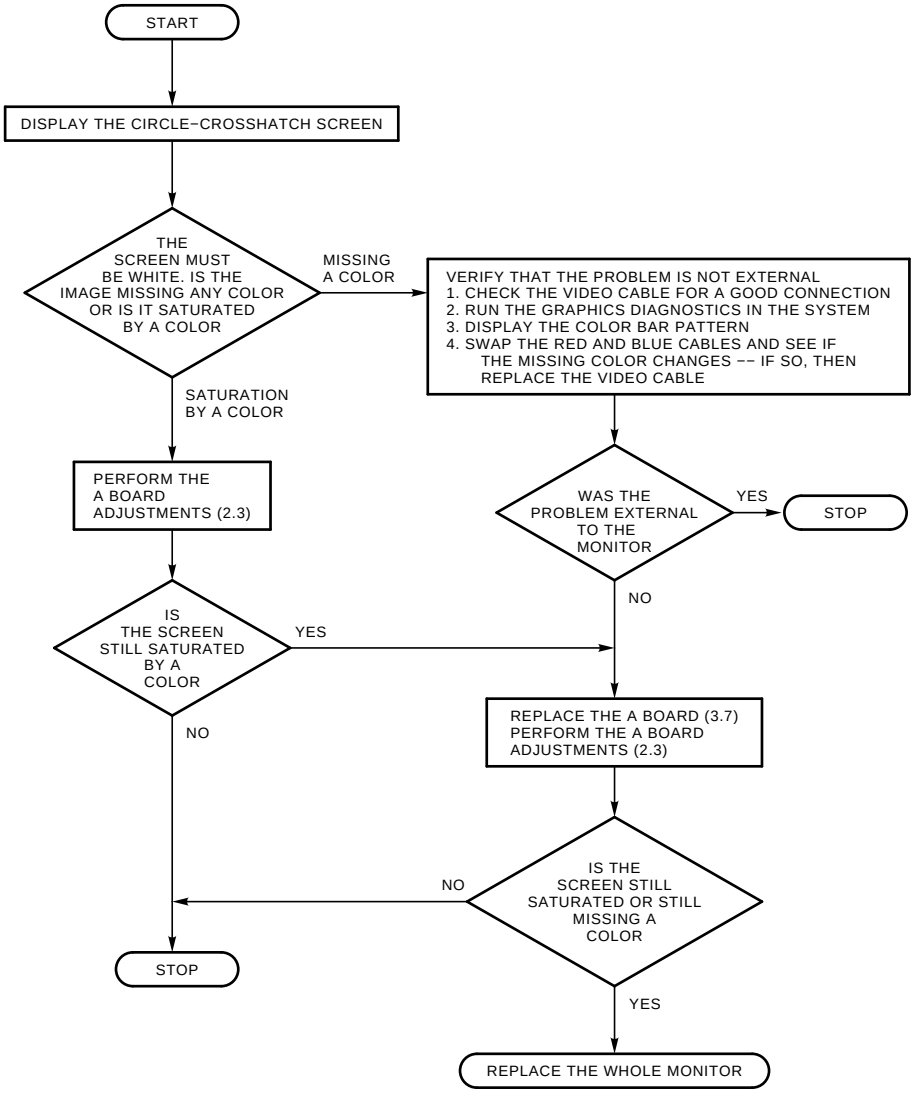
SECTION NUMBERS ARE IN PARENTHESES.

No Display (4 of 4)



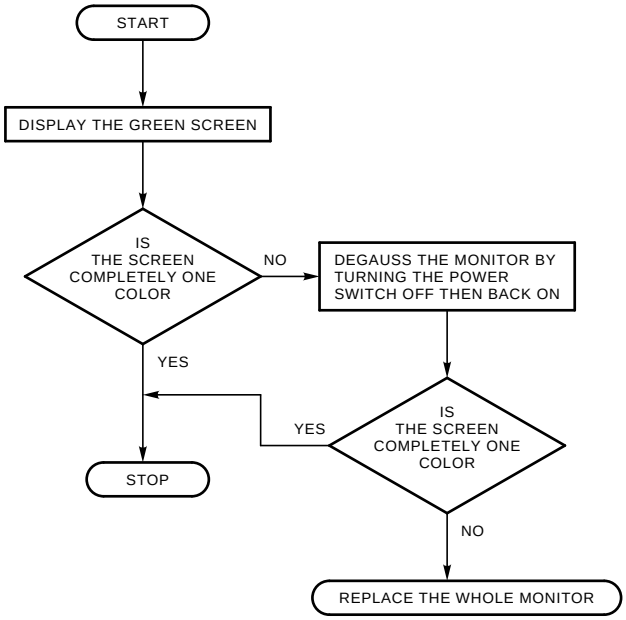
SECTION NUMBERS ARE IN PARENTHESES.

