HORIZON 24

RASTEROPS®

USER GUIDE

RASTEROPS®

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Contents

Introduction

About the RasterOps Horizon 24

Horizon products incorporate RasterOps' latest display acceleration technology. The Horizon 24 is an integrated 24-bit graphics display card and graphics accelerator for the NuBus™ family of Apple® Macintosh® computers. Designed to deliver superior performance for all your graphics applications, Horizon 24 supports a range of monitor sizes, including 21", 20", 16/17", and 13/14" and portrait displays. (See Appendix B, "Technical Information" for monitor specifics.)

Display Features

Horizon 24 supports resolutions as high as 1152 x 870 pixels at 72 dpi, giving you two full pages of WYSIWYG display.

Horizon 24 uses 9-bit digital-to-analog converters (DACs) instead of the customary 8-bit. This allows for the visible brightness range to be divided into 512 levels instead of the 256 allowed by 8-bit DACs. By maintaining the full 16.7 million colors even after gamma correction, the Horizon 24 offers you the maximum possible color fidelity when working with true color 24-bit images.

Horizon 24 provides Zoom (2x, 3x, 4x . . . 16x), so you can view your documents at many levels of magnification. Zoom is built right into the hardware, so magnification is immediate. Zooming is great for detail work like photo retouching. When you zoom in, the Pan feature allows you to move around the desktop. Panning is smooth at all pixel depths and magnifications. The Extended Desktop feature lets you create a "virtual" desktop much larger than the screen, which gives you room for working with larger documents or poster-size layouts. Other productivity enhancing features include pop-up menus and instant color-depth switching.

Horizon 24 ships with 4 MB of onboard RAM for use as a RAM disk or for offscreen graphics memory (GWorld). Many graphics applications benefit from these features.

DSPro Daughtercard

To enhance the image-processing capabilities of Horizon 24, RasterOps offers a daughtercard option—the **RasterOps DSPro**. The DSPro is available as a bundled configuration with the Horizon 24 (*Horizon 24 with DSPro*) or as a separate optional daughtercard (for users who purchased a standalone Horizon 24).

The RasterOps DSPro uses twin digital signal processors (DSPs) to boost the performance of compute-intensive operations, such as applying filters, in Adobe Photoshop™.

The DSPro is ARTA (Apple Real Time Architecture) Level-1 compliant and therefore capable of boosting the performance of any ARTA-compliant software.

Included with the DSPro software is a plug-in for Adobe Photoshop™ 2.5 that enables DSP acceleration of a number of the Photoshop image filters, like Gaussian Blur and Unsharp Mask.

System Requirements

System requirements for the Horizon 24 are as follows:

- Macintosh CPU with a full-size NuBus expansion slot (14")
- System 7 or later with 32-bit addressing
- 21", 20", 16/17", 13/14", or portrait display

What's in this Manual

Here is a quick overview of the manual's three chapters and appendices.

- Chapter 1 shows you how to install the RasterOps Horizon 24 display card in your Macintosh and select the resolution of the monitor you're using.
- Chapter 2 gives you instructions for installing the software and setting your display.
- Chapter 3 describes the special graphics utilities included with the software.
- Appendix A covers troubleshooting.
- Appendix B lists technical information.
- Appendix C contains the FCC Class A Statement.
- Appendix D contains the limited warranty.

Chapter 1: Installing the Horizon 24

In this chapter

- Unpacking the RasterOps Horizon 24
- Installing the Horizon 24 in your computer
- Selecting the monitor resolution

Unpacking

In the RasterOps Horizon 24 package, you will find the

- Horizon 24 graphics display card
- Horizon 24 software disk
- RasterOps Horizon 24 User Guide

▲ WARNING Do not remove the display card from its anti-static bag until you're ready to install it. Removing the card prematurely exposes it to static electricity, which could damage it.

Product Information

Please record the following information *before* you install your Horizon 24. This information is necessary for RasterOps Technical Support to serve you. If you need assistance, see the Troubleshooting appendix for more information on Technical Support.

Purchased From _____ Purchase Date _____

Card Serial No. _____ RasterOps Monitor Serial No. _____
(on underside of card) *(on back of monitor)*

ROM Version Number _____
(appears in top right corner of screen during startup)

Installing the Horizon 24

You can install the Horizon 24 in any Macintosh that has NuBus slots.

- Macintosh II family, excluding the IIsi:

  Instructions for installing the Horizon 24 in a Macintosh II, IIx, IIcx, IIci, or IIfx are provided in this chapter.

- Macintosh Quadra™ family:

  See the Apple manual that came with your computer for instructions on installing a NuBus card. For the Quadra 700, the procedure is the same as for a Macintosh II family computer. Not all Quadra computers can accept a full size NuBus card.

- Macintosh Centris™ family:

  See the Apple manual that came with your computer for instructions on installing a NuBus card. Not all Centris computers can accept a full size NuBus card.

- Macintosh Performa™:

  See the Apple manual that came with your computer for instructions on installing a NuBus card. Not all Performa computers have a NuBus slot.

- DuoDock (for use with the Macintosh PowerBook Duo™):

  See the Apple manual that came with your computer for instructions on installing a NuBus card.

To Install the Horizon 24 in a Macintosh II Family CPU

1. **Turn off the Macintosh and monitor.**

   Leave the Macintosh plugged in for proper grounding.

Important If you have been using your Macintosh, wait five minutes after switching it off before you proceed. Failure to do so can result in damage to your system.

2. **Remove the cover from the Macintosh.**

   You may have to remove a security screw at the top of the back panel.

