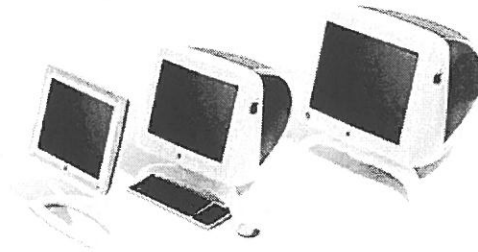


# ACSE Update 1999 Studio Displays



## Notes

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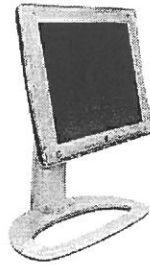
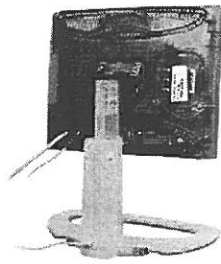
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## Apple Studio Display Rev B

- Overview
- Install & Use
- Using Apple Display Software
- Issues
- Exploded View



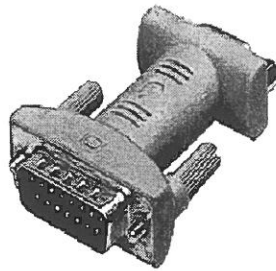
### Notes

#### Apple Studio Display Rev B

In January 1999, the Rev. B version of the Apple Studio Display was introduced. The display performance and internal circuitry remains the same. The Rev. B version is identical to the original (Rev. A) version except the video cable has changed to a VGA style, and the housing colors are different.

## Overview

- Flat Panel Display
- Resolutions
- Compatibility
- Like for Like
- New VGA-to-Macintosh Adapter



3

## Notes

### Studio Display

15.1-inch viewable diagonal screen, active matrix thin film transistor (TFT) liquid crystal display (LCD)  
1024 x 768 active pixels Colors: 16 million (maximum)

### Resolutions

640x480 at 59.9 Hz in VESA VGA mode	640x480 at 66.7 Hz in Mac VGA mode
640x480 at 72.8 Hz in VESA VGA mode	640x480 at 75.0 Hz in VESA VGA mode
720x400 at 70.1 Hz in VGA Text mode	800x600 at 56.3 Hz in VESA SVGA mode
800x600 at 60.3 Hz in VESA SVGA mode	800x600 at 72.2 Hz in VESA SVGA mode
800x600 at 75.0 Hz in VESA SVGA mode	832x624 at 74.6 Hz in Mac 16" mode
1024x768 at 60.0 Hz in VESA XGA mode	1024x768 at 70.1 Hz in VESA XGA mode
1024x768 at 74.9 Hz in Mac XGA mode	1024x768 at 75.0 Hz in VESA XGA mode

### Compatibility

The Apple Studio Display is NOT compatible with the following products:

Mac OS-compatible computers NOT using a PowerPC processor (680x0-based computers)

PowerBook 1400-series computers

PowerBook Duo 2300-series computers

PowerBook 3400-series computers

PowerBook 5300-series computers

Apple 8\*24 graphics card

Apple 8\*24AC graphics card

Apple 24AC graphics card

Apple PowerBook products that have been modified with a Power PC upgrade card

Apple desktop, minitower or tower products that have been modified with a Power PC upgrade card

Radius ThunderColor 30/1600 graphics card

## **Like for Like**

The Rev. B housing parts (desktop stand, flip-out stand, and AV door) should be exchanged like for like.

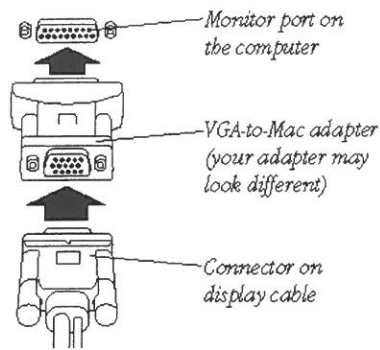
## **New VGA-to-Macintosh Adapter**

The connector on the display cable is a VGA video connector. To ensure the proper connection to your computer or video card, read the “Update.pdf” for instructions on using the VGA-to-Macintosh adapter that comes with the Rev. B version of the Apple Studio Display.



## Install & Use

- Cables
- VGA to Mac Adapter
- ADB Connector
- Display Software
- Adjustment
  - Tracking
  - ColorSync
- Compatibility



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### Notes

#### ADB Connector

The ADB connector is not optional; it's needed for your Mac OS-based computer to work correctly with your display. If the ADB connector on the display cable is not connected properly, the maximum number of resolutions and software controls will not be available.

#### Pattern on a gray background

When you first power up your Studio Display AMLCD, you may see a pattern on the initial gray background. The pattern disappears in a few seconds. This is a normal characteristic of a flat panel display.

#### Tracking

For the clearest image, after you set up your monitor and install the Apple Displays Software, make sure you use the Monitors & Sound control panel to adjust Tracking.

The monitor is pre-adjusted at the factory, but you can change many settings to better suit your viewing environment and preferences. You can adjust the Tracking, Sharpness, Brightness, White Level, Black Level, White Point, and Position using the Monitors & Sound control panel.

#### ColorSync Profile

In the ColorSync Profiles list shown in the Color section of the Monitors & Sound control panel, be sure to select the profile for your Studio Display AMLCD. When using the ColorSync Monitor Calibration Assistant with the Studio Display AMLCD, choose the profile called Generic LCD Color.

#### Compatibility

The Apple PowerBook Duo 2300, the PowerBook 1400, PowerBook 3400 and the PowerBook 5300 are not compatible with the Studio Display AMLCD. See your manual for more information on compatibility.

The Radius ThunderColor 30/1600, Matrox MTRX Millennium I, and Apple 24AC video cards are not compatible with the Studio Display AMLCD.

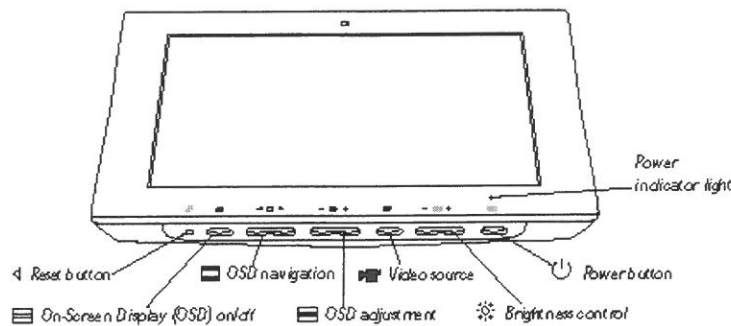
## **Files installed with Apple Displays Software version 1.7.1**

The following files are installed by the Apple Displays software installer, unless a newer version of the same file is already installed on your system.

•Filename	Ver.	Location
•DigitalColor Meter	1.3	Apple Menu Items
•Monitors & Sound	1.5	Control Panels
•ColorSync	2.5	Control Panels
•Control Strip	1.4.1	Control Panels
•Monitor Bitdepth	1.4.1	Control Strip Modules
•Monitor Resolution	1.4.1	Control Strip Modules
•Sound Volume	1.4.1	Control Strip Modules
•Monitor Bitdepth	2.2	Control Strip Modules (on Mac OS 8.5 & later)
•Monitor Resolution	2.2	Control Strip Modules (on Mac OS 8.5 & later)
•ColorSync Profiles		ColorSync Profiles (in System folder)
• Display Enabler	2.4.1	Extensions (Note space before filename)

**Check the Apple Display read me file for a complete list of installed files**

## Manual Controls/On-Screen Display



### Notes

#### Reset

Use this control to reset the settings to the factory default. To reset the settings for all formats, not just the current format, use a ballpoint pen to press and hold the Reset control for approximately 3 seconds. The power indicator flashes amber. When the amber light stops flashing, release the reset control.

#### On-Screen Display (OSD) on/off

Use this button to turn the On-Screen Display on and off when the display is connected to a Windows-based computer or in video playback mode. If the display is connected to a Mac OS-based computer, pressing this button will open the Monitors & Sound control panel.

#### OSD navigation

Use these buttons to navigate through the On-Screen

#### OSD adjustment

Use these buttons to make adjustments to the selected icon in the On-Screen Display window.

#### Video source

Press this button to switch between computer and video modes.

#### Brightness

Press this button to change the brightness of the backlight. If you're using a Mac OS-based computer, the brightness dialog box appears. If you're using a Windows-based computer or are in video mode, a similar brightness window appears.

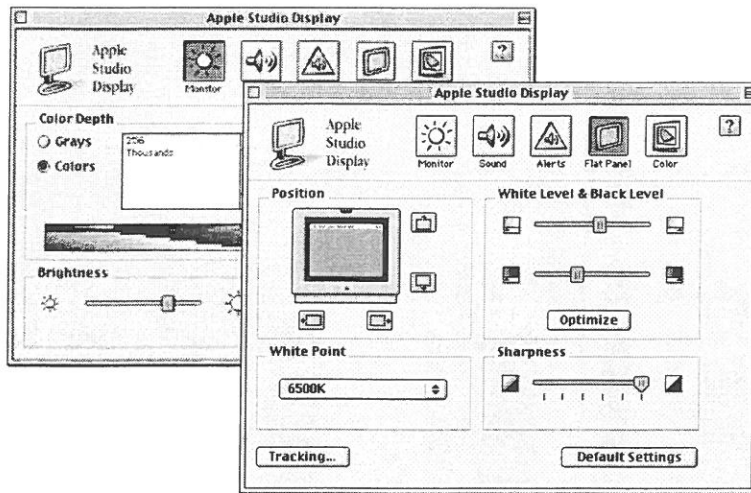
#### Power

Press this button to turn the display on or off.