1.2.2 Incorrect Color

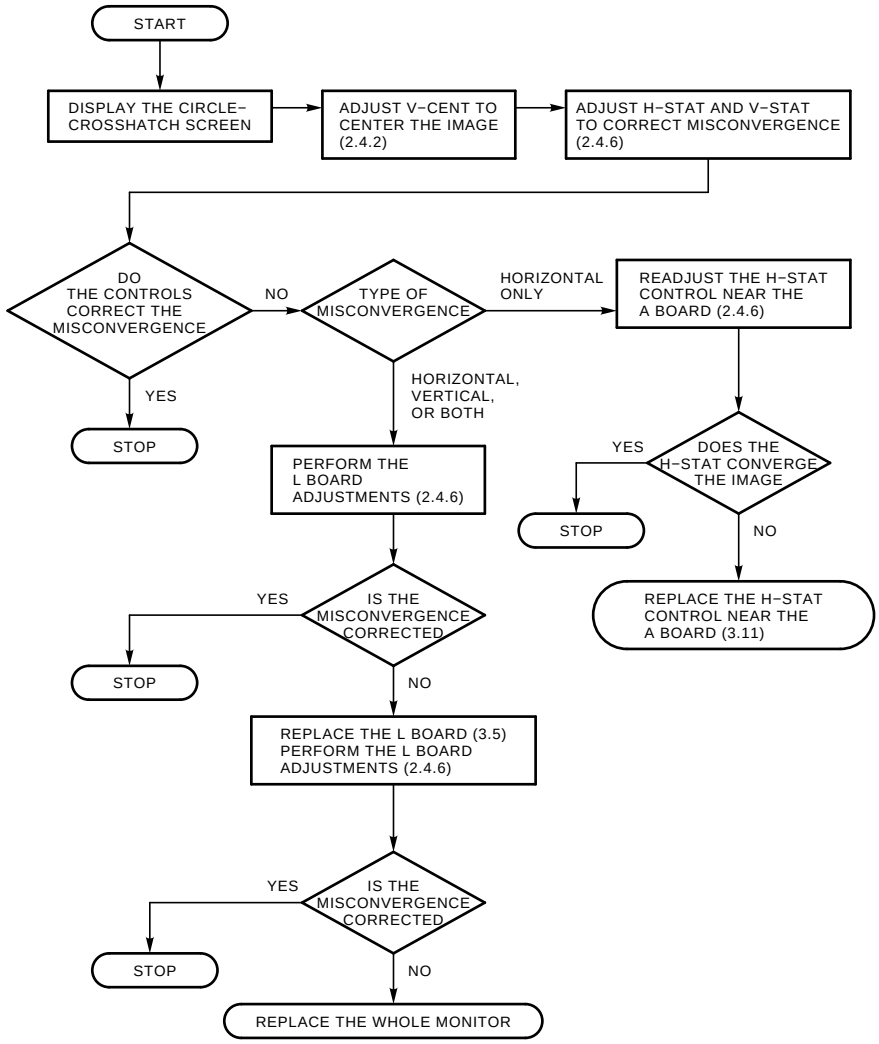


SECTION NUMBERS ARE IN PARENTHESES.