3. **Choose the expansion slot you wish to use. See Figure 1-1.**

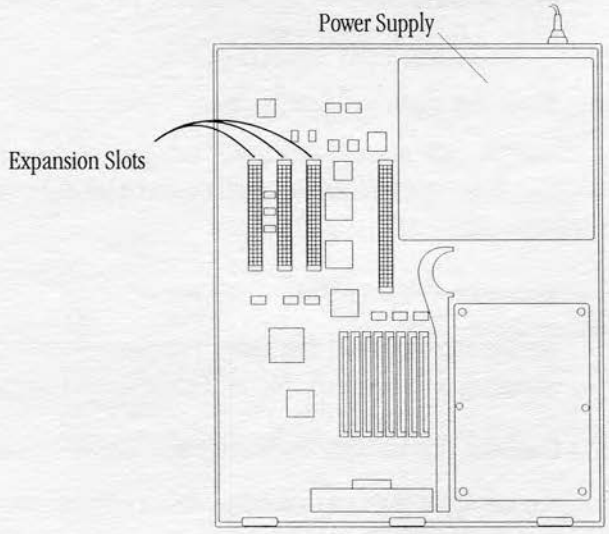


Figure 1-1 Inside a Macintosh IIcx/IIci

4. **Remove the plastic access port cover (and metal shield, if present) that line up with the expansion slot you plan to use.**

5. **Touch the metal part of the power supply to discharge any static electric charge that you might be carrying.**

6. **Remove the Horizon 24 from its anti-static bag.**

   Handle the card by its edges and by the metal bracket at the end. Avoid touching the connector pins on the bottom of the card.

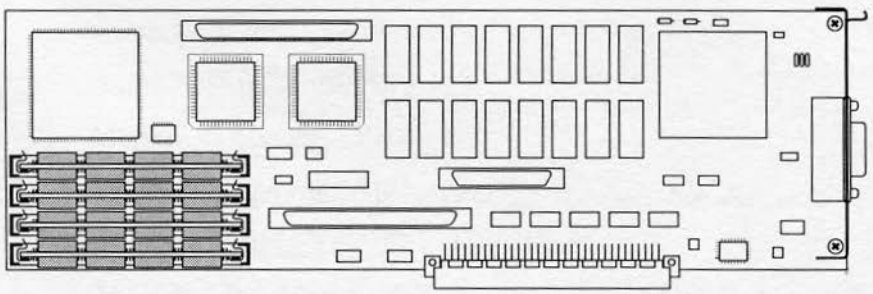


Figure 1-2 Horizon 24

7. **Insert the Horizon 24 into the expansion slot.**

   - With the bracket toward the open access port, align the connector on the bottom of the card directly over the slot you've chosen.
   - Push down and gently rock the card lengthwise until the card is firmly seated.

Important Don't force the card. If there is resistance, remove the card and try again.

8. **Replace the cover of the Macintosh.**

Setting the Monitor Resolution

The Horizon 24 supports six different monitor resolutions:

1152 x 870 (75 Hz) on a 21" monitor

1024 x 768 (75 Hz) on a 20" monitor

1024 x 768 (60 Hz) on a 20" monitor

832 x 624 (75 Hz) on a 16" monitor

640 x 480 (67 Hz) on a 14" monitor

640 x 870 (75 Hz) on a Portrait Display

The method of setting the resolution with the Horizon 24 depends on the type of monitor you have:

- **The RasterOps 16" or Portrait Display Monitor, or any Apple Monitor:**

  Simply connect the monitor and start up your computer. The Horizon 24 senses what type of monitor is connected and sets itself automatically. (See *Monitor Sense* in Appendix B for technical information on how the Horizon 24 senses the monitor type.)

- **Other RasterOps Monitors:**

  Use the Monitor Sense Adapter that came with your monitor to set the resolution. The Monitor Sense Adapter plugs into the display card, and the monitor cable plugs into the adapter. Set the switches on the adapter to identify the resolution of your monitor.

  If you don't have a Monitor Sense Adapter, you can set the resolution manually. Follow the instructions on the next page.

- **Other Monitors:**

  Follow the instructions on the next page to set the monitor resolution manually.

To Set the Monitor Resolution Manually

1. **Turn on the Macintosh and hold down Command-Shift-Option during startup.**

   After a few moments, the Horizon 24 displays each of the resolutions it supports. (This may take 15 to 45 seconds, depending on your Macintosh configuration.) The screen shifts from one resolution to the next every few seconds. Depending on your monitor, some of these displays will be unreadable.

2. **When the screen begins cycling through the different resolutions, you can release the keys.**

3. **When the display appears, as shown in Figure 1-3, press any key (except Command, Shift, Option, Control, or Caps Lock) or click the mouse button.**

   Note: Your monitor may support more than one resolution. If so, select the desired resolution for your monitor.

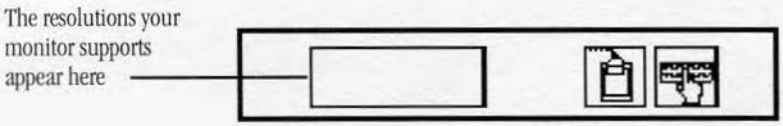


Figure 1-3 Monitor Resolution Display

The computer automatically restarts. In a few moments the Macintosh desktop appears.

If you make a mistake, reset or turn off the Macintosh and return to step 1.

The Horizon 24 remembers this monitor resolution. If you move the card to a different expansion slot, you do not need to reselect the monitor resolution. If you change to a different type of monitor, however, you must select the resolution again.

If you have trouble setting the monitor resolution manually, refer to Appendix A "Troubleshooting" for more information.

Chapter 2: Installing the Software and Setting Your Display

In this chapter

- About Horizon software
- Installing the software
- Specifying the number of colors or shades of gray
- Identifying the position of multiple monitors
- Setting the accelerator

About Horizon Software

Horizon 24 requires certain software components installed in your System Folder. An Installer on the software disk simplifies your installation procedure.

RasterOps Controls: The RasterOps Control Panel provides access to the RasterOps graphics display system utilities. These features are described in Chapter 3, "RasterOps Graphics Utilities."

Horizon 24: The Horizon 24 Control Panel provides control of the display card's acceleration functions, including memory allocation. These features are described in the section, *Setting Acceleration Options*, later in this chapter.

Note: The Horizon 24 Control Panel must be installed to enable acceleration.

Installing the Software

1. **Insert the RasterOps Horizon 24 Install disk into your disk drive.**
2. **Double-click the Horizon 24 Installer icon.**

3. **For the easy install, click Install.**

   The application copies RasterOps Controls and Horizon 24 to the Control Panels folder.

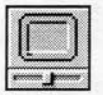
4. **When installation is complete, restart your Macintosh.**

   Installation of the System software components takes effect when you restart your Macintosh.

Specifying Colors or Shades of Gray

The RasterOps Horizon 24 has six color depths to choose from: Black & White, 4, 16, 256, Thousands, or Millions of colors.