#### Power indicator light

A green light indicates the display is on. An amber light indicates the display is in sleep mode. A blinking amber light indicates that you've pressed the Reset control to reset the settings for all formats. If there is no light, the display is off.

## Using Apple Display Software



### Notes

#### Monitors & Sound control panel

Mac OS-based computer users use the Monitors & Sound control panel to adjust settings for the Apple Studio Display. This interface is more elegant and easy to use than the built in on-screen display (OSD).

The Monitors & Sound control panel is similar to that used in other recent Apple Displays:

The Monitor panel information is limited to just the settings for color depth, resolution, and brightness. The majority of the display settings are in the Flat Panel panel, which we will cover momentarily.

As with other displays, on the Apple Studio Display the Color Depth and Resolution options will vary depending on the amount of VRAM available for your display.

Not surprisingly, the Recommended settings give the best quality image for that resolution. When troubleshooting with customers, make sure they are using a recommended resolution.

The Brightness slider allows you to adjust the display's backlighting.

#### Flat Panel panel

The Flat Panel panel contains controls specific to the Apple Studio Display:

The Position control moves the image relative to the physical screen, just like it does on our AppleVision displays.

The White Level & Black Level sliders are analogous to contrast controls, but split into white and black levels. The Optimize button initiates an adjustment sequence that terminates in a White/Black setting that a built-in algorithm considers best.

The AppleGuide button invokes the AppleGuide palette, and shows preselected topics relevant to the Flat Panel settings:

#### TIP

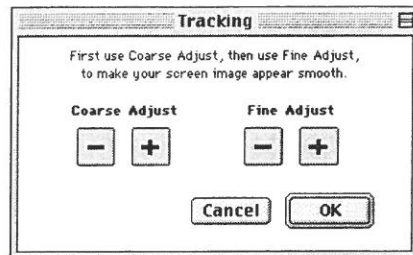
If you need background information on white points and color temperatures, check out TIL 9019 and 19673.

The Sharpness slider only works in 1024 x 768 resolution, and only serves to blur the screen image when moved to the left. Plan on leaving it in the full right position.

The Default Settings button resets the settings to the factory defaults.

## Tracking

- Adjust Tracking for each screen resolution!



### Notes

#### Tracking

The Tracking button is the most important Flat Panel setting to be familiar with. It allows you to adjust display blur, or "tracking," for each resolution. Initially, customers may have to set this tracking adjustment for each resolution selected, in order to remove blur and distortion.

#### Here is how to adjust tracking:

- Click on the Tracking... button. The screen will turn gray, and the Tracking adjustment dialog box will appear:
- Click on the Coarse Adjust buttons as needed to remove any vertical banding that may appear on the gray screen image.
- Then click on the Fine Adjust buttons to remove blurring or horizontal interference. You may need to hold the + or - button down a few seconds for optimal results, and the screen image may get worse before it gets better.
- Click OK when finished.
- Close the Monitors & Sound control panel to ensure the tracking settings are saved.

## Issues

- Apple Displays Software 1.7 Not Installed
- ADB Cable Not Connected
- Tracking Not Adjusted
- "Signal Out-of-Range"
- No ColorSync Profile for the Apple Studio Display
- Sync to Green
- Vertical Gray Bar

10

## Notes

### Apple Displays Software 1.7 Not Installed

Customers that do not have it installed may report the following:

- Missing resolution options.
- No Flat Panel panel in the Monitors & Sound control panel.
- Display name does not show up in the Monitors & Sound control panel, and various settings are missing.
- "AppleVision failed to load completely. Error 0x00088F8" error

### ADB Cable Not Connected

Like many other Apple displays that use the Apple Displays Software (previously called AppleVision software), for Mac OS-based connections the ADB cable must be connected to the display (and the display ADB cable connected to the Mac OS-based computer) for the software to recognize which display model you have connected. Customers that do not have the ADB cable connected to the display may report the following:

- Only one resolution is available.
- Monitors & Sound control panel missing the Flat Panel panel.
- Display name does not show up in the Monitors & Sound control panel, and various settings are missing.

### Tracking Not Adjusted

To minimize blurring on the Apple Studio Display, tracking must be adjusted in the Monitors & Sound control panel. Customers that have not done so may call complaining about different degrees of blur at different resolutions. If a customer calls with blur problems, start off by having them adjust the tracking. If they are using 1024 x 768 resolution, also have them adjust the Sharpness setting to the full right position. Adjusting the tracking also reduces image waviness.

## Signal Out-of-Range

When you change resolutions, the screen will go dark for a few seconds (and may momentarily display random garbage), then switch to the new resolution. This is normal.

Sometimes the display may show the message "Signal Out-of-Range" for 10 seconds, then switch back to the original resolution if you select a resolution that does not work with your computer. If customers report this, have them try selecting another resolution.

Some graphics cards may show a resolution that is not used by this display. If the "Signal Out-of-Range" message doesn't go away, restart your computer holding the Shift key down to turn extensions off. Open the Preferences folder in the System Folder and throw the Display Preferences file in the Trash. Then restart your computer again.

## No ColorSync Profile for the Apple Studio Display

Issue:

I have an Apple Studio Display and in the Monitor calibration assistant's profile's list (Color section of Monitors and Sounds control panel) it doesn't show the Apple Studio Display. The Apple Studio Display profile can be selected from the ColorSync Profiles list shown in the color panel, but appears nowhere in the calibration assistant's profiles list. Is this a known problem and if so what profile should I select?

Resolution:

Yes, this is a static list and the Apple Studio Display profile never made it into the 2.5 release of ColorSync. The profile to use for your Apple Studio Display would be the Generic LCD Display profile. The Apple Studio Display profile will make it into the next release of ColorSync.

## Sync to Green

Issue:

I have an Apple Studio Display running on a Power Macintosh 7200 with a Radius ThunderColor 30/1600 PCI video card. I have noticed that my display has a predominant green color throughout. Is this a problem with my display or my computer?

Resolution:

The predominant green color that is displayed is due to the fact that the video source syncs to green video which incorporates VSync and HSync. The Apple Studio Display only supports separate vertical and horizontal sync. The best way to get around this problem would be to use a different video card or through using a third party display adapter such as Griffin Technologies Mac Sync Adapter.

TIL: 30536

## Vertical Gray Bar

Issue:

I have an Apple Studio Display and when I adjust the horizontal position to the maximum position either to the right or to the left on my display, through the Monitors & Sounds control panel, I notice a 1/4 inch vertical gray bar at the edge of the screen. Is this normal?

Resolution

Yes, when you move the position of the display (raster) all the way to the left or right of the screen, you are displaying an area of the display which is outside of the usable area. Adjust the screen position, via the Monitors & Sounds control panel, so that the raster is centered on the display.

## Issues continued

- "No Computer Signal"
- No Sound From External Speakers
- Video Anomalies When Changing Resolutions

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### Notes

#### No Computer Signal

TIL: 24494

The Apple Studio Display should go into sleep mode when you select sleep or when Energy Saver is set to put the system or display to sleep. If you see the message "No Computer Signal" remain on the screen, then the Apple Studio Display needs to be reset to clear a value from its internal memory. To do this, press the reset button on the front of the Apple Studio Display (far left button with the triangle icon) until the LED starts to flash.

#### No Sound From External Speakers

TIL: 22174

First, the Studio Display will not provide audio output unless the display is in video mode. In other words, if you are using the 15 pin video connector and monitoring computer video output but not monitoring the C-video or S-video input, you will not get sound. For more information, consult page 50 of the Studio Display user manual.

If you are monitoring the C-video or S-video input, for example from a VCR, follow these steps:

1. Wire the audio output from the VCR to the audio input on the display.
2. Use amplified speakers connected to the audio output of the display.
3. Be sure the amplified speakers have power. For more information on connecting external speakers and video devices to the display, as well as how to switch video modes, consult Chapter 5 of the Studio Display user manual.

