

🍏 Apple Technical Procedures

**Apple Macintosh Portrait Display
“Series B”**

Section 3 – Adjustments

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o INTRODUCTION

Whenever you replace a module within the Apple Macintosh Portrait Display "Series B," some adjustment of the video display may be necessary. As a general rule, replacing the main deflection board may require making geometric (vertical/horizontal) or focus adjustments, whereas replacing the CRT or video board requires performing the video adjustments.

IMPORTANT: *Do not attempt any tilt or ring adjustments on the yoke of the Macintosh Portrait Display. All such yoke adjustments have been set by the manufacturer.*

Use the following procedures to perform horizontal, vertical, focus, and video adjustments. If these procedures do not correct the monitor's adjustment problems, isolate the faulty module (see Section 4, Troubleshooting) and return the module to Apple.

o SAFETY INSTRUCTIONS

WARNING: *The Macintosh Portrait Display contains a high-vacuum picture tube and operates at very high voltages. To prevent serious injury, before working inside this monitor, **read and learn all safety precautions in Section 8, CRT Safety, under the You Oughta Know tab.***

In addition to the safety precautions outlined in CRT Safety under the You Oughta Know tab, be sure to:

- Use only insulated alignment tools whenever performing live video adjustments on the monitor.
- Keep one hand behind your back at all times, and grasp the handle of the insulated alignment tool with your other hand.
- Use a mirror for viewing adjustment results. **Never** attempt to make live adjustments while facing the screen and reaching around to the back of the monitor to rotate the controls—you cannot see what you are about to touch!
- Perform only those adjustments that are absolutely necessary. Do not attempt to make any adjustments other than the ones explained in this section, and do those with extreme caution.

WARNING: *Serious injury could result if, with the power on, you touch any of the components shown in Figure 1 .*

**Live
Adjustment
Rules**

In addition to the precautions listed on the previous page, never touch the following components when adjusting a live Macintosh Portrait Display (Figure 1).

- Any part of the yoke assembly, including the yoke wires
- The anode wire
- The anode connector
- The flyback transformer
- The inside of the AC power switch
- The high-voltage resistors (R517, R518, R520) on the dynamic focus board

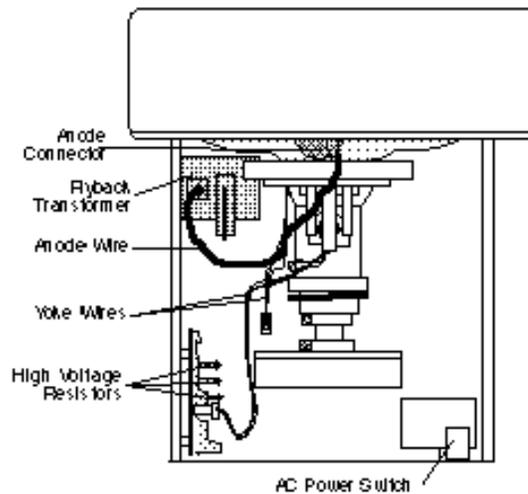


FIGURE 1

o LOCATION OF CONTROLS

User Controls

The brightness and contrast controls are located on the side of the monitor's case and are accessible to the user (**Figure 2**).

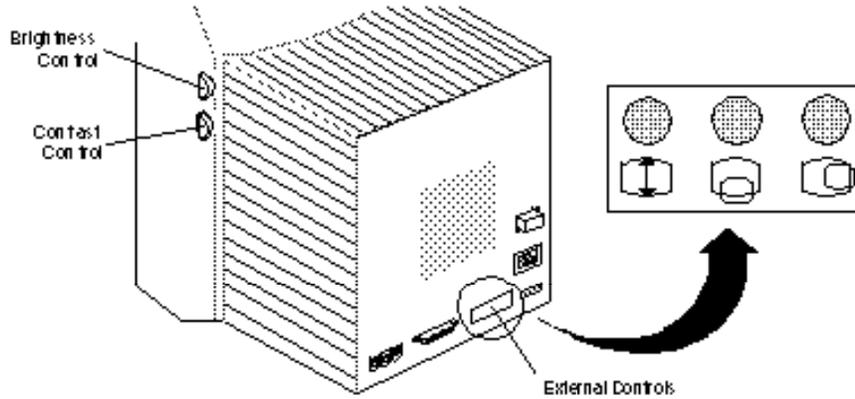


FIGURE 2

External Service Controls

The following service adjustment controls are located on the main deflection board, but can be accessed by removing a plastic panel found on the rear cover (**Figure 2**).