To Change the Colors or Shades of Gray Displayed



1. **Open the Control Panels folder.**

   The Control Panels window opens.

2. **Locate the Monitors icon in the window and double-click to open the Monitors Control Panel, shown in Figure 2-1.**

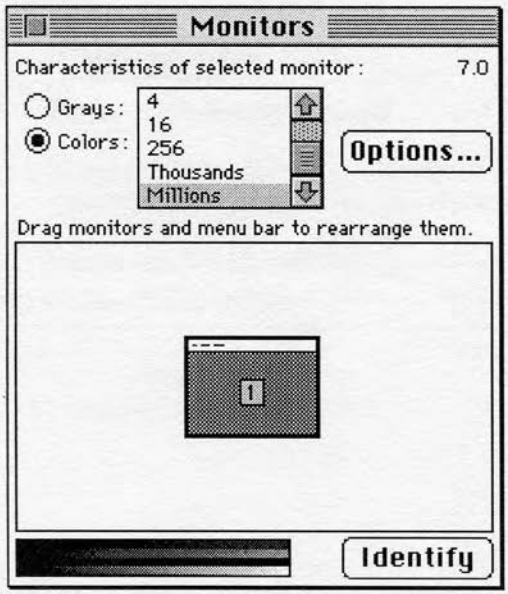


Figure 2-1 Monitors Control Panel

3. **If you're using two monitors, click the icon for the monitor whose status you want to define.**

   When a monitor is selected, the border of its icon will appear darkened. To check which icon belongs to which monitor, click Identify.

4. **Click Grays or Colors as shown in Figure 2-2.**

   This change takes effect immediately.

5. **Select the number of colors or shades of gray you want to display on the selected monitor. See Figure 2-2.**

   The RasterOps Horizon 24 can display up to 256 shades of gray or Millions of colors.

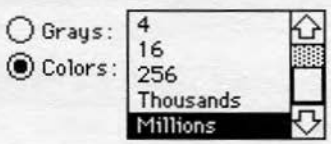


Figure 2-2 Select the Number of Colors or Shades of Gray

- "Thousands" is equivalent to 16-bit mode which gives you 32,768 colors to choose from.
- "Millions" is equivalent to 24-bit mode which gives you 16.7 million colors to choose from.

Setting an Extended Desktop

The RasterOps Horizon 24 can create a workspace much larger than the actual dimensions of the screen. This feature is known as an Extended Desktop. You can extend your desktop to as large as 4000 x 3000 pixels.

When you work on an Extended Desktop, Panning is automatically enabled, so you can easily move across your workspace. Panning scrolls the desktop as your cursor approaches the edge of the screen.

To Extend the Desktop

1. **In the Monitors Control Panel, double-click the icon that represents the monitor connected to the Horizon 24.**

   The Monitor Options panel is displayed.

2. **In the box below "Select monitor type," click the Extended Desktop size you want.**

3. **Click OK to return to the Monitors Control Panel.**

4. **If necessary, select the number of colors or shades of gray you want, then click the close box.**

   Depending on the desktop size, the number of available colors or shades of gray may be limited, as shown in the following table.

Desktop Size	Colors or Grays Available
640 x 480, 640 x 870, 832 x 624, 1024 x 768, 1152 x 870	2, 4, 16, 256, Thousands, Millions
1600 x 1200	2, 4, 16, 256, Thousands
2400 x 1800	2, 4, 16
3200 x 2400	2, 4, 16
4000 x 3000	2, 4

5. **Restart the Macintosh immediately.**

   If you do not restart immediately after selecting a different desktop size, the selection defaults to the previous setting.

Positioning the Monitors

When you use two monitors, you need to specify the monitor positions relative to each other in the Monitors Control Panel. When they are aligned correctly, the cursor makes a smooth transition between screens.

To Identify the Position of the Monitors

1. **Open the Control Panels folder.**
2. **Double-click the Monitors icon.**
3. **Drag the monitor icons to positions that correspond to the physical arrangement of your monitors. See Figure 2-3.**

   To determine which icon represents which monitor, click the Identify button in the lower right corner. A number appears on each monitor's screen. These numbers correspond to the numbers appearing on the monitor icons in the control panel.

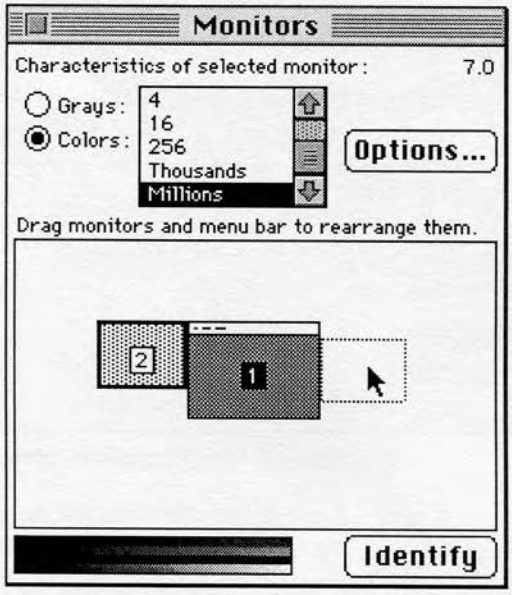


Figure 2-3 Identifying the Position of the Monitors

To Change the Main Monitor

- **Drag the miniature menu bar to the monitor icon you want to be your main one. See Figure 2-4.**

  The main monitor is where the menu bar is displayed. You can designate either of your monitors as the main monitor.

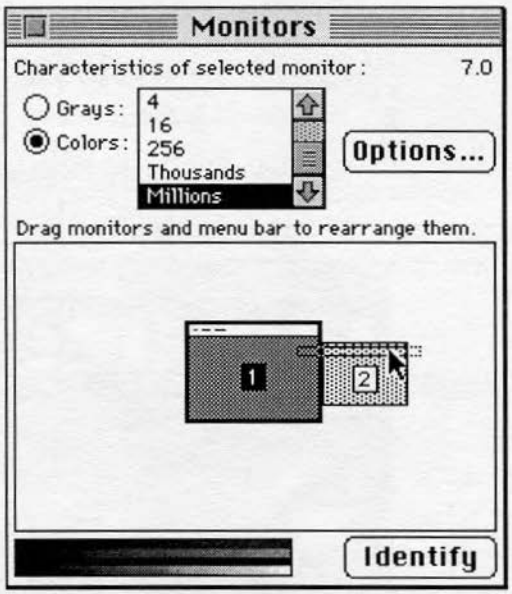


Figure 2-4 Identifying the Main Monitor

- **Choose Restart for all changes to take effect.**

Setting Acceleration Options

You can set your acceleration options in the Horizon 24 control panel.