1.2.3 Purity

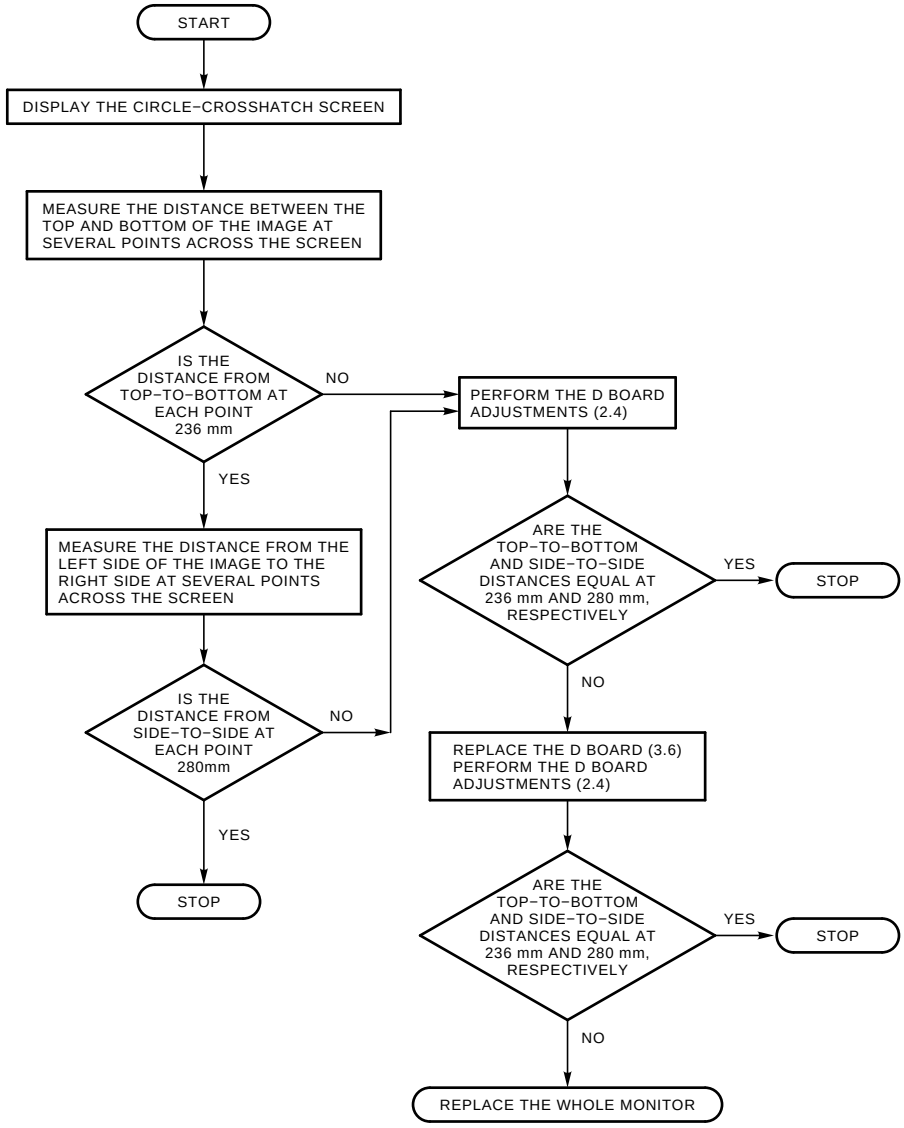

START
DISPLAY THE GREEN SCREEN
IS THE SCREEN COMPLETELY ONE COLOR
NO
DEGAUSS THE MONITOR BY TURNING THE POWER SWITCH OFF THEN BACK ON
YES
IS THE SCREEN COMPLETELY ONE COLOR
YES
STOP
NO
REPLACE THE WHOLE MONITOR