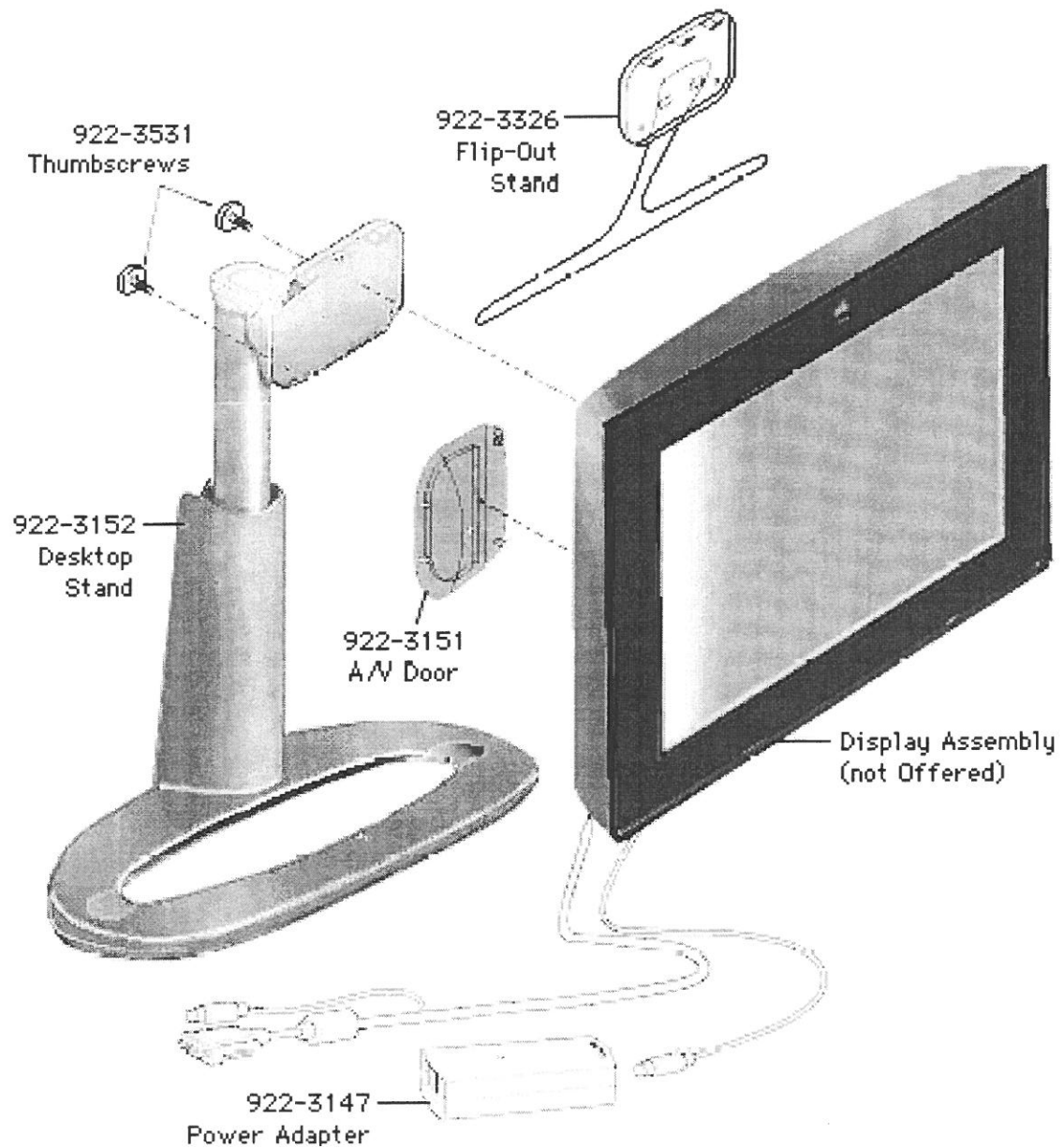
#### Video Anomalies When Changing Resolutions

TIL: 30524

The display will show different video anomalies such as lines, checkerboard patterns, or may go black for a second in order for the video circuitry to switch to the selected resolution.



## Exploded View of Apple Studio Display



## Studio Display 17"

- Overview
- Install and use
- Using Apple Display Software
- Support
- Exploded view

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### Notes

#### Introduction

The Apple Studio Display 17-inch (16-inch VIS) CRT replaces the Apple Multiple Scan 720 as an entry-level display. The Apple Studio Display's features and price point allow Apple to remain competitive in the low end, full page display market segment (this segment includes business users, advanced home users, and higher education users).

## Overview

- Screen
- Input Signals
- Dimensions
- System Requirements
- Resolution
- Display Cable
- User Controls

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### Notes

#### Screen

17-inch Diamondtron CRT  
 16-inch diagonal viewable image area  
 Anti-static, anti-glare surface treatment  
 0.25/0.28 mm aperture grille pitch

#### Input signals

Red, green, and blue video signals  
 Multiple-scan  
 Separate horizontal and vertical sync  
 DDC clock and data signals  
 Vertical refresh: 30 to 85 hertz (Hz)  
 Horizontal scan: 30 to 160 kHz

#### Dimensions

Weight: 48 pounds (21.8 kilograms)  
 Height: 18.9 inches (in.) (480 mm)  
 Width: 16.5 in. (420 mm)  
 Depth: 16.9 in. (430 mm)

#### System Requirements

Any PowerPC-based Macintosh computer, except the PowerBook Duo 2300, with either a built-in monitor port adapter or compatible graphics card and running Mac OS 8 or later.

## Resolution

Compatible with most Mac OS-based computers, the Apple Studio Display supports the following resolutions:

Screen Resolution	Vertical Refresh Rate
640 x 480	60Hz
640 x 480	66.7Hz
640 x 480	85Hz
800 x 600	72Hz
800 x 600	85Hz
832 x 624	75Hz
1024x768	60-85Hz
1152x870	75Hz
1280x1024	75Hz
1600x1200	60

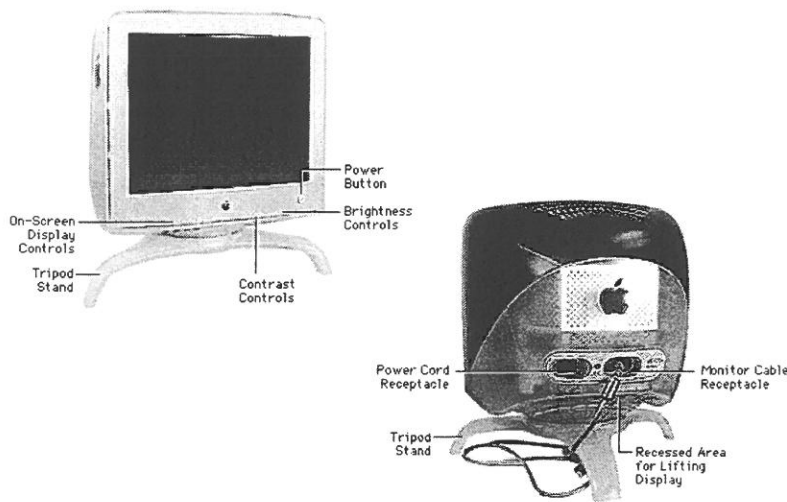
## Display Cable

VGA video connector with VGA-to-Mac adapter.

## User Controls

- Power On/Off button
- Automatic degauss at power-up; manual degauss through the degauss control
- On-Screen Display (OSD) control buttons
- OSD Enter and Exit
- Left and Right arrows
- Brightness Increase/Decrease
- Contrast Increase/Decrease

## External features



### Notes

#### Front View

Features located on the front of the Apple Studio Display 17-inch (16-inch diagonal viewable image size) CRT include the following digitally operated user controls:

- Power-On Switch
- On-Screen Display (OSD)
- Contrast
- Brightness

The Power button turns the monitor on or off. A green light indicates the monitor is on. An amber light indicates the power-saving mode (sleep). When the monitor is in sleep, move the mouse or press a key to return the monitor to its normal display operation. At startup, the light may be amber until the computer comes on. If the green light does not go on, press the monitor's power button again. If that does not work, shut down and unplug the computer and make sure the monitor is connected to the computer properly.

#### Important:

The Apple Studio Display monitor sits on a plastic tripod stand. Be sure that the workstation desk or table can support the display's weight (48 pounds) and that the desktop is large enough to accommodate the tripod legs. To move the monitor, make sure the monitor is facing you. Then lift the monitor by placing your hands on the recessed areas on the bottom of the monitor.

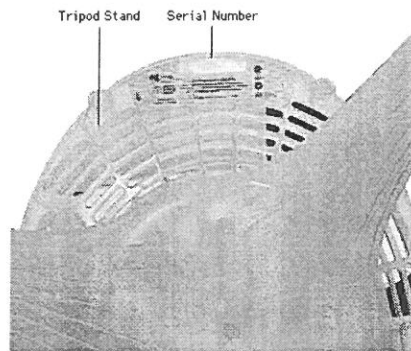
#### Note:

When you first power-up the Apple Studio Display, you may see a moiré pattern on the initial gray background. The pattern disappears after a few seconds and does not effect the usage or image quality of your monitor.

#### Back View

The power cord receptacle, security lock port, monitor cable, and two recessed areas for lifting the monitor are located on the back of the Apple Studio Display.