To Open the Horizon 24 Control Panel

1. **Choose Control Panels from the Apple menu.**

   The Control Panels window appears.

2. **Double-click the Horizon 24 icon.**

   The Horizon 24 Control Panel appears. See Figure 2-5.

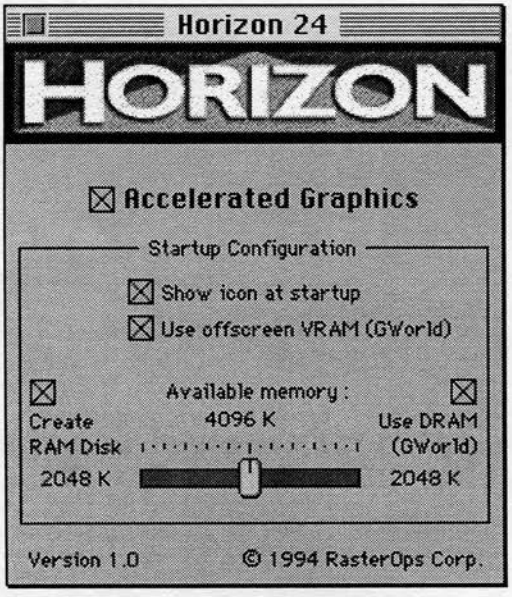


Figure 2-5 Horizon 24 Control Panel

The Horizon 24 will accelerate graphics as long as the "Accelerated Graphics" check box is enabled. You can turn acceleration off, if you want, by disabling the check box. This change takes effect immediately.

To Disable Acceleration on Startup

- **Hold down the Shift key or mouse button during startup.**

  All Extensions, including the Accelerator software, are not loaded.

Accelerator Memory

Horizon 24 may have 4, 16, 64, or 256 MB of RAM installed. (Contact Technical Support for memory upgrade options.) This memory is accessed via a high performance bus. Many applications benefit greatly from this local memory, which can be used for offscreen graphics memory and/or for a RAM Disk.

About Offscreen Graphics Memory (GWorld)

GWorld is a set of Macintosh Toolbox routines that support offscreen graphics. Applications that use GWorld, like MediaGrabber, QuickTime™, PageMaker®, FreeHand™, ADDmotion™, ColorAccess™, MARS™, Oasis™, and Studio/32™, draw images into the GWorld RAM first, then simply move them onto the screen. This increases efficiency, and images can be redrawn much more quickly.

Refer to the documentation that came with your software application to find out if it takes advantage of GWorld.

To Use Offscreen VRAM

Horizon 24 contains 4 MB of VRAM. This memory holds the image displayed on the screen. Depending on the resolution and color depth setting, some of this memory may be unused and can be used to temporarily hold more common items like menus.

- **Enable the "Use offscreen VRAM (GWorld)" check box to allow "unused" VRAM to be used for small offscreen graphics like menu items and Finder icons.**

About the RAM Disk

A RAM Disk is like a normal disk except that it is volatile memory—anything you put on the RAM Disk is lost when you shut down or lose power to your computer.

Graphics programs that use a scratch disk, like Adobe Photoshop™, will operate much faster when you use the RAM disk as your scratch disk.

Treat the RAM Disk like any other disk, with the following exceptions:

- You cannot designate the RAM Disk as the Startup disk.
- Before you Shut Down, be sure to copy information you want saved from the RAM Disk to another disk.

  Note: The Restart command does not interrupt power to Horizon 24, so restarting your Macintosh does not eliminate files from the RAM Disk.

Allocating Memory to GWorld/RAM Disk

1. **Make sure the appropriate checkbox is selected in the Horizon 24 Control Panel.**

   If you want to use one feature only, disable the checkbox for the other item. If you want to use them both, select both checkboxes.

2. **Drag the slider along the Memory Allocator to the distribution of GWorld vs RAM Disk you want.**

   For accelerated imaging in applications like Adobe Photoshop (e.g., when using the RasterOps DSPro Photoshop plug-in), you should allocate as much RAM as possible to offscreen graphics memory.

   Note: The DSPro is RasterOps' optional daughtercard that may be used with the Horizon 24 for Photoshop acceleration.

3. **When you've divided the memory to your liking, close the Horizon 24 Control Panel.**

4. **Restart your computer for these changes to take effect.**

Chapter 3: RasterOps Graphics Utilities

In this chapter

- About the utilities
- The RasterOps Control Panel
- Panning and zooming
- ScreenShift
- Depth Flipper
- SyncCamera
- Pop-Up menus

About the RasterOps Graphics Utilities

The RasterOps Controls software allows you access to a suite of graphics utilities which you may find useful.

- Zooming lets you get really close to your documents almost instantly. Panning helps you move around the workspace when you are zoomed in or using an Extended Desktop.

- ScreenShift lets you adjust the horizontal timing of the Horizon 24 display card to match your monitor. This will shift the position of the image horizontally on the screen. ScreenShift is useful for older monitors that do not have adjustments for horizontal positioning.

- Depth Flipper lets you change the color depth of the monitor without leaving the application you're working in.

- SyncCamera lets you synchronize the monitor timing with the timing of a video camera. This feature only applies when you are recording a video of your monitor screen.

  Note: Horizon 24 cannot be genlocked.

- Pop-Up menus give you access to your application's menus at the current location of the cursor—you don't have to run the mouse all the way to the top of the screen to choose a command. This feature is particularly useful when zoomed in or working on an Extended Desktop.

  Note: The Extended Desktop feature is available through the Options panel in the Monitors Control Panel. Refer to the section on Extended Desktop in Chapter 2 for details.