- Height, or vertical amplitude (V.AMP; RV5)
- Vertical center (V.SHIFT; RV4)
- Horizontal center (H.PHASE; RV7)

Internal Service Controls

The internal service adjustment controls are located on the video board, the dynamic focus board, and the main deflection board. These controls can be accessed only after removing the rear cover.

Video board (Figure 3)

- VIDEO GAIN

Dynamic focus board (Figure 3)

- FOCUS (RV502)
- DYNAMIC FOCUS (RV501)

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FIGURE 3

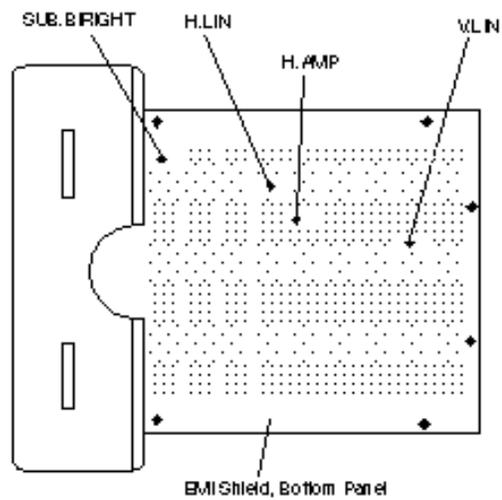


FIGURE 4

Note: Internal service controls located on the main deflection board are accessed through the bottom panel of the EMI shield.

Main deflection board (Figure 4)

- V.LIN (RV3)
- H.AMP (B5)
- H.LIN (B6)
- SUB.BRIGHT (RV9)

o TEST PATTERNS

Procedures for using the *MacTest* diagnostic program to display test patterns on a Portrait Display differ, depending upon whether the monitor is connected to a Macintosh II/IIx or to a Macintosh IIcx/IIci. Use the version of *MacTest* that is appropriate for your test station.

MacTest II/IIx Materials Required

Macintosh II or Macintosh IIx
Macintosh II Portrait Video Card or Macintosh Display Card
MacTest™ II/IIx diagnostic disk (version 3.1 or higher)

IMPORTANT: *The Macintosh II Portrait Video Card RAM must be upgraded to 512K in order to display the MacTest (II/IIx or IIcx/IIci) test patterns. Refer to the Macintosh Family Cards Technical Procedures .*

Generating Test Patterns Using MacTest II/IIx

MacTest II/IIx tests the video RAM on the Macintosh II Portrait Video Card and displays test patterns used to adjust the monitor. Follow the steps below to display the *MacTest II/IIx* test patterns:

1. Connect the monitor's video cable and power cord to the Macintosh II or Macintosh IIx computer.
2. Boot the *MacTest II/IIx* disk. For computers with more than one drive, boot *MacTest* from Drive 1, the right - side drive.
3. *MacTest II/IIx* will display a window instructing you to turn off the system and connect a SCSI loopback card. Unless you wish to test the logic board, click **OK** to get to the Start window.
4. When the Start window appears on the screen, go to the  menu and open the Control Panel.
5. Click the Monitors icon.
6. In the area called **Characteristics of selected monitor** , select **Black & White/Grays** . In the area called **Grays** , select the number **16** .

7. If more than one monitor is connected to the computer, make sure the Macintosh Portrait Display is the main monitor. (Test patterns can be displayed on the main monitor only.) Check the box at the bottom of the panel—the monitor icon with a menu bar is the main monitor. If necessary, drag the menu bar to the icon representing the Portrait Display.