## Serial Number



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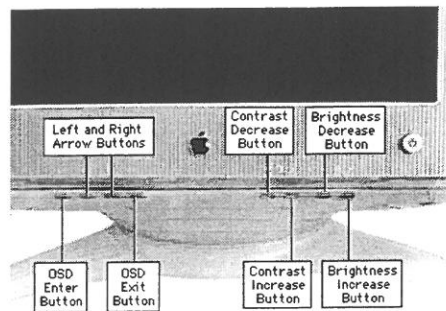
### Notes

#### Important

The serial number identification is located on the back side of the tripod stand, as shown below.

Replacement caution: The back of the tripod stand carries a product identification label that includes the serial number and the manufacturing date for the monitor. When you receive a new tripod stand, the product identification label will show blank lines for the serial number and the manufacturing date. To avoid losing this critical information, copy the serial number and the manufacturing date onto the blank lines on the product identification label on the new tripod stand.

## Controls



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### Notes

#### On Screen Display

The buttons located under the front left side of the monitor control On-Screen Display (OSD) user adjustments (see illustration below). The On-Screen Display (OSD) controls let you fine-tune the picture on your monitor. OSD adjustments include Basic Adjustments, Geometry, Image, and Color.

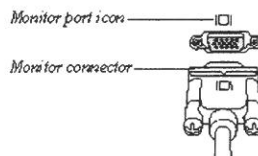
Use the OSD Enter button to enter the OSD and to enter choices. The left and right arrow buttons allow movement between the OSD controls. Pressing the OSD Exit button exits the OSD and the OSD windows.

#### Contrast and Brightness

The Contrast and Brightness buttons increase or decrease the contrast and brightness of the picture. There are four buttons: Contrast Increase, Contrast Decrease, Brightness Increase, and Brightness Decrease. Depressing of any of the four buttons activates an on-screen scale bar to indicate the level change of the control function being activated. Increasing functions will increase the bar size.

## Install & Use

- Data Display Channel (DDC)
- Apple Studio Display Software
- VGA to Mac Adapter



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### Notes

#### Data Display Channel:

If you are using any of the following computer models or graphics cards, the DDC (Data Display Channel) control needs to be turned off to make the maximum number of resolution settings available.

- Power Macintosh 6100, 7100, and 8100 series
- PowerBook 1400 and 5300
- Power Macintosh 9500, 6200, 6300, and 6400 series
- Some third-party video cards

If you are using any of the above computer models, or a third-party video card, and you are able to access only the 640 x 480 resolution setting, turn off the DDC control to access the rest of the resolution settings. For instructions on turning off the DDC control, see "Accessing and Adjusting the On-Screen Display Controls" in Chapter 3 of the electronic user's manual.

#### Apple Display Software

The Upgrader/Installer checks whether you have the system software you need to use the monitor. If anything is missing, a message tells you what you need. You won't be able to install the software until you correct the problem. If a message says you don't have the correct system software, you can purchase a new version from an Apple-authorized dealer. After the installation, the Upgrader/Installer tells you to restart your computer.

Restart the computer upon completion of the installation process.

Upon restart, the following icon appears on the desktop:



*About Your Apple Studio Display*

About Your Studio Display accesses on-line help files relating to the display. Here you will find out how to use Apple Displays software, technical specifications, health and safety information, and maintenance tips.

#### VGA-to-Mac Adapter

The connector on your display cable is a VGA video connector. All references to the monitor connector (2-row D-15 video connector) in the setup manual are replaced by the information presented here. For instructions on connecting your display, see the setup manual that came with your display.

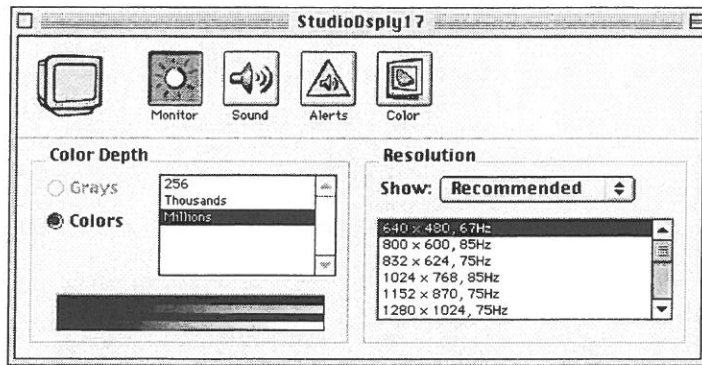


## Files Installed by Apple Display 1.7 Software

<u>Filename</u>	<u>Version</u>	<u>Location</u>
•Monitors and Sound control panel	1.5	Apple Menu Items
•Control Strip	1.4.1	Control Panels
•Display Enabler	2.4	Extensions
•Apple IX3D Graphics Accelerator	1.0.2	Extensions
•Apple IX3D Rave Engine	1.0	Extensions
•Apple IX3D Video Memory Manager	1.0	Extensions
•SystemAV	1.5	Extensions
•About Your Studio Display	Help (a folder of help files)	
•Monitors & Sound Help	Help (a folder of help files for pre-Mac OS 8.5 users)	

## Using Apple Display Software

- No Geometry button!



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### Notes

### Using Apple Studio Displays Software

The Apple Displays Software is a set of files that let you adjust basic picture, sound, and color settings with the following software tools:

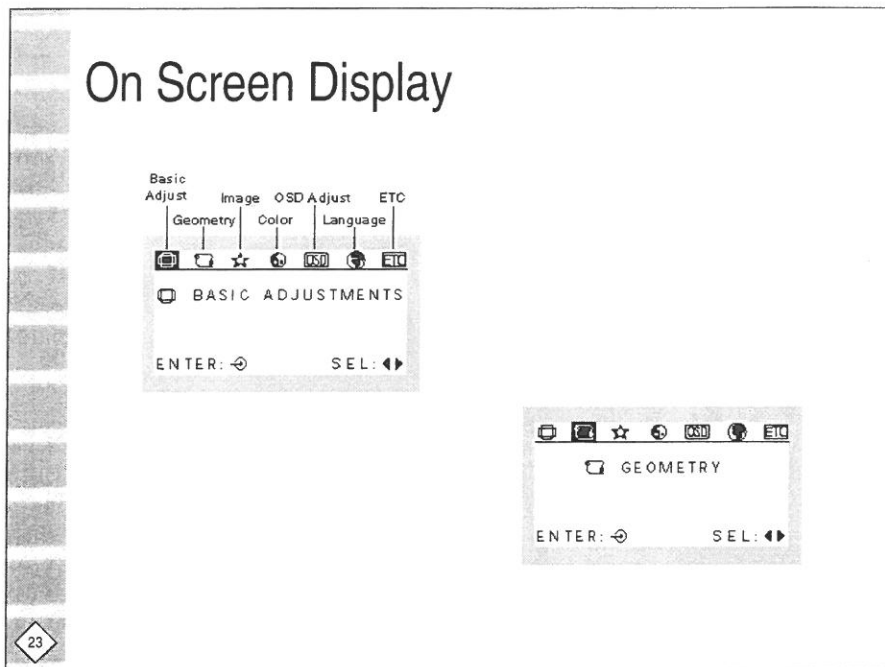
Monitors and Sound control panel

Control Strip

### Monitors and Sound Control Panel

The Monitors & Sound control panel lets you change basic settings that affect the way your computer displays images and processes sound. For more information, see Mac OS Help (Mac OS 8.5 users), or Monitors & Sound Help when the Monitors & Sound control panel is active (Mac OS 8 or 8.1 users).

Notice that the Geometry button is missing from the Monitors and Sound Control Panel. The Geometry adjustment is performed by the On-Screen Display feature.



## Notes

### On Screen Display

The On-Screen Display lets you fine-tune the picture on the monitor. The built-in OSD works both with Macintosh and PC-compatible computers; however, Apple only supports this display for use on any PowerPC-based Macintosh (except the PowerBook 2300) with either a built-in monitor port adapter or compatible graphics card. In most cases, adjustments will not need to be made to the picture. Basic use of the Apple Studio Display does not require use of the OSD, but it does have some useful features.

### Accessing and Adjusting the On-Screen Display Controls

To make adjustments in the On-Screen Display, follow these steps: Press the OSD Enter button on the left of the monitor, and the Basic Adjustments menu (main menu) appears.

This menu contains the seven main control icons of the On-Screen Display. Use the left or right arrow buttons to highlight OSD controls. When the desired icon becomes highlighted, press the Enter button.

### Geometry Adjustments include:

Side Pincushion Balance	Adjusts the shape of the screen, to curve the sides of the image.
Parallelogram	Adjusts the slant of an image.
Pin S Adjust	Modifies the right and left edges of the screen image.
Pin W Adjust	Modifies the right and left edges of the screen image.
Tilt	Rotates the screen image.
Zoom	Adjusts the height and width of the screen image simultaneously.
Recall	Restores the factory settings for Geometry.

**For additional information on On-Screen Display controls, refer to the Using Manual Controls section of the Setup Guide.**

## Support

- Removing Vertical Lines
- Changing the DDC Setting
- Noise or shimmer at startup
- Adjustment Adapter



- Diagnosing a suspected hardware problem

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### Notes

#### Removing Vertical Lines

TIL: 58272

The Diamondtron CRT used in the 17-inch Studio Display incorporates an aperture grid of very fine, vertical wires to enhance the sharpness of the image. Exposure to cold and or vibration can cause these fine wires to temporarily adhere to each other. The vertical line anomaly is inherent to this type of display when exposed to lower temperatures and is not indicative of the need for a service call.