1.2.4 Misconvergence



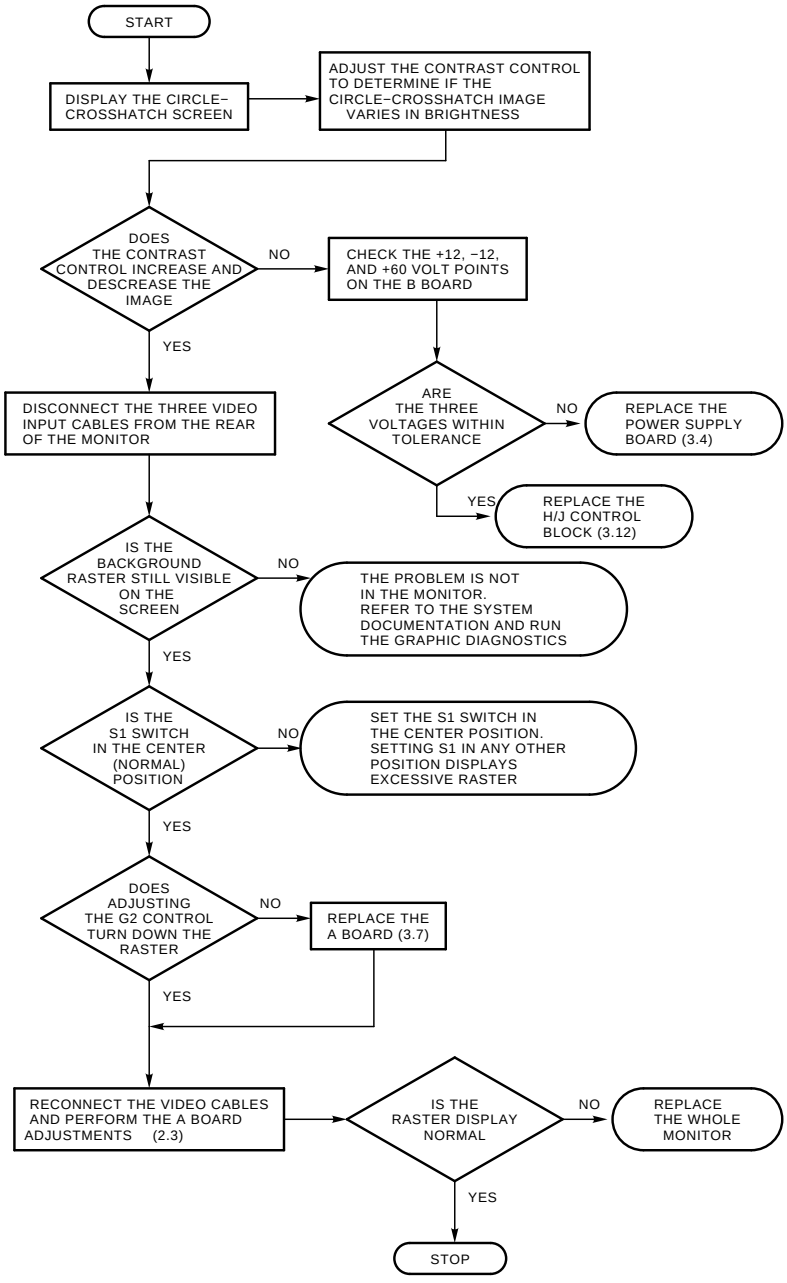
SECTION NUMBERS ARE IN PARENTHESES.

1.2.5 Geometric Distortion



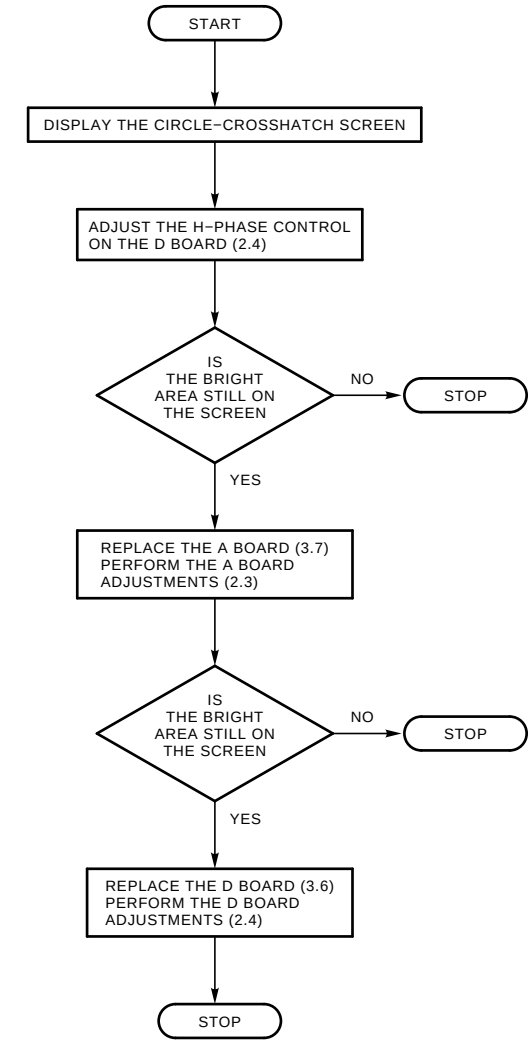
SECTION NUMBERS ARE IN PARENTHESES.