8. Close the Control Panel to return to the Start window.

Note: If you selected a new main monitor, you must restart *MacTest II/IIx* in order for this change to take effect. After closing the Control Panel, quit *MacTest II/IIx* and then reboot *MacTest II/IIx*.

9. Select **Test Selections** from the Options menu (or type **T**). When the Test Selections window appears, deselect the default Logic and Disk Drives tests by clicking their selection boxes once.

10. To test video RAM on the video card, click **Video Card in slot**. Apple recommends testing the video card before performing the video adjustments.

11. Click **Video monitor** to display the video adjustment test patterns, and click **OK** to close the Test Selections window.

12. When the Start window reappears, click **Start**.

Note: If you selected the video card RAM test, this message appears: **Testing Macintosh Video Card**. Horizontal and vertical lines flash across the screen. After about one minute the Start window reappears, and the Status line indicates whether the video card passed the test.

13. An alert box informs you that test patterns can be displayed only on the default monitor. Click **OK** to display the first test pattern.

Note: Click the mouse to advance to the test pattern you want. Each test pattern is displayed once. When you have advanced through the test patterns, you will be returned to the Start window. Clicking **Start** reruns the video RAM test (if selected), and/or redisplay the test patterns. (To display the test patterns without rerunning the video RAM test, deselect **Video Card in slot** in the Test Selections window.)

14. *MacTest II/IIx* displays the test patterns listed below and shown in Figure 5.

- Gray Bars
- Full Black Screen
- Full White Screen
- Crosshatch I (black background)
- Crosshatch II (white background)
- Focus

(Graphic not available)

FIGURE 5

MacTest IIcx/IIci Materials Required

Macintosh IIcx or Macintosh IIci
Macintosh II Portrait Video Card or Macintosh Display Card
(not required for Macintosh IIci)
MacTest™ IIcx/IIci diagnostic disk (version 2.0 or higher)

IMPORTANT: *The Macintosh II Portrait Video Card RAM must be upgraded to 512K in order to display the MacTest IIcx/IIci test patterns. Refer to the Macintosh Family Cards Technical Procedures .*

Generating Test Patterns Using MacTest IIcx/IIci

MacTest IIcx/IIci tests the video RAM on video cards installed in Macintosh IIcx or IIci computers and displays test patterns used to adjust the monitor. Follow the steps below to test the video RAM or display the test patterns.

1. Connect the monitor's video cable and power cord to the Macintosh IIcx or Macintosh IIci computer.
2. Boot the *MacTest IIcx/IIci* disk.
3. Select **Test Selections** from the Options menu (or type **T**). When the Test Selections window appears, deselect all default test selections.

Note: Apple recommends testing the video RAM before performing the video adjustments. To test video RAM on board a Macintosh IIci computer, you must run the **Short** or **Long RAM** logic test.

4. To test the video RAM on an installed video card, click **Video Card in Slot** and enter the appropriate slot number.
5. To display the video adjustment test patterns:
 - Click **Video Monitor Connected to Built-in Video** , or
 - Click **Video Monitor Connected to Selected Card** . (Be sure that the correct video card slot is entered in the Video Card in Slot box.)

6. Click **OK** to close the Test Selections window and return to the Start window.

Note: If built-in video is being used to generate the monitor test patterns, the memory allocation for the built-in video must be set to at least 16 grays/colors. From the Apple menu, open the Control Panel, click **Monitors**, click the highest number of Grays/Colors, and close the Control Panel.

7. From the Start window, click **Start** to proceed. You will encounter one or both of these scenarios:

- If you chose to test the Portrait Video Card, the following message appears on the main (boot) monitor: **Testing Macintosh II Portrait Video Card**. Horizontal and vertical lines flash across the screen of the Portrait Display. After about one minute, the Status line in the Start window on the main monitor indicates whether the video card passed the test. Clicking **Start** again displays the first test pattern (if selected) or reruns the video card test.
- If you chose to display only the monitor test patterns, the first (gray bars) test pattern is displayed on the Portrait Display screen. Click the mouse to advance through the test patterns (each test pattern is displayed once). When you have advanced through the test patterns, you are returned to the Start window. Clicking **Start** reruns the video RAM test (if selected), and/or redisplay the test patterns. (To display the test patterns without rerunning the video RAM test, deselect **Video Card in Slot** in the Test Selections window.)

