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TWIN TURBO 128 FOR PCI POWER MACINTOSH

Revision 3.0

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Printed in USA

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Introduction

Introduction

About the Twin Turbo-128

Congratulations on your purchase of the Twin Turbo-128, a high performance 128-bit display adapter for PCI Power Macintosh computers.

The Twin Turbo-128 provides the latest in computer graphics technology on one single board. Features such as a high speed 32-bit PCI bus interface, 128-bit VRAM graphics acceleration, and Video Playback acceleration make the Twin Turbo-128 one of the fastest graphics boards ever to be used on the Macintosh. Applications can operate at high resolution or in true color without any noticeable degradation in performance. Video playback is accelerated with special hardware that is included on the Twin Turbo-128 display adapter.

About Monitors and Resolution

The Twin Turbo-128 supports a multitude of screen resolutions and monitor refresh rates. Resolution is the dimension of the display in pixels, for example 1024 x 768. For any given monitor size, pixels are larger at low resolutions and smaller at high resolutions. A multi-sync monitor may be able to display some or all of the available resolutions supported by the Twin Turbo-128. In low resolution, text and images may be larger, but there will be less workspace on the desktop. In high resolution, text and images will be smaller, but there will be more desktop available. The included Twin Turbo-128 Control Panel allows the user to quickly select the best resolution for a particular application. The monitor's refresh rate relates to the amount of screen flicker that the user perceives. The higher the number, the less the screen flickers and eye fatigue is reduced. Some monitors are limited in there maximum resolution at a particular screen refresh rate. In this case, the screen refresh rate is compromised for increased screen resolution.

Introduction

About True Color

True Color is so called because 24 bits (binary digits) of information are used to define each pixel. The 24-bits are divided as eight bits for the red channel, eight bits for the green, and eight bits for the blue. The total number of colors that can be defined by a 24-bit diplay board is $2^8 * 2^8 * 2^8$, which equals 16.7 million colors. While you'll never be able to see all 16.7 million colors displayed at once, you will appreciate the smooth, continuous transitions in a shaded object.

The preferred display mode for QuickTime video playback is 16-bits per pixel. Special YUV-RGB hardware on the Twin Turbo-128M and M2 will be used to accelerate software MPEG movie playback in future software releases.

About Acceleration

The Twin Turbo-128 processes 128-bits of graphics data every two clock cycles. Graphics performance is inversely proportional to the amount of color used to define each pixel. When running the Twin Turbo-128 in 256 color mode, 16 pixels are processed in two clock cycles. In thousands of colors mode, 8 pixels are processed in two cycles, and in millions of color mode, 4 pixels are processed in two cycles. Maximum graphics performance is achieved by using the lowest possible color mode for each application. A word processing application would operate best in 256 color mode, while a Photo-Retouching program would operate best in millions of color mode.

Unlike DRAM based graphics accelerator cards, screen resolution and refresh rate have little effect on graphics acceleration performance on the Twin Turbo-128. A typical DRAM based graphics card might only be able to display 800 x 600 pixels at 16.7 million color mode, and have degraded graphics performance.

Chapter 1 :
Installing the Hardware

Chapter 1: Installing the Hardware

System Requirements

The system requirements for the Twin Turbo-128 are as follows:

- PCI based Power Macintosh
- 16 MB of RAM Minimum, 32 MB of RAM recommended for the Twin Turbo-128M8.
- An Apple 13” color monitor or larger. Higher resolutions are best used on 17” or larger monitors. A multi-sync monitor is required in order to take advantage of on-the-fly resolution switching or the Pan-Zoom feature.

Unpacking

In the Twin Turbo-128 package you will find the following items:

- Twin Turbo-128M, M2, or M8 display adapter
- Twin Turbo-128 software disk
- Twin Turbo-128 Manual
- Warranty/Registration Card

WARNING Do not remove the board from its anti-static bag until you are ready to install it in your computer. Removing the board could expose it to potentially harmful static electricity.

Chapter 1: Installing the Hardware

Installing the Twin Turbo-128

If you are unfamiliar with your computer or have never installed an expansion card, please refer to your computer manual and read the following instructions before proceeding.

1. **Turn off your computer and all attached peripherals. Leave everything plugged in to AC power.**

2. **Remove the cover from the computer's main unit.**
   Refer to your computer's manual for instructions

3. **Touch the power supply case to discharge any static electricity you may have.**

4. **Remove the Twin Turbo-128 display adapter from its anti-static bag.**
   Handle the board from its edges and the metal bracket at the end. Avoid touching the connector pins or any components on the board.