The RasterOps Control Panel

To Open the RasterOps Control Panel

1. **Open your Control Panels folder.**

   The Control Panels window appears.

2. **Locate the RasterOps Controls icon in the window and double-click to open it.**

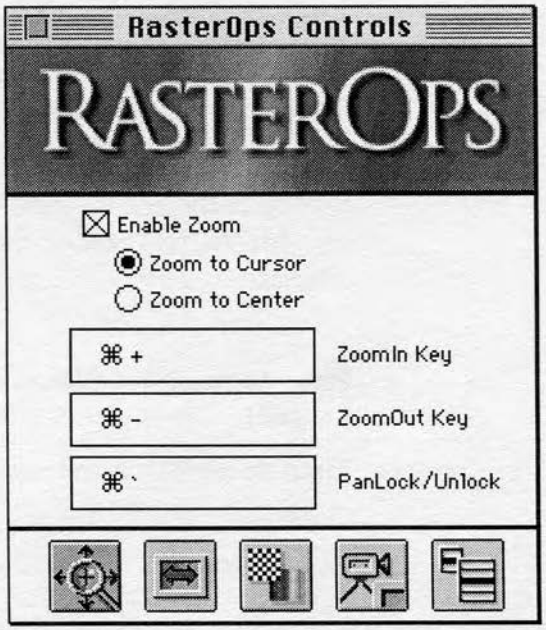


Figure 3-1 RasterOps Control Panel

The RasterOps Control Panel appears as shown in Figure 3-1.

The RasterOps Control Panel provides access to the controls of several utilities. The icons at the bottom of the panel show the utilities that are available.

To switch between utilities, click the icon for the feature you want.

Zooming in for a Close-Up View

You can zoom in on a document to see it more clearly. When you zoom in, the Pan feature, which allows you to move around the desktop, becomes active. Pan and Zoom are enabled when the RasterOps Controls file is installed.

Both Pan and Zoom have options which can be changed through the Control Panel. See the next section, *Changing Pan and Zoom Options.*

To Zoom In

- **Press ⌘-+ (Command-"Plus" on the numeric keypad).**

  This is the default keyboard command. If you want to change the command, see the next section.

  If you press the command, the document doubles in size. Press the command again, and the document increases to three times its original size. You can zoom incrementally to a maximum of 16x using this command.

To Zoom Out

- **Press Command-– (Command-"Minus" on the numeric keypad).**

  This is the default keyboard command. If you want to change the command, see the next section.

  Press the command until your document returns to its original size.

Panning

When you zoom in, you can use the mouse to move around the magnified desktop. This feature is called Pan. As you move the mouse, the view of your desktop changes accordingly.

To Lock and Unlock Pan

You can temporarily lock Pan to keep an area of the desktop in view.

- **Press ⌘-` (Command-backquote).**

  To unlock Pan, press this keyboard command again.

To Switch between Cursor and Edge Panning

In Cursor Pan, the desktop pans around the cursor (pointer), which remains in the center of the screen. In Edge Pan, the desktop moves only when the cursor approaches the edge of the screen.

- **Press ⌘-\ (Command-backslash).**

  This command toggles between cursor and edge panning.

Changing Pan and Zoom Options

The Zoom feature has several options that affect how it operates. Refer to Figure 3-1 for the zoom controls.

To Change Zoom Options

- **An "x" inside the Enable Zoom check box confirms that zoom is on. To turn zoom off, click this box.**
- **To zoom to the center of the screen, click the Zoom to Center radio button.**
- **To zoom to the cursor, click the Zoom to Cursor radio button.**
- **To change the zoom keyboard commands, click the Zoom in or Zoom out button to select it, then enter the command you want.**

  The new command appears inside the corresponding button. If you enter an invalid key command, the Macintosh will beep and revert to the previous command.

ScreenShift

ScreenShift lets you adjust the display card horizontal timing, which shifts the image on your monitor. This adjustment is saved and loaded automatically each time you start your computer.

ScreenShift is useful for older monitors that do not have adjustments for horizontal positioning.

To Shift Your Screen

- **Click the radio button for the screen you wish to adjust.**
- **Click the arrow buttons to shift the screen to the left or right.**

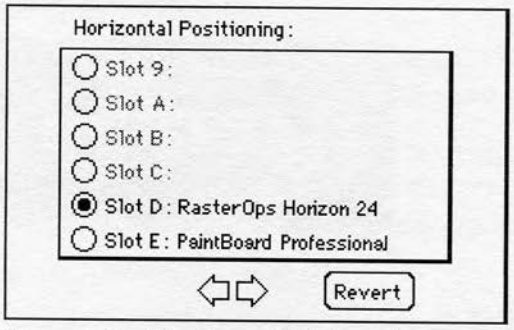


Figure 3-2 The ScreenShift Panel

Depth Flipper

Depth Flipper lets you change the color depth of the monitor without leaving the application you're working in.

Horizon 24 acceleration is active when displaying 256, Thousands, and Millions of colors, with increased performance at the lower color depths. Depth Flipper lets you quickly switch between the advantages of speed and color display.

- **Enable Depth Flipper and set the Modifier keys you want.**

Whenever you want to change color depth, hold down the Modifier keys and press the mouse button. A pop-up menu will appear under your cursor that you can use to select the color depth you want.

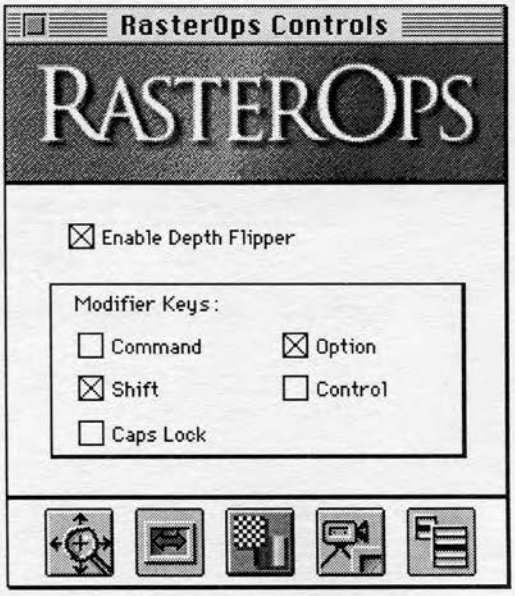


Figure 3-3 The Depth Flipper Panel

SyncCamera

RasterOps SyncCamera allows you to adjust the refresh rate of your display adapter to eliminate visual artifacts when videotaping the screen display.