8. *MacTest IIcx/IIci* displays the test patterns listed below:

- Gray Bars
- Full White Screen
- Full Black Screen
- Crosshatch I (black background)
- Crosshatch II (white background)
- Focus

o ADJUSTMENT PROCEDURES

The vertical size, vertical center, and horizontal center adjustments can be performed using the external service controls only. All other service adjustments are performed with the rear cover removed.

WARNING: Always use an insulated screwdriver when performing live video adjustments. For the following procedures, also make sure the insulated screwdriver has a plastic tip.

Materials Required

Plastic adjustment tool (insulated plastic screwdriver)
Plastic hex alignment tool
Voltmeter
Light meter (Sekonic Multi-Lumi, model L-248)
Mirror and flexible metric ruler

Vertical Adjustments

The vertical size and vertical center adjustments use the Full White Screen test pattern; the vertical linearity adjustment uses a Crosshatch test pattern. To display these patterns, see "Test Patterns."

Adjusting Vertical Size

1. Display the Full White Screen test pattern on the monitor (see "Test Patterns").
2. Using the insulated plastic screwdriver, turn the height, or vertical amplitude (V.AMP) control (**Figure 6**) until the raster is 276 mm high.

Note: To measure the raster height, place a flexible metric ruler against the screen and align the zero mark of the ruler over the top edge of the raster, keeping your eye perpendicular to the zero mark. Without moving the ruler, shift your head until the same eye is perpendicular to the bottom of the raster, and note the ruler measurement.

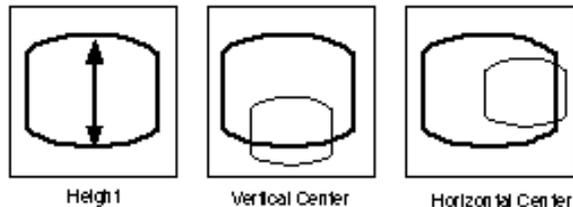


FIGURE 6

Adjusting Vertical Center

1. Display the Full White Screen test pattern on the monitor (see "Test Patterns").
2. Using the insulated plastic screwdriver, turn the vertical center (V.SHIFT) control (**Figure 7**) until the raster is centered (top to bottom) in the display area.
3. Verify that the raster is 276 mm high. If it is not, perform the vertical size adjustment and (if necessary) repeat the vertical center adjustment.

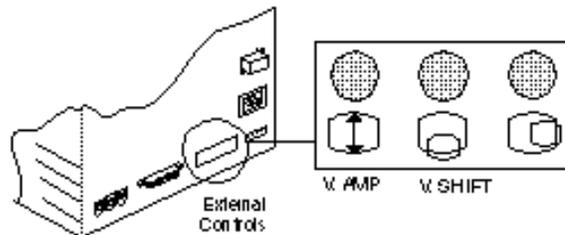


FIGURE 7

Adjusting Vertical Linearity

1. Turn off power to the test station and to the monitor, and disconnect all cables from the monitor.
2. Remove the rear cover .
3. Reconnect the power and video cables to the monitor, and turn on monitor and system power.
4. Display either Crosshatch test pattern on the monitor (see "Test Patterns").
5. Place the monitor on its side, with the bottom facing you. Use the mirror to view the screen display.
6. Using the insulated plastic screwdriver, turn the vertical linearity (V.LIN) control (**Figure 8**) until the boxes at the top of the display are the same size as those at the bottom. (With the monitor on its side, keep in mind that the top and bottom of the display are on your left and right.)
7. Recheck and (if necessary) repeat the vertical center and vertical size adjustments.