1.2.6 Excess Luminance



SECTION NUMBERS ARE IN PARENTHESES.

1.2.7 Bright Area at Left Margin



SECTION NUMBERS ARE IN PARENTHESES.

2
Adjustments

This chapter shows you how to align the monitor. You do not have to perform every adjustment procedure each time you align the monitor. However, you should check all adjustments in the order shown, because many adjustments affect each other. If a setting is already correct, you can skip that adjustment and go on to the next one.

You must use the screen alignment test patterns to make all adjustments. Use Section 2.1 to set up the monitor for adjustments.

Use a metric measuring tape (PN 29-25342-00) or a plastic ruler to measure the dimensions of the screen display. To avoid scratching the screen with the tape's metal clip, start the measurement at 10 cm (100 mm). Make sure all adjustments are made under these conditions.

2.1 Before You Start

Let the monitor warm up for at least 20 minutes before performing any adjustments on the monitor. The warm-up time ensures that the electron guns are at a stable temperature before you do any adjustments.

NOTE

If a customer calls with a display-quality problem, ask the customer to leave the monitor on until you arrive. Then you only need to let the monitor warm up for 5 minutes after you remove the rear cabinet assembly.

Before you perform adjustments, set up the monitor as follows. First remove the rear cabinet assembly (Section 3.1).

1. Place the monitor on a nonconductive surface.
2. Reconnect the video cables.
3. Reconnect the power cord.
4. Press the power switch on (|). Wait for a video display to appear on the screen.

Displaying Screen Test Patterns

For some procedures in this chapter, you must display a circle-crosshatch or screen of E's diagnostic pattern (Appendix B). To display these patterns, refer to your host system's service manual and follow the procedures for accessing diagnostic screen patterns.

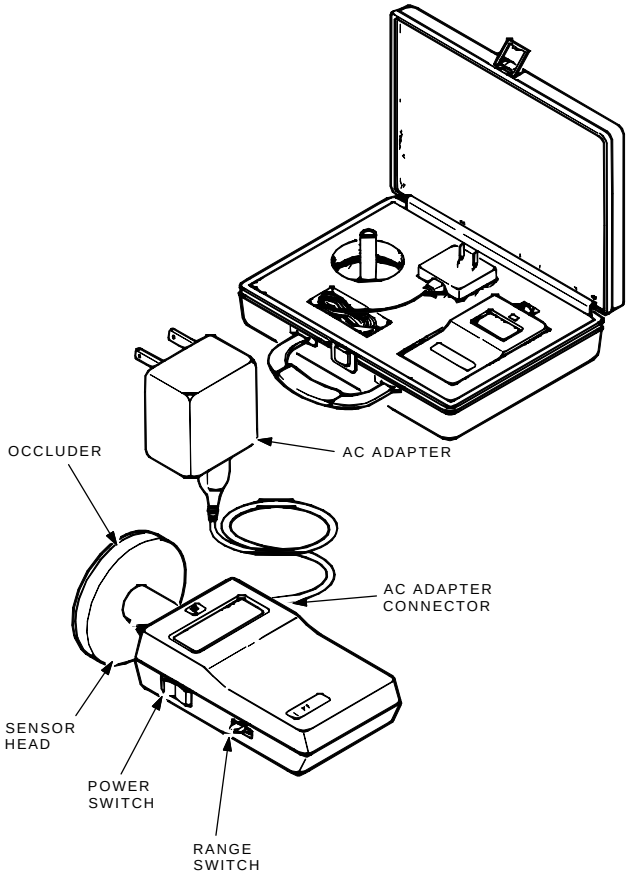
2.2 Using the Radiance Meter

You use the radiance meter when making color adjustments (Section 2.3).

To use the radiance meter:

1. Remove the cap from the radiance meter's sensor head and connect the occluder to the radiance meter.

CAUTION
Avoid excessive force when tightening the occluder, or you may damage the radiance meter. Do not touch the exposed filter after the protective cap is removed.



2. Connect the ac line adapter to the radiance meter and plug it in to a wall outlet.

   NOTE
   Make sure that your radiance meter is in calibration.