RasterOps video display adapters operate at refresh (scan) rates that are optimized to minimize flicker and maximize sharpness of the display. The rates used are 60 Hz and above.

In the United States (and other countries that use the NTSC television standard), video cameras and TVs operate at a 30 Hz scan rate. When you point a video camera at a computer display, you will often see a horizontal black line rolling slowly across the face of the display. This moving line is a by-product of the fact that the camera and display refresh rates are not simple multiples of each other.

SyncCamera allows you to minimize this annoying effect by modifying the refresh rate of your computer's to a close multiple of the video rate.

Note: Use SyncCamera only when videotaping the display. Because the display card is not set at its optimum refresh rate with SyncCamera, you may notice increased flicker or other degraded performance.

To Use SyncCamera

1. **Set the monitor resolution to 1024 x 768, 60 Hz or 640 x 480, 67 Hz.**

   These are the only frequencies supported by SyncCamera. Your monitor must be capable of either of these timings.

2. **Look through the video camera viewfinder, click the Up arrow in the SyncCamera dialog box and hold it till the horizontal line rolls off the screen.**

3. **You can now hide this window and proceed with videotaping.**

4. **Click the "Reset" button to reset the screen timing back to its initial settings.**

Pop-Up Menus

You can have a pop-up menu for the current application appear at the cursor location.

- **Enable Pop-Up Menus and set the Modifier keys.**

  You may change the default settings for the modifier keys (Command-Shift, in this case) if you experience a keyboard command conflict with some of your other applications.

To get a pop-up menu, hold down the Modifier keys and press the mouse button. The pop-up menu will appear beneath your cursor. Pull down and to the right, as shown in Figure 3-4, to select the command you want.

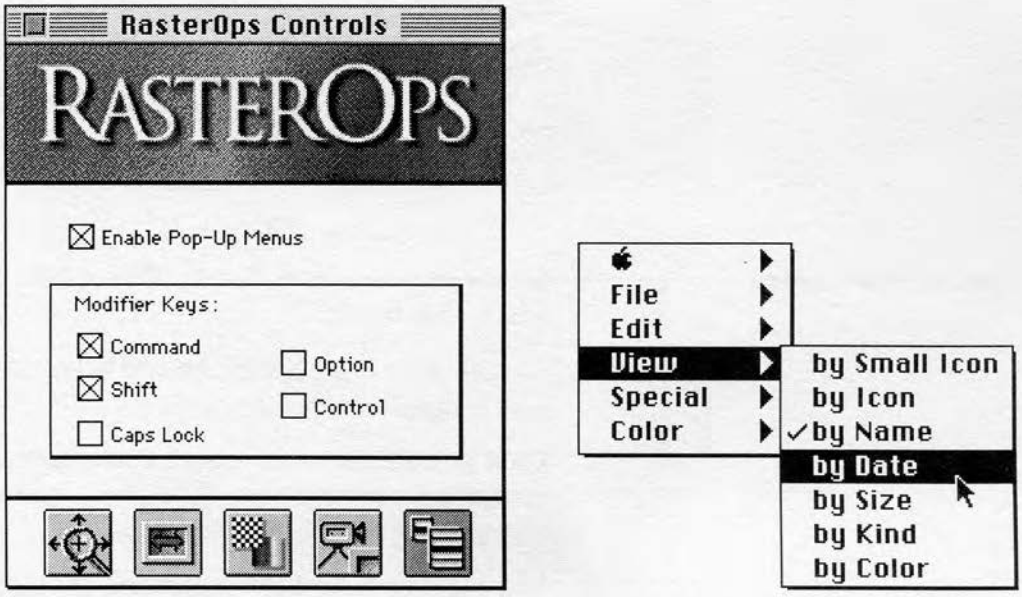


Figure 3-4 Pop-Up Menus in Action

Appendix A: Troubleshooting

Occasionally, you may have a problem while using your RasterOps Horizon 24. This appendix covers potential situations and describes steps you can take to identify and correct them.

Macintosh Does Not Start Up Properly

- **Try disabling all System Extensions.**

  If the problem no longer appears, it may be caused by an incompatibility with a System Extension.

  a. Hold down the Shift key during startup. This will disable all system extensions.

  b. Temporarily remove all unnecessary Extensions from your System folder.

  c. Restart your Macintosh.

  d. If the problem is not apparent, put one or two of these files back into the Extensions folder or Control Panel folder and restart your computer.

  e. Continue replacing the files until you isolate which one is incompatible with the Macintosh system software version you're using, or with the Horizon 24.

- **Start up your Macintosh with the original System Disk that came with your computer.**

- **Remove the Horizon 24 card and install it in another Macintosh. Load the software and test the Horizon 24.**

  If the problem is not apparent on this second computer, you have determined that the problem is within your Macintosh or with other hardware connected to your computer.

- **If you have three expansion cards in a IIcx or IIci, remove one card.**

  There is a limited amount of power available for the expansion slots in your computer. If the expansion cards collectively require too much power, the Macintosh may not start up.

Monitor Out of Sync

The RasterOps Horizon 24 must be configured with your monitor. Please refer to *Setting the Monitor Resolution* in Chapter 1.

Can't Set Monitor Resolution Manually

1. **Make sure your monitor conforms to a resolution supported by the Horizon 24.**
2. **Make sure the monitor is properly adjusted.**
3. **If possible, try a different cable.**

   An incorrect cable can force the monitor sense, which precludes setting the resolution manually.
4. **If you are still unable to set the resolution manually, you may need a Monitor Sense Adapter.**

   Contact your dealer or RasterOps Technical Support.

No Screen Image

1. **Be sure the monitor and the Macintosh are both receiving power.**
2. **Turn off the Macintosh and the monitor.**
3. **Remove, then reattach the monitor cable.**

   If possible, use a different cable.

4. **Start up from a different System disk.**

   This helps determine whether the problem is caused by System software or the display card.

Pop-Up Menu Conflicts

If you are using an application that has its own pop-up menus, these may conflict with the Horizon 24 pop-up menus. If you encounter problems, temporarily disable the latter.