If your display is exhibiting visible thin vertical lines, you can most often break the adhesion between the grid wires by using the heel of your hand to moderately impact the side of your display under the Apple logo on the right, then left side. Using moderate force will not damage your display.

#### Changing DDC settings

TIL:58219

DDC stands for "Display Data Channel," a communication protocol used by many displays for display/CPU connections. If the DDC setting is not correct, you will not be able to access all the resolution settings that your monitor and system will support. You can change the DDC setting of the Apple Studio Display 17 by using the On-Screen Display controls.

Most newer Macintosh computer models support DDC, so the default DDC setting on the display is ON. **IMPORTANT:** If you have reset the DDC control, turn the monitor off and then on again by pressing the power button at the lower right corner of the monitor's front panel, then restart your computer. Doing this ensures that the new DDC setting is enabled.

#### Noise or Shimmer at Startup

TIL: 58216

Degaussing is the process of stabilizing the magnetic field of the CRT. It is a normal function of every display and does not indicate a need for service.

Waking the display from sleep or initiating a degauss from the on-screen display can also cause the same noise to be generated.

## Adjustment adapter

Apple part number 077-0168) to save adjustment settings to factory space. Connect the adjustment adapter (Apple part number 077-0168) between the computer's monitor port and the monitor's video cable.

Use the adjustment adapter to set the OSD to factory mode, as follows:

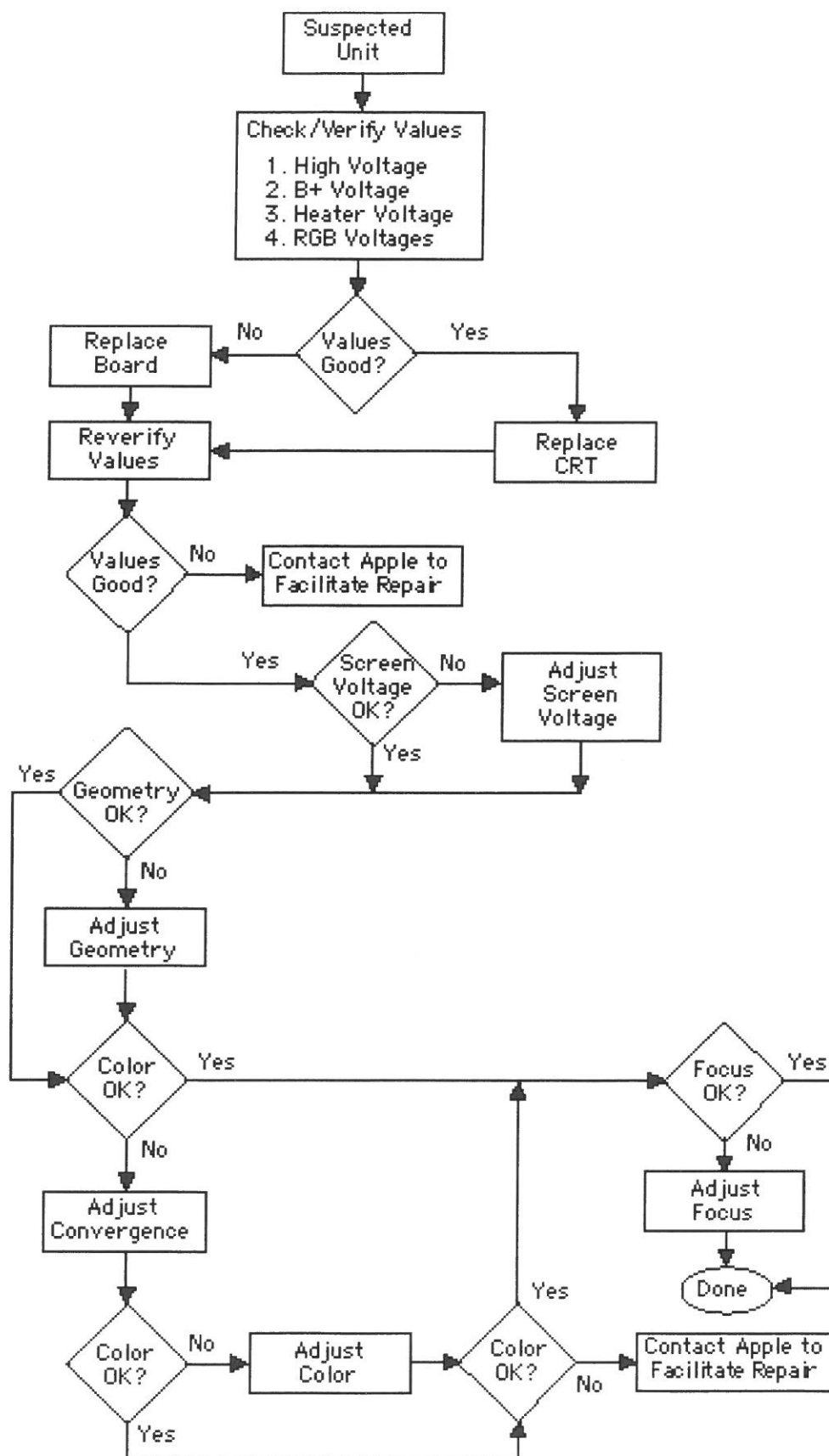
- Open the OSD by pressing the OSD enter button on the front control panel.
- Press the red button on the adjustment adapter once.

The screen will go blank momentarily. When the screen reappears, the OSD window will show a symbol in the lower left corner of the window.

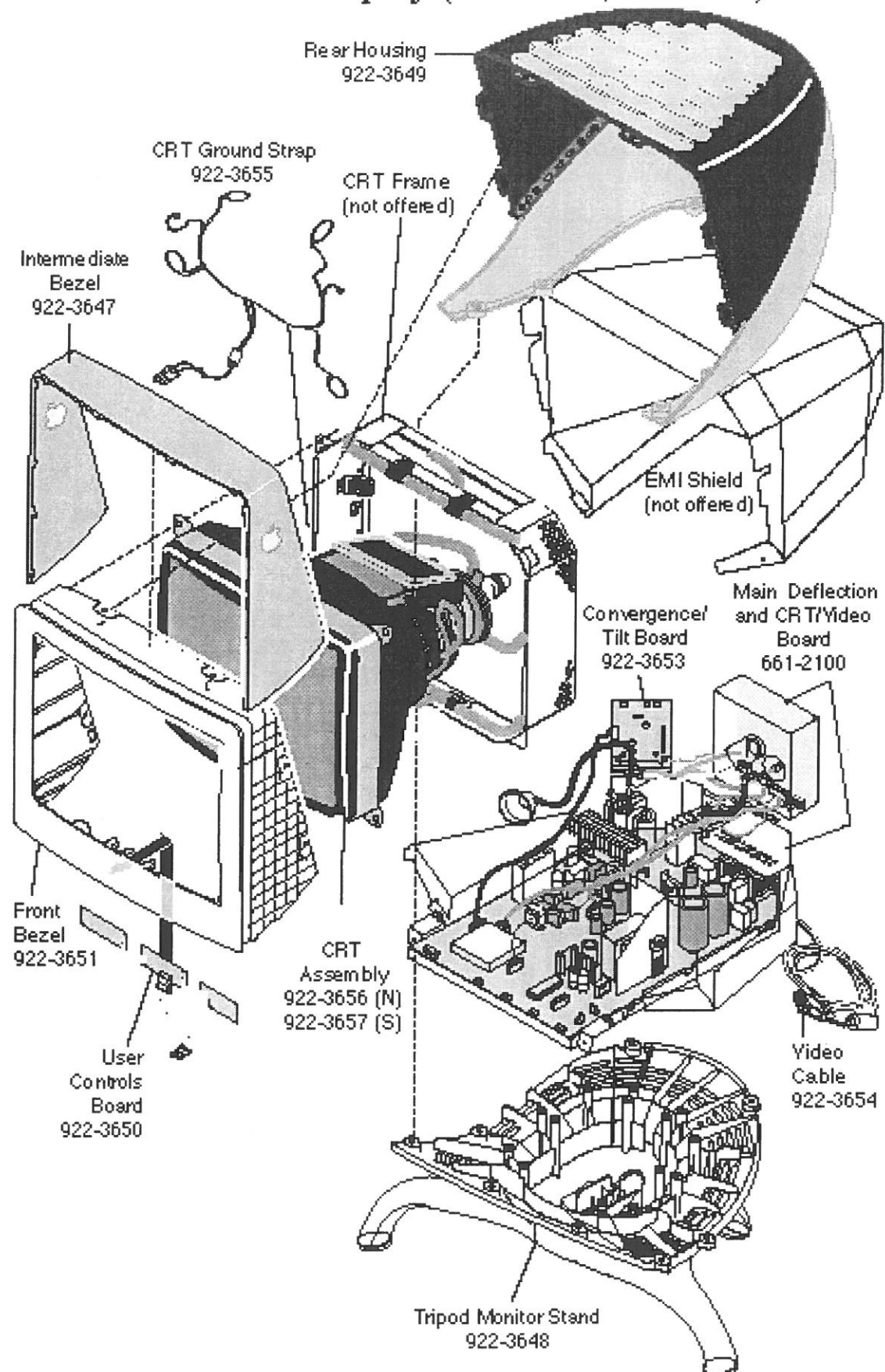


This music note symbol indicates factory mode is turned on. From this point any changes you make to the geometry, screen color or convergence adjustments will be saved in factory mode.