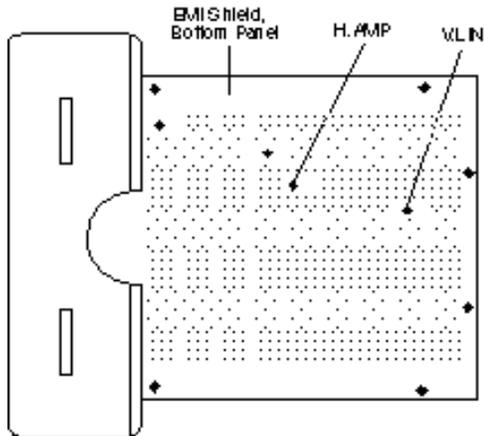


FIGURE 8

Horizontal Adjustments

The horizontal adjustments use the Full White Screen test pattern. To display this pattern, see "Test Patterns."

Adjusting Horizontal Size

1. Turn off power to the test station and to the monitor, and disconnect all cables from the monitor.
2. Remove the rear cover .
3. Reconnect the power and video cables to the monitor, and turn on monitor and system power.
4. Using the insulated plastic screwdriver, turn the horizontal size (H.AMP) control **(Figure 8)** until the raster is 203 mm wide.

Note: On some monitors you may need to remove the bottom panel of the EMI shield to adjust the H.AMP control (see the Take-Apart procedure). If the H.AMP control is too difficult to adjust using a plastic tool, try using the Apple alignment tool with metal tip (P/N 949 - 0223).

Note: To measure the raster width, place a flexible metric ruler against the screen and align the zero mark of the ruler exactly over the left edge of the raster, keeping your eye perpendicular to the zero mark. Without moving the ruler, shift your head until the same eye is perpendicular to the right edge of the raster, and note the ruler measurement. Adjust the H.AMP control as necessary.

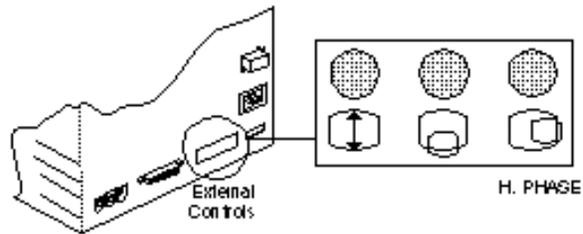


FIGURE 9

*Adjusting
Horizontal Center*

1. Using the insulated plastic screwdriver, turn the horizontal center (H.PHASE) control **(Figure 9)** until the raster is centered (left to right) in the display area.
2. Verify that the raster is 203 mm wide. If it is not, perform the horizontal size adjustment and repeat (if necessary) the horizontal center adjustment.

*Adjusting Horizontal
Linearity*

1. Turn off power to the test station and to the monitor, and disconnect all cables from the monitor.
2. Remove the rear cover .
3. Reconnect the power and video cables to the monitor, and turn on monitor and system power.
4. Display either Crosshatch test pattern on the monitor (see "Test Patterns").
5. Place the monitor on its side, with the bottom facing you. Use the mirror to view the screen display.

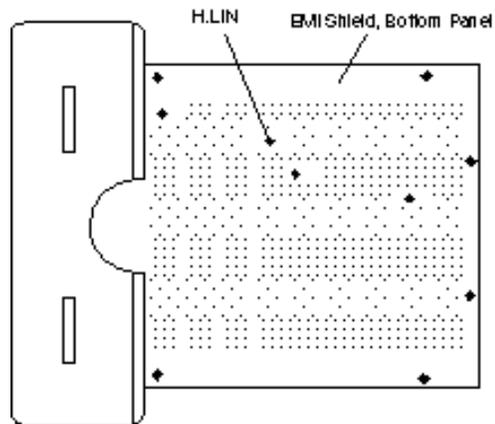


FIGURE 10

6. Using the hex alignment tool, turn the horizontal linearity (H.LIN) control **(Figure 10)** until the boxes at the left of the display are the same size as those at the right. (With the monitor on its side, keep in mind that the left and right sides of the display are on the top and bottom.)
7. Recheck and (if necessary) repeat the horizontal center and horizontal size adjustments.