Zoom Command Conflicts

If you experience problems, temporarily disable the Zoom feature, or designate a different Zoom key sequence.

If Your Problem Persists

For additional help, you can contact RasterOps Technical Support. Before calling Technical Support, please complete the Troubleshooting Questionnaire on the next page and be sure to have it handy when you call.

RasterOps Technical Support

RasterOps Technical Support is available Monday through Friday from 8:00 a.m. to 5:00 p.m. Mountain Standard Time.

Telephone

Worldwide:	(801)785-5750

FAX

U.S. and Canada:	(801) 785-5776
Outside the U.S.:	(801) 785-5778

Online Services

America Online:	RASTERHELP
AppleLink:	RASTERHELP
Internet:	support@rasterops.com

DirectAccess BBS

Up to 14,400 baud	(801) 785-5783
Settings:	8 bits - No parity - 1 stop bit

RasterFax™ is an automated Faxback system that allows you to obtain immediate information on products, price lists, bulletins, and upgrades by dialing (1-800) SAY-COLOR and selecting the FAXBack option.

Mailing Address

RasterOps Technical Support
890 West 410 North
Lindon, UT 84042

Troubleshooting Questionnaire

Please complete this questionnaire before calling Technical Support.

1. What are the serial numbers, model numbers, and software version numbers of the RasterOps products that you have installed on your computer?

   _____

2. Which Macintosh computer are you using with the product listed in item 1 of this questionnaire (IIcx, IIsi, Quadra 700, etc.)? _____

3. What version of System are you using? _____

4. How much memory (RAM) is installed on your computer? _____

5. What INITs, Control Panels, Extensions, and/or DAs do you have installed on your computer?

   _____

   _____

   _____

6. What other hardware is connected to your computer (multimedia cards, monitors, network cards, hard drives, etc.)? Please include all relevant model numbers, ROM version numbers, and software version numbers, where applicable._____

   _____

   _____

Appendix B: Technical Information

Hardware Specifications

System Requirements	Macintosh CPU with full size (14") NuBus expansion slots
Interface	Single NuBus slot
Palette Size	134.2 million colors*
Display Modes	1, 2, 4, 8, 16, 24 bits per pixel
Output Signal	RS-343
Max. Supply Voltage, VCC	5.25 volts
Operating Ambient Temperature Range	0 °C to 60 °C
Storage Temperature	-65 °C to 150 °C

* The Horizon 24 uses 9-bit DACs, so the palette size is $2^9 * 2^9 * 2^9 = 134.2$ Million colors.

Video Specifications

Resolution 640 x 480 (67 Hz)

Pixel Timing	33.307 ns = 30.24 MHz
Horizontal Visible	640 pixels
Horizontal Total	864 pixels
Horizontal Front Porch	64 pixels
Horizontal Sync	64 pixels
Horizontal Back Porch	96 pixels
Vertical Visible	480 lines
Vertical Total	525 lines
Vertical Front Porch	3 lines
Vertical Sync	3 lines
Vertical Back Porch	39 lines
Horizontal Frequency	35.00 kHz
Vertical Frequency	66.19 Hz

Resolution 640 x 870 (75 Hz)

Pixel Timing	17.46 ns = 57.2732 MHz
Horizontal Visible	640 pixels
Horizontal Total	832 pixels
Horizontal Front Porch	48 pixels
Horizontal Sync	80 pixels
Horizontal Back Porch	64 pixels
Vertical Visible	870 lines
Vertical Total	918 lines
Vertical Front Porch	3 lines
Vertical Sync	3 lines
Vertical Back Porch	42 lines
Horizontal Frequency	68.83kHz
Vertical Frequency	74.98 Hz

Resolution 832 x 624 (75 Hz)

Pixel Timing	17.46 ns = 57.2732 MHz
Horizontal Visible	832 pixels
Horizontal Total	1152 pixels
Horizontal Front Porch	32 pixels
Horizontal Sync	64 pixels
Horizontal Back Porch	224 pixels
Vertical Visible	624 lines
Vertical Total	667 lines
Vertical Front Porch	1 line
Vertical Sync	3 lines
Vertical Back Porch	39 lines
Horizontal Frequency	49.7 kHz
Vertical Frequency	75 Hz

Resolution 1024 x 768 (60 Hz)

Pixel Timing	15.50 ns = 64.0 MHz
Horizontal Visible	1024 pixels
Horizontal Total	1312 pixels
Horizontal Front Porch	64 pixels
Horizontal Sync	96 pixels
Horizontal Back Porch	128 pixels
Vertical Visible	768 lines
Vertical Total	813 lines
Vertical Front Porch	6 lines
Vertical Sync	6 lines
Vertical Back Porch	33 lines
Horizontal Frequency	49.17 kHz
Vertical Frequency	60.48 Hz

Resolution 1024 x 768 (75 Hz)

Pixel Timing	12.5 ns = 80.0 MHz
Horizontal Visible	1024 pixels
Horizontal Total	1328 pixels
Horizontal Front Porch	80 pixels
Horizontal Sync	80 pixels
Horizontal Back Porch	144 pixels
Vertical Visible	768 lines
Vertical Total	803 lines
Vertical Front Porch	3 lines
Vertical Sync	3 lines
Vertical Back Porch	29 lines
Horizontal Frequency	60.24 kHz
Vertical Frequency	75.01 Hz

Resolution 1152 x 870 (75 Hz)

Pixel Timing	10 ns = 100.0 MHz
Horizontal Visible	1152 Pixels
Horizontal Total	1456Pixels
Horizontal Front Porch	56 Pixels
Horizontal Sync	128 Pixels
Horizontal Back Porch	120 Pixels
Vertical Visible	870 Lines
Vertical Total	915 Lines
Vertical Front Porch	3 Lines
Vertical Sync	3 Lines
Vertical Back Porch	39 Lines
Horizontal Frequency	68.68 kHz
Vertical Frequency	75.08 Hz

Pin Assignments

Pin	Signal Description
1	Ground
2	Red
3	External Sync
4	Monitor ID 0
5	Green
6	Ground
7	Monitor ID 1
8	No Connection
9	Blue
10	Monitor ID 2
11	Ground
12	External Vertical Sync
13	Ground
14	Ground
15	External Horizontal Sync

Monitor Sense

The Horizon 24 senses what type of monitor is connected via the cable and sets itself accordingly. The following tables describe how the different monitors supported are identified.