## Flowchart: Diagnosing A Suspected Hardware Problem



## Studio Display (17" CRT, 16" VIS)



## Apple Studio Display 21"

- Overview
- Install & Use
- Using Apple Display Software
- Support
- Exploded view

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Notes



## Overview

- Screen
- Input signals
- Interface
- System Requirements
- Resolution
- Compatibility
- Display Cable
- Serial Number

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### Notes

#### Screen

21-inch Sony Trinitron display  
 19.8-inch diagonal viewable image size  
 Anti-static, anti-glare surface treatment  
 0.25/0.27 mm aperture grille pitch

#### Input signals

Red, green, and blue video signals  
 Multiple-scan  
 Separate horizontal and vertical sync  
 DDC clock and data signals  
 Vertical refresh: 48 to 120 hertz (Hz)  
 Horizontal scan: 31.5 to 106 kHz

#### Interface

Universal Serial Bus (USB) - 4 USB ports

#### System Requirements

Mac OS-based computer with a PowerPC processor and a built-in USB port

## Resolution

Compatible with only Mac OS-based computers with a PowerPC processor and a built-in USB port, the Apple Studio Display supports the following resolutions:

Screen Resolution	Vertical Refresh Rate
640 x 480	60 - 85Hz
800 x 600	60 - 85Hz
832 x 624	75Hz
1024 x 768	60 - 85Hz
1152 x 870	75Hz
1280 x 1024	60 - 85Hz
1600 x 1200	60 - 85Hz

**Note:** If the adapter is used on a computer that does not have built-in USB, the display supports only 640x480 resolution, and access to the software controls is not available.

## Compatibility

For additional compatibility information, refer to TIL article 58212: Compatibility to other Macintosh Models

## Display Cable

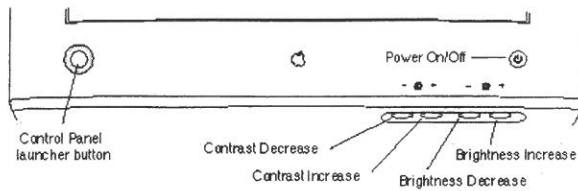
VGA video connector with VGA-to-Mac adapter

## Serial Number

The serial number identification is located on the back side of the display. Replacement caution: The rear housing or back cover carries a product identification label that includes the serial number and the manufacturing date for the monitor. When you receive a new back cover, the product identification label will show blank lines for the serial number and the manufacturing date. To avoid losing this critical information, copy the serial number and the manufacturing date onto the blank lines on the product identification label on the new tripod stand.

## User Controls

- Control Panel launcher
- Contrast & Brightness



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### Notes

#### Control Panel Launcher

The Control Panel Launcher button is located on the front left side of the monitor. Pressing this button opens the Monitors and Sound control panel window.

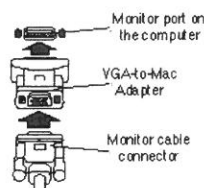
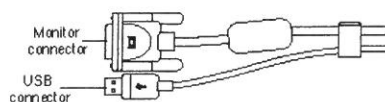
#### Contrast and Brightness

The Contrast and Brightness buttons increase or decrease the contrast and brightness of the picture. There are four buttons: Contrast Increase, Contrast Decrease, Brightness Increase, and Brightness Decrease. Depressing of any of the four buttons activates an on-screen scale bar to indicate the level change of the control function being activated. Increasing functions will increase the bar size.

**Note:** If Apple Display software is not installed, the on-screen scale bars do not appear.

## Install & Use

- Video Cable and adapter
- USB Connector
- Display Software



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### Notes

#### Video cable and adapter

The monitor cable is a VGA video connector. To connect the Apple Studio Display to a computer or graphics card with a Macintosh-type connector (2-row DB-15 connector), or to a graphics card with both VGA and Macintosh connectors, you need to use the VGA-to-Mac adapter included with the Apple Studio Display.

**Important:** All references to the monitor connector (2-row DB-15 video connector) in the setup manual are incorrect. Refer to the Important Information About Your Studio Display Cable document included in the box.

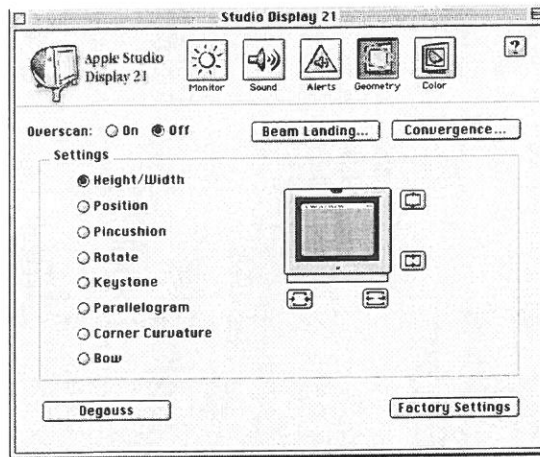
The USB connector plugs into a USB port on the back of the computer. Make sure the USB connector is attached firmly. **Important:** The USB connector is not optional; it is needed for your computer to work correctly with the monitor. If the connector is not connected properly, the software controls will not be available. **Note:** If the adapter is used on a computer that does not have built-in USB, the display supports only 640x480 resolution, and access to the software controls is not available.

See also TIL article 58215: Using the VGA-to-Mac Adapter.

#### Files Installed by Apple Display 1.7 Software

Monitors and Sound control panel	1.5	Apple Menu Items
ColorSync	2.5	Control Panels
Control Strip	1.4.1	Control Panels
Display Enabler	2.4	Extensions
USB Apple Monitor Module	1.7	Extensions
Apple IX3D Graphics Accelerator	1.0.2	Extensions
Apple IX3D Rave Engine	1.0	Extensions
Apple IX3D Video Memory Manager	1.0	Extensions
ColorSync Extension	2.5.1	Extensions
SystemAV	1.5	Extensions
About Your Studio Display		Help (a folder of help files)

## Using the Apple Display Software



### Notes

### Using Apple Studio Displays Software

The Apple Displays Software is a set of files that let you adjust basic picture, sound, and color settings with the following software tools:

- Monitors and Sound control panel
- Digital Color Meter

### Monitors and Sound Control Panel

The Monitors & Sound control panel lets you change basic settings that affect the way your computer displays images and processes sound. User adjustments in the Monitors and Sound control panel include the following:

- brightness and contrast
- screen resolution
- color depth
- sound
- alerts
- geometry
- Color

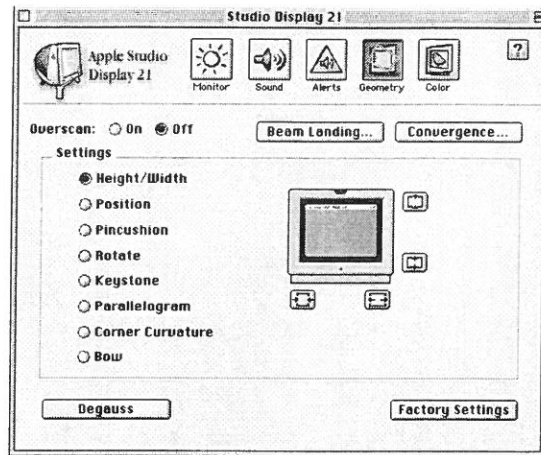
### Brightness and Contrast

You can make changes to brightness and contrast settings to impact color. The higher the brightness setting for your screen, the more washed-out the colors may appear. For best color, set the brightness to the middle setting, then adjust the contrast to change the overall luminance of the monitor.

### Color and Geometry

The Color and Geometry controls allow you to compensate for differences in your surroundings and display placement. For example, you can use the Geometry controls, such as Pincushion and Beam Landing, to adjust the edges of your screen image or minimize color patches on your screen. You can also calibrate your monitor to accommodate ambient light or select a preferred gamma and white point.

## Geometry adjustment



### Notes

## Geometry Adjustments

You can adjust the shape and position of the display's image by making geometry adjustments.

**Beam Landing:** Click this button to correct patches in the corners or the top and bottom of the screen.

**Convergence:** Red, green, and blue signals in the monitor converge to create the colors seen on the screen. If the convergence is not set properly, images or text on your screen may appear blurred, or you may get a "rainbow" effect with several colors forming the edges of images on the screen.

If the monitor is exposed to an external electromagnetic field (for example, from another monitor) over a period of time, the convergence may need to be changed to get a clear, distinct screen image.