Focus

1. Turn off power to the test station and to the monitor, and disconnect all cables from the monitor.
2. Remove the rear cover .
3. Reconnect the power and video cables to the monitor, and turn on monitor and system power.
4. Display the Focus test pattern on the monitor (see "Test Patterns").
5. Set the brightness control **(Figure 11)** to midrange — the detent position. To identify the detent position, turn the knob and locate the place in the middle where the knob hesitates.
6. Set the contrast control **(Figure 11)** at maximum (full clockwise).

(Graphic not available)

FIGURE 11

Note: On some monitors you may need to remove the top panel of the EMI shield to adjust the focus control. Refer to the Take-Apart procedure.

WARNING: To prevent serious injury, do not touch the three high-voltage resistors on the dynamic focus board. These resistors are labelled R517, R518, and R520.

7. Using the insulated plastic screwdriver, successively adjust the following focus controls **(Figure 11)** :
 - a) Turn the focus control to attain the best possible overall focus.
 - b) Turn the dynamic focus control to attain the best possible focus along the left and right edges of the display.
 - c) Repeat substeps a and b until you have attained the best focus possible.

Video Adjustments

The video adjustments should be performed whenever the CRT or video board has been replaced.

1. Turn off power to the test station and to the monitor, and disconnect all cables from the monitor.
2. Remove the rear cover .
3. Reconnect the power and video cables to the monitor, and turn on monitor and system power.
4. Display the Gray Bars test pattern on the monitor (see "Test Patterns").
5. Set the brightness control **(Figure 11)** to midrange — the detent position. To identify the detent position, turn the knob and locate the place in the middle where the knob hesitates.
6. Set the contrast control **(Figure 11)** at maximum (full clockwise).

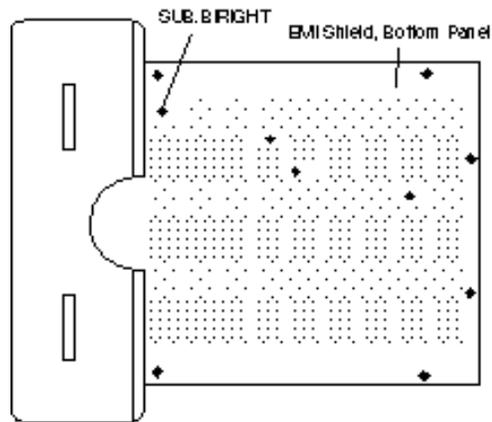


FIGURE 12

7. Place the monitor on its side, with the bottom facing you. Use the mirror to view the screen display.
8. Using the insulated plastic screwdriver, turn the SUB.BRIGHT control (**Figure 12**) until the first bar (on bottom) is completely black, and the second bar is barely visible. The first bar should match the black border that extends 1/8 inch around the screen.
9. Place the monitor upright, and display the Full White Screen test pattern on the monitor (see "Test Patterns").
10. Make sure the brightness control is still set at its detent position and the contrast control is at maximum (full clockwise).

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FIGURE 13

11. Measure screen luminance with the light meter. The light meter should read at the low end of the 11 scale (40 ft.-lamberts) (**see Figure 14**) .

If screen luminance is too high or low, use the insulated screwdriver to turn the video gain control (**Figure 13**) until you obtain a correct reading at the light meter. (See "Using the Light Meter to Measure Screen Luminance" later in this section for more information.)

12. Set the brightness control at maximum (full clockwise), and recheck screen luminance with the light meter. The light meter should not measure beyond the 11 scale (above 60 ft.-lamberts) (**see Figure 14**) .

If screen luminance measures out of the 11 scale (over 60 ft.-lamberts) on the light meter, repeat the video adjustments procedure.

(Graphic not available)

FIGURE 14

*Using the Light Meter
to Measure
Screen Luminance*

Use the light meter to measure the screen luminance of the Portrait Display as follows:

1. Verify that the light meter is functioning correctly by pressing the red button on the back of the meter. If the reading moves to the right of the red notch, replace the battery.
2. Move the side switch up so that the lower scale reads 10 through 18 **(Figure 14)** .
3. Move the lens hood aside to uncover the lens of the meter. Place the lens against the screen exactly at screen center, press the "read" button, and obtain the light meter reading on the lower scale **(Figure 14)** .