Pins 4, 7, and 10 are used for monitor sense. In the configurations described in Table B-1, these pins are tied to pin 11 or 14 (ground). In Table B-2, the sense pins are tied together.

Table B-1 Monitor Sense Primary

Setting	Pins Connected		
	10-Ground	7-Ground	4-Ground
12" Monochrome (640 x 480)	-	-	*
14" Color (640 x 480)	-	-	*
21" Monochrome (1152 x 870)	*	-	-
21" Color (1152 x 870)	*	*	*
Portrait Display (640 x 870)	*	*	-

An asterisk (*) means that those pins should be connected (in the cable or at the monitor).

If none of the monitor sense pins are connected to pin 11 or 14, the Horizon 24 looks for one of the conditions described in Table B-2.

Table B-2 Monitor Sense Secondary

Setting	Pins Connected		
	4-10	10-7	7-4
16" (832 x 624)	*	-	-
20" Color (1024 x 768)	-	-	*

An asterisk (*) means that those pins should be connected (in the cable or at the monitor).

Appendix C: FCC Class A Statement

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

▲ **WARNING** To minimize emissions from your system, use only shielded interface cables.

365.91

Appendix D: Limited Warranty

RasterOps Corporation ("RasterOps") warrants this product against defects in materials and workmanship for a period of THREE (3) YEARS from the date of original retail purchase.

If you discover a defect, RasterOps will, at its sole option, repair or exchange the product at no charge to you, provided you contact RasterOps Technical Support to obtain a Return Material Authorization (RMA) Number and instructions on where and how to obtain repair. Note that a copy of the bill of sale bearing the RasterOps' serial numbers as proof of date of original purchase is required for each product returned for warranty service. Before returning product, remove all non-RasterOps RAM, accessories, and options. RasterOps cannot be liable for the return or care of any non-RasterOps products, nor accept responsibility for loss or damage of product in transit.

This warranty does not apply if the product has been damaged by accident, installation or removal of product, abuse, misuse, misapplication, accident, neglect, fire, water, lightning, or other acts of nature, failure to follow supplied instructions; has been modified, repaired or undergone attempted repair by unauthorized personnel without the written consent of RasterOps; has a serial number that has been removed, modified, or defaced. RasterOps reserves the right to use remanufactured, refurbished, or used parts and components in making warranty repairs.

RasterOps products are designed to work with the Macintosh, Sun and IBM computers. Certain features of third-party software or hardware designed for the host system may not be available when used with this product. Accordingly, RasterOps does not warrant or represent that all software or hardware will function error-free when used in conjunction with this RasterOps product.

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, WHETHER ORAL OR WRITTEN, EXPRESS OR IMPLIED. ALL EXPRESS AND IMPLIED WARRANTIES FOR THIS PRODUCT, INCLUDING THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, ARE LIMITED IN DURATION TO THE WARRANTY PERIOD. NO WARRANTIES, EXPRESS OR IMPLIED, WILL APPLY AFTER THIS PERIOD. RASTEROPS SHALL NOT BE LIABLE FOR ANY LOST PROFITS, DAMAGE TO OTHER PROPERTY CAUSED BY ANY DEFECT IN THIS PRODUCT, DAMAGES BASED UPON INCONVENIENCE, LOSS OF USE OF THE PRODUCT, LOSS OF TIME, COMMERCIAL USE, INCIDENTAL AND/OR CONSEQUENTIAL DAMAGES FOR THE BREACH OF ANY EXPRESS OR IMPLIED WARRANTY, INCLUDING DAMAGE TO PROPERTY AND, TO THE EXTENT PERMITTED BY LAW, DAMAGES FOR PERSONAL INJURY, EVEN IF RASTEROPS HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

Some states do not allow the inclusion or limitation of incidental or consequential damages or limitations on how long an implied warranty lasts, so the above limitation or exclusion may not apply to you. This warranty gives you specific legal rights, and you may have other rights which vary from state to state.

Product specifications and information are subject to change without notice.

RasterOps Corporation
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Modem 317-577-8777

ftp. rasterops.com

070.93

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Please complete and return this card to activate your warranty.
If you would like information about other RasterOps products, please call: 1 800 SAY COLOR.
Outside the U.S. or Canada, please call: (801) 785-5750.

Purchase Date (*Month, Day, Year*)

RASTEROPS **Product Name** (*same as user guide title*)

Serial No. (*on package, underside, or back of product*)

RASTEROPS **Monitor Model No.** (*on package*) **and Serial No.** (*on back of product*)

☐ New monitor purchase
☐ Previous monitor purchase

User Guide Release No. and Date (*on copyright page*)

Purchased from Reseller Name _____ **Address** _____

Comments / Suggestions _____

Your Name (*Last*) *First* *Middle Initial*

Company Name

Telephone

Street Address ☐ Home ☐ Business

Telephone (*International*)

City **State** **Zip Code** – **Country**

1 This RasterOps product was purchased to be used where?

☐ Home/Family ☐ Scientific / Industrial
☐ Business ☐ Government
☐ Education - Grades K-12 ☐ Other
☐ University _____

2 The two primary uses for your RasterOps products.

☐ Desktop Publishing ☐ Word Processing ☐ Desktop Presentations
☐ Animation ☐ Presentation Graphics ☐ Color Pre-Press
☐ Architecture ☐ Desktop Video ☐ Computer Art
☐ Image processing ☐ CAD / CAM ☐ Other _____

3 The most important factors influencing your purchase.

☐ Dealer Recommendation ☐ Product Features
☐ RasterOps Brand Name ☐ Warranty & Technical Support
☐ Magazine Review ☐ Personal Recommendation
☐ Price ☐ Other _____

4 How did you first learn about this product?

☐ Magazine Advertisement ☐ Dealer
☐ Personal Recommendation ☐ Other _____
☐ Magazine Review
☐ Trade Show

5 Which computer will this product be used with? ☐ Mac ☐ IBM ☐ Sun ☐ Other _____

Model _____

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