When convergence is set properly, the image is clear and distinct.

**Height and Width:** When the height and width are set properly, you should be able to see the entire image on the screen with no distortion at the edges.

**Position:** When the position is properly adjusted, the image is centered on your screen. The black borders surrounding the image are the same width on all sides.

**Pincushion:** Adjusts the shape of the screen image.

**Rotate:** Rotates the screen image.

**Keystone:** When keystone is properly adjusted, the top and bottom edges of the image are the same length.

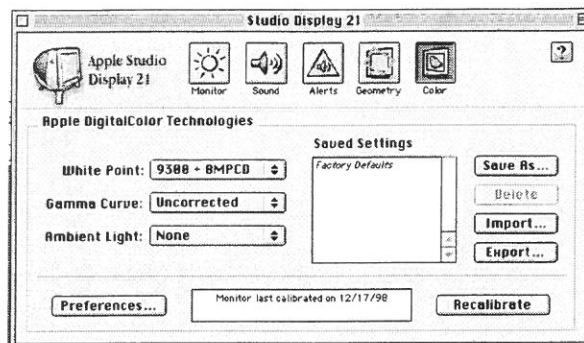
**Parallelogram:** Adjusts the left and right sides of the screen image. When parallelogram is properly adjusted, the sides of the image are perpendicular to the top and bottom of the image.

**Corner Curvature:** Adjusts the shape of the corners of the screen image.

**Bow:** Adjusts the curvature of the sides of the screen image.

**Degauss:** Manually degausses the monitor. Degaussing realigns the magnetic domains of the CRT's shadow mask or aperture grill with the Earth's magnetic field so that the CRT's precisely aligned electron beam is not negatively affected. Degaussing helps to maximize the visual quality of the display.

## Color adjustments



### Notes

#### ColorSync

The Apple Studio Display comes with a ColorSync profile that characterizes the monitor. The Apple Displays software included with the monitor uses this ColorSync profile, along with other device profiles, to match colors as closely as possible. To select ColorSync profiles, use the Monitors and Sound control panel.

#### Color settings include the following:

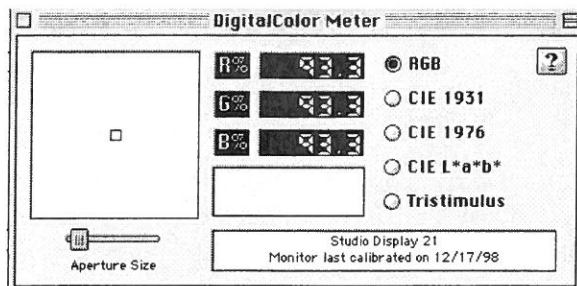
**Ambient light:** The light surrounding your monitor may change how colors appear. For example, colors look different in sunlight than in fluorescent light. Use the Apple Studio Display ambient light controls to adjust the monitor to the lighting conditions in your location.

**Gamma curve:** The relationship between the input value and output luminance on your display is represented by gamma curve. At a low gamma value, colors are washed out. At a higher gamma value, colors have more contrast.

**White point:** The white point you select for your monitor sets the mix of red, green, and blue light that make the color white. When the white point changes, monitor colors change.

**Recalibrate:** When you change color settings, it is important to recalibrate the monitor to ensure accuracy. Also, over time, your monitor may become less efficient, causing colors to change. Recalibration ensures that color accuracy is maintained.

## DigitalColor Meter



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### Notes

#### DigitalColor Meter

For high-accuracy color, the 20-inch (19.8 VIS) Apple Studio Display includes Apple DigitalColor internal calibration technology, which ensures that the display's color accuracy remains true over time and in a variety of ambient lighting conditions. The DigitalColor Meter helps measure and translate colors on ColorSync monitors into industry standard values, such as PANTONE, CIE, and Tristimulus.

DigitalColor Meter and Apple Studio Display monitor work together to identify colors on the screen based on the standard color gamuts defined by the CIE. DigitalColor Meter can also identify colors using the PANTONE system. PANTONE is a color-matching system used to specify ink colors for high-end printers. PANTONE colors are described using their printing ink formulation, which is identified by a specific PANTONE number. DigitalColor Meter performs color matching and provides PANTONE numbers for the coated (CVC), uncoated (UVC), and process (CVP) color samples. The PANTONE numbers are especially important when you have your work professionally printed to ensure that the printer will use colors similar to those displayed on your screen.

**Note:** The PANTONE Color Picker, included in the Apple Displays software, also lets you specify PANTONE values for colors used in documents in many application programs. In these applications, the system color picker opens automatically when a new color needs to be specified. For more information about using the PANTONE Color Picker for Apple, see Mac OS Help or Monitors & Sound Help, available when the Monitors & Sound control panel is open.

Finally, you can use DigitalColor Meter to identify the RGB (red, green, blue) values your computer uses to create colors. The RGB number is used by some applications to specify colors. Many programming tools and graphics programs use RGB values to specify colors. The DigitalColor Meter helps to identify those RGB values.

**Note:** CIE and Tristimulus values are used in programming, color science, and research-related industries.



## Support

- Connecting to a PCI Video Card
- Compatibility
- Screen Jitters
- Screen resolution
- AppleVision failed to load
- Diagnostic adjustments
- Replacing CRT/Video Board
- Replacing Main Deflection board

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### Notes

#### Connecting to a PCI Video Card

Due to signal dependencies not present on the VGA style connector of most third party cards, you must use the VGA-to-Macintosh adapter to connect the display to the DB-15 video connector, if the card has one. The VGA-to-Macintosh adapter is included with the Apple Studio Display 21.

By using the VGA to Macintosh adapter and connecting to the DB-15 port on the card, the additional video controls become available for use. Be sure to connect the adapter to the card first, then connect the display cable.

#### Compatibility

Due to the requirement of on-board USB, the Apple Studio Display 21 can be connected only to USB based computers. An earlier Power Macintosh with a USB card installed is not a supported configuration.

#### Screen Jitters

A slight jitter appears on screen when the Apple Studio Display is set to 1200 x 1600 resolution and connected to a ATI Rage Pro video card. The jitter problem is NOT caused by the display.

#### Screen resolution:

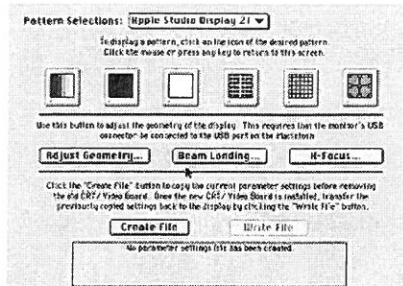
After setting up the Apple Studio Display, there is only resolution available is 640 x 480. Make sure the USB connector is plugged into a PowerPC computer with a built-in USB port. If the computer you are connected does not have built-in USB, 640 x 480 is the only resolution available.

#### AppleVision failed to load:

If the Apple Displays Software is installed and you disable the Display Enabler extension, you can't use the software. Make sure the Display Enabler extension is turned on in the Extensions Manager, then restart your computer.

## Diagnostic adjustments

- USB Service Utility



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### Notes

## Diagnostic Adjustments

Diagnostic adjustments are those display adjustments that can be made by the service provider, but are not available to users.

### Diagnostic adjustments for this display require both

- The Monitors & Sound control panel
- The new USB Display Service Utility (USB DSU)

## USB Display Service Utility

New for this display is the USB Display Service Utility. This diagnostic utility is for use only with the USB-based Apple Studio Display (21" CRT, 19.8" VIS).

The USB Display Service Utility (USB DSU) works very much like the Display Service Utility that is used for other monitors; however, it features two new functions:

**Beam Landing**—a button used to adjust and correct color distortion at the corners of the screen

**Corner Correction**—a control used to correct the shape of the corners of the screen

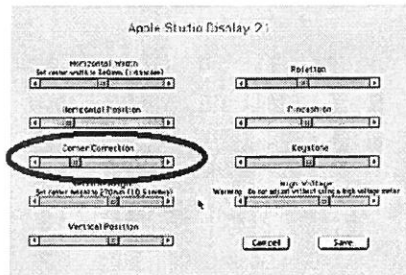
When you open the USB Display Service Utility, the first screen appears as shown. Note the Beam Landing button at the center of the screen. This button represents a new feature for the Display Service Utility.

When you click Beam Landing, a screen with four slider bar controls appears, as shown. Moving a slider bar adjusts the color distortion in the corner indicated by the control.

**Important:** If you click Cancel, any changes made are not saved. However, to resume the previous look of the screen display, you must reset the monitor by turning it off and on at the monitor's power button. If you click Save, the changes are saved to both user and factory mode. To see the difference made on the screen, reset the monitor by turning it off and on at the monitor's power button. (This way the changes will be noticeable when you turn on the display.)

## Adjust Geometry

- Corner Correction



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### Notes

#### Geometry

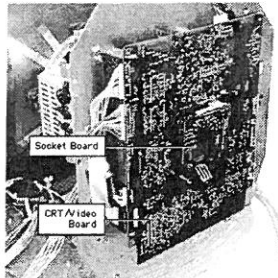
When you click Adjust Geometry, a screen appears with the slider bar controls shown. Unique to this version of the Display Service Utility is the Corner Correction control. This control corrects the shape at the corners of the screen.