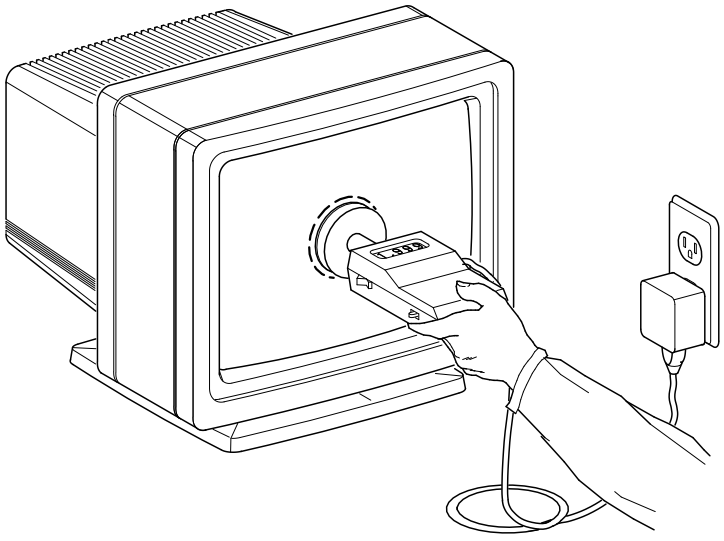
3. Turn on the power switch (down position).

   NOTE
   Do not use the POWER ON W/BACKLIGHT position when you are using the radiance meter with batteries.

4. Set the range switch to the second position from the top (1.999).

5. Place the occluder firmly against the center of the screen. Take a red china pencil from the color alignment kit and draw an arc or circle around the occluder.

NOTE
You must take all meter readings with the meter centered in this marked arc or circle .



MA-X0573-88

2.3 Color Adjustments

NOTE
Make color adjustments after replacing the video amplifier board (A board).

The following figure shows the location of the controls used to make the color adjustments:

A Board adjustments ma-0951-89

To adjust the monitor's color:

1. Set the following controls on the A board to minimum (fully counterclockwise):
   - Green drive (RV403)
   - Blue drive (RV402)
   - Red drive (RV401)
   - Blue background (RV405), labeled with the letter B in a circle
   - Green background (RV404), labeled with the letter G in a circle
2. Set the contrast control to minimum (fully counterclockwise).

3. Turn the screen control (G2) clockwise until the screen background is visible. G2 is the bottom control on the high-voltage block. Then turn G2 counterclockwise until the screen background disappears. (Raster cut-off is not set.)
4. Turn the green background control (RV404) clockwise until the screen background is visible. Then turn RV404 counterclockwise until the screen background disappears.

   Repeat this step for the blue background control (RV405).
5. Set the contrast control to maximum (fully clockwise).
6. At the keyboard, type **T 84** and press Return to display the red screen.
7. Place the radiance meter at the center of the monitor screen and hold the meter there. See Section 2.2 for instructions on how to operate the meter.
8. Adjust the red drive (RV401) clockwise until the meter reads 0.174.
9. Type **T 85** and press Return to display the green screen.
10. Adjust the green drive (RV402) clockwise until the meter reads 0.195.
11. Type **T 86** and press Return to display the blue screen.
12. Adjust the blue drive (RV403) clockwise until the meter reads 0.183.
13. Type **T 82** and press Return to display the white screen. The meter reading for the white screen should be 0.533 (± 0.003). If not, recheck the setting for the red, green, and blue drives. Adjust the settings if necessary.
14. Set the contrast control to minimum (fully counterclockwise).
15. Type in the T commands and check the readings (with the radiance meter) for the red, green, blue, and white screens.

Red screen	0.014
Green screen	0.018
Blue screen	0.017
White screen	0.047

    If the screen readings differ from those listed above:

    - Check that the contrast control is set at maximum.
    - Check the color drive settings, then adjust RV401, RV402, and RV403 if necessary.

2.4 Deflection Adjustments

NOTE
You must perform the deflection adjustments if the deflection board (D board) is replaced.

This section covers the following adjustments:

- Vertical linearity
- Vertical centering
- Vertical height
- Horizontal linearity
- Horizontal phase
- Horizontal centering
- Horizontal width
- Side pincushioning
- Trapezoid
- Focus

For these adjustments, select the circle-crosshatch screen pattern from your host system.