**Caution:** The High Voltage control is the only control whose setting is automatically saved even if you click Cancel.

**Important:** If you click Cancel, any changes made are not saved. However, to resume the previous look of the screen display, you must reset the monitor by turning it off and on at the monitor's power button. If you click Save, the changes are saved to both user and factory mode. To see the difference made on the screen, reset the monitor by turning it off and on at the monitor's power button. (This way the changes will be noticeable when you turn on the display.)

## Adjustments Continued

- Replacing CRT/Video board
  - Downloading Parameters
  - Adjustments



- Replacing the Main Deflection Board

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### Notes

#### **Replacing CRT/Video board**

Before replacing the CRT/Video board you have to download the parameters, using the USB Display utility from the CRT/Video board. After replacing the CRT/Video board you have to upload the parameter settings to the new CRT/Video board.

After replacing the CRT/video board, the following adjustments are necessary:

- Adjusting screen geometry
- Recalibrating white points

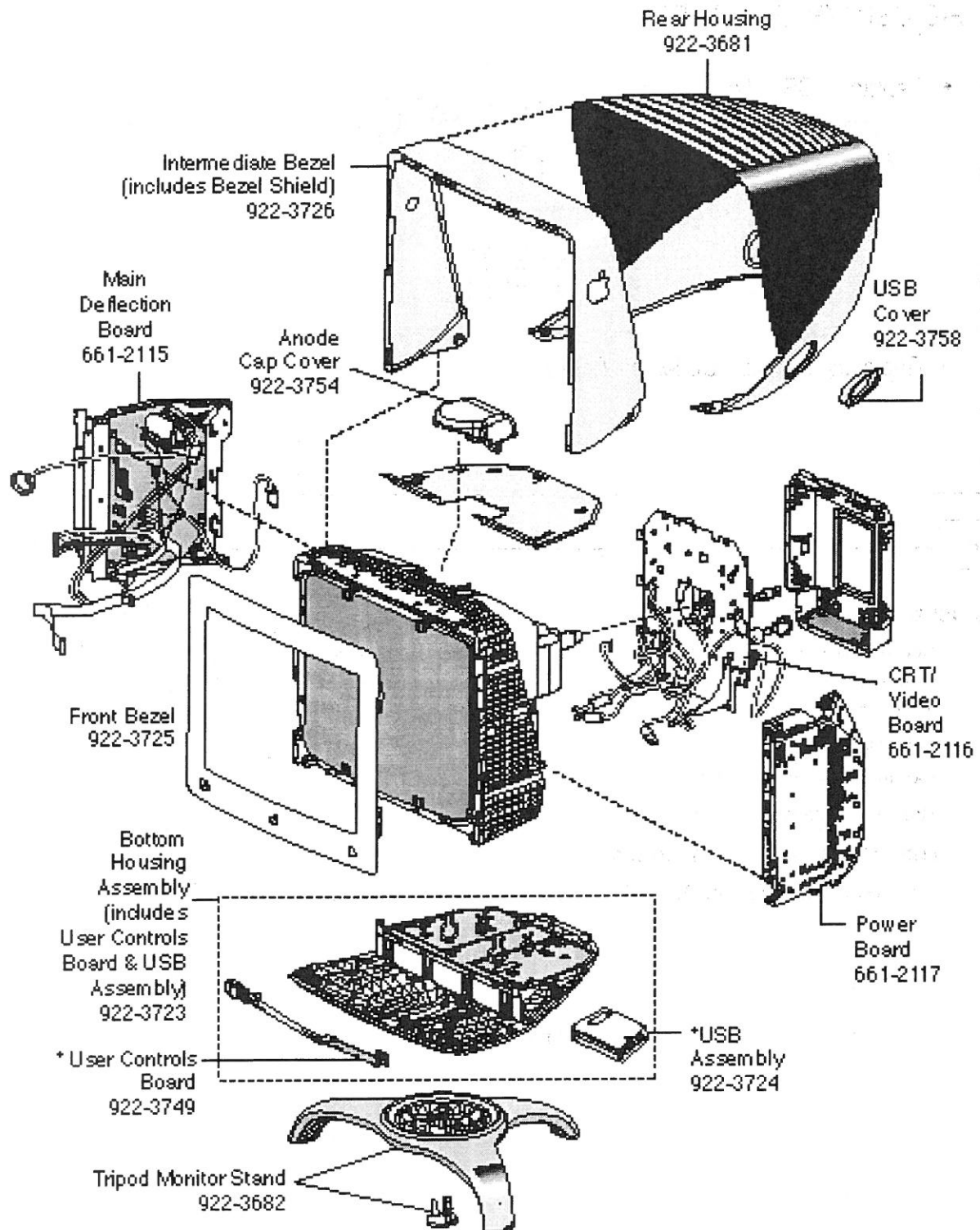
#### **•Replacing Main Deflection Board**

After replacing the Main Deflection Board perform the following adjustments:

- Geometry
- High Voltage
- Focus

Check the Service Source for the correct procedures.

# Apple Studio Display (21" CRT, 19.8" VIS)



\*Also offered separately

## ColorSync 2.5

- New Profile Folder Location
- Subfolders and Aliases
- Optimized Profile Searching
- Monitor Calibration Framework and Per/Monitor Profiles
- Scripting Support
- Multiprocessor Support
- Sixteen-bit Channel Support
- Flexibility in Choosing CMMs and Default Profiles

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### Notes

#### **New Profile Folder Location**

Earlier versions of ColorSync placed the ColorSync Profiles folder inside the Preferences folder. Version 2.5 places that folder at the first level inside the System folder. For backward compatibility, ColorSync may put an alias to the original folder inside the new profiles folder.

#### **Subfolders and Aliases**

You can now organize profiles by storing them in one level of subfolders within the profiles folder. You can also store aliases to other profiles and profile folders.

#### **Optimized Profile Searching**

ColorSync 2.5 uses a cache file to keep track of currently-installed profiles. A flexible new routine, CMIterateColorSyncFolder, takes advantage of the profile cache to perform fast profile searches and provide profile information quickly.

#### **Monitor Calibration Framework and Per/Monitor Profiles**

ColorSync 2.5 uses the Monitors & Sound control panel to provide a monitor calibration framework and per/monitor profiles.

#### **Scripting Support**

ColorSync 2.5 provides an extensible AppleScript framework that allows users to script many common tasks.

#### **Multiprocessor Support**

The default CMM now supports multiple processors for color matching functions.

#### **Sixteen-bit Channel Support**

ColorSync Manager 2.5 and the default CMM supplied by Apple Computer and Linotype-Hell now support 16-bits-per-channel color spaces.

#### **Flexibility in Choosing CMMs and Default Profiles**

The ColorSync control panel, which replaces the ColorSync™ System Profile control panel, now lets you choose a preferred CMM from any CMMs that are present.

#### **Check the ColorSync 2.5 read me file for further detail.**

## ColorSync 2.6

- Expanded AppleScript dictionary
- JPEG and GIF support
- Control Panel interface
- Intelligent profile listing in Monitors & Sound
- Gray space profile
- Expanded bitmap support
- Additional API calls for developers

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### Notes

#### Expanded AppleScript dictionary

The ability to use AppleScript to automate ColorSync was introduced in ColorSync 2.5 by making the ColorSync Extension a faceless background application, allowing it to respond to Apple events. ColorSync 2.6 responds to even more commands than it did before, allowing the user to get detailed information about profiles in the ColorSync Profiles folder, profiles associated with displays, and profiles embedded within images. Most of these attributes of profiles can also be changed by the user via AppleScript. Images can be matched, proofed, or embedded with profiles as before, and can also have any embedded profiles removed by unembedding.

#### JPEG and GIF support

Prior to ColorSync 2.6 only TIFF images could be used with the ColorSync PhotoShop Plug-ins and with AppleScripts performing ColorSync operations. Now both Applescripts and the plug-ins will work with images saved in the widely used JPEG and GIF formats.

#### New Control Panel design

The control panel has been redesigned for clarity, subdividing the various popups which control ColorSync's behavior. Controls and preferences can be set in the Profiles and CMM's panels.

#### Intelligent profile listing in Monitors & Sound

Launching the Monitors & Sound control panel and selecting the Color button brings up the ColorSync Profile panel, and selecting a profile from this list associates that profile with your display.

#### New Gray Space Profile

ColorSync 2.5 shipped with the standard color space profiles Generic RGB Profile, Generic CMYK Profile, Generic Lab Profile, and Generic XYZ Profile. ColorSync 2.6 adds to this set the Generic Gray Profile.

#### Expanded Bitmap Support

Of interest to developers is the addition of more types of bitmap formats supported natively by ColorSync. Some of these new formats allow ColorSync to support both Mac and PC bitmap formats.

#### Additions to the API

Also of interest to developers is the addition of some new calls to the ColorSync API.