The following figure shows the names and the location of adjustment controls on the D board:

D Board controls ma-0953-89

2.4.1 Vertical Linearity (V-LIN)

To check and adjust vertical linearity:

1. Display the circle-crosshatch screen.
2. Check the pattern to make sure the squares are all the same height. If the squares are not all the same height, go to the next step.
3. Refer to the next two figures. Turn the V-LIN BAL (RV103) control to equalize the height of squares in symmetrical positions at the top and bottom of the pattern—for example, the top-center and bottom-center.
4. Turn the V-LIN (RV102) control to equalize all the squares in the pattern.

V LIN figure 1 ma-0954-89

V LIN figure 2 ma-0949-89

NOTE
The V-LIN BAL control has no effect when the V-LIN control is turned completely counterclockwise (small squares in the center of the pattern).

2.4.2 Vertical Centering, Horizontal Centering, and Screen Size

NOTE
Make the following adjustments after completing the adjustments in Sections 2.4.1 and 2.4.3.

To vertically and horizontally center the screen, and adjust the screen size:

1. Turn the V-CENT control on the front panel to its center click.
2. Place the monitor so it is facing north or south. Degauss the monitor whenever you change its direction.
3. Turn the V-CENT (RV108) control on the D board to vertically center the display.
4. Now place the monitor so it is facing east or west. Degauss the monitor whenever you change its direction.
5. Turn the V-SIZE (RV101) control on the D board to set the vertical size of the screen center to 236 mm (10.8 inches).

6. Set the switch S1 on the A board to the test position (up) to produce raster.

   NOTE
   The right edge of the screen may be a purple color. To measure the size of the raster, measure to the edge of this purple section.

7. Turn the H-CENT (RV208) control on the D board until the raster comes to the center of the CRT.
8. Turn the H-SIZE (RV204) control to set the horizontal size of the screen's center to 280 mm (11.0 inches).
9. Turn the H-PHASE (RV205) control to set the picture to the raster center.

H-Phase movement ma-0948-89

10. Set switch S1 on the A board to the normal position (low) for normal operation.

After the vertical and horizontal adjustments, you have to set the raster as shown in the next two figures.

Vertical and Horizontal Centering Standard

ma-0947-89

Vertical and Horizontal Size Standard

ma-0945-89

2.4.3 Horizontal Pincushion Distortion

When the sides of a video display are bowed, the effect is known as pincushioning or barreling, depending on whether the sides are bowed in or out.

To check and adjust horizontal pincushion distortion:

1. Place the monitor so it is facing east or west. Degauss the monitor whenever you change its direction.
2. Display the circle-crosshatch screen.
3. Turn the PIN AMP (RV203) control so the right and left sides of the picture are linear.

PIN AMP ma-0936-89

4. Turn the KEY (RV201) and KEY BAL (RV202) controls so the widths of the top and bottom sections of the picture are equal.

KEY and KEY BAL ma-0939-89

5. Check for right and left pincushion distortion again. Use the PIN AMP (RV203) control to make the sides linear, if necessary.

   If one side remains distorted when the other side is linear, follow the steps in the next figure.

SIDE PIN BAL ma-0938-89

2.4.4 Top and Bottom Pincushion Distortion

To adjust top and bottom pincushion distortion:

1. Display the circle-crosshatch screen.
2. Set the TOP AMP (RV106) and BOTTOM AMP (RV104) controls to maximum (clockwise).
3. Move the crests to the center, as shown in next two figures, by turning the TOP PHASE (RV107) and BOTTOM PHASE (RV105) controls.

TOP and BOTTOM PHASE Adjustment (1 of 2) ma-0935-89

TOP and BOTTOM PHASE Adjustment (2 of 2) ma-0937-89

4. Turn the TOP AMP and BOTTOM AMP controls to adjust the lateral line horizontally, as shown.

TOP and BOTTOM PIN AMP Adjustment ma-0946-89

2.4.5 Checking Horizontal Synchronization

To adjust the horizontal frequency:

1. Display the circle-crosshatch screen.
2. Disconnect the green input cable with the BNC connector from the rear of the monitor. The screen should roll vertically and horizontally.
3. Turn the H-FREQUENCY (RV207) control on the D board to minimize the horizontal roll.
4. Reconnect the green input cable at the rear of the monitor.

2.4.6 Convergence

The following figure shows the location of adjustment controls for the L board.

L board ma-0950-89