5. **Install the board into any PCI expansion slot. If you are installing the Twin Turbo-128M2 display adapter which uses DIMM memory modules for memory expansion, use the slot closest to the outside of the computer. Refer to figure 1-1.**

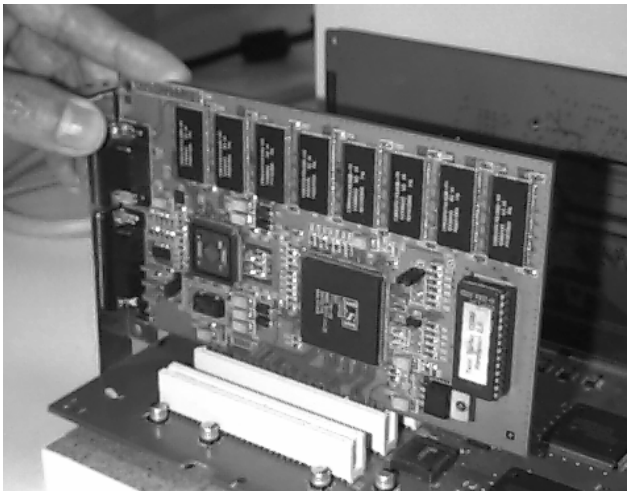


Figure 1-1

Installing the Twin Turbo-128

6. Make sure that the Twin Turbo-128 does not touch any other expansion boards or wires.

If there is not enough clearance, then choose another PCI slot.

7. Replace the cover on the computer and connect the monitor to the Twin Turbo-128 display adapter.

You may use either the Apple standard video connector or the VGA style video connector provided at the rear of Twin Turbo-128 display adapter.

Note: The resolutions available for display is dependent on which video connector is being used. See Chapter 3 for more detailed information.

Chapter 2 :
Installing the Software

Chapter 2: Installing the Software

The installation of the software for the Twin Turbo-128 is a simple task. Running the Installer program that is provided and restarting the computer is all that is needed to use the Twin Turbo-128 Display Adapter.

The Twin Turbo-128 Installer will put the following files in their proper locations:

Twin Turbo™ Acceleration

Twin Turbo™ Control Panel

Twin Turbo™ Control Strip

Twin Turbo™ Upgrade

To Install:

1. Start up your computer.

2. Insert the Twin Turbo software disk into your floppy disk drive. The contents of the disk is shown in figure 2.1.

3. The Installer includes a "Read-Me" section which has any late breaking information which is not included in this manual. It should be read before actually installing any software. See figure 2.2.

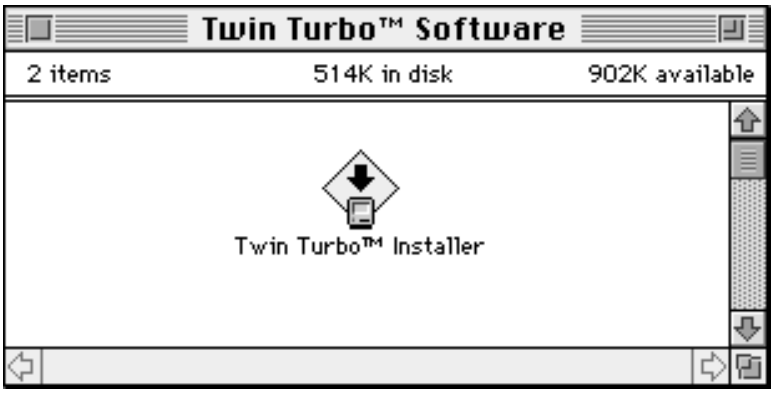


Figure 2.1
Twin Turbo Software Disk

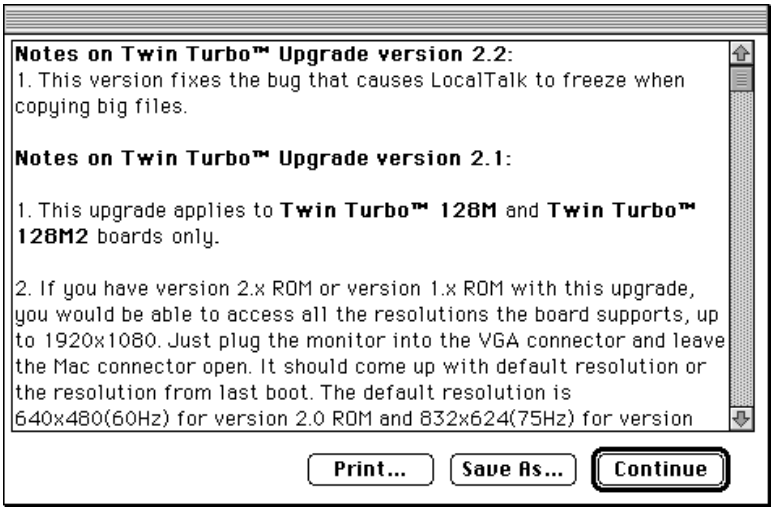


Figure 2.2
Read Me Section

4. Double-Click the "Twin Turbo™ Installer" icon on the Twin Turbo software disk. The Installer will show the window shown in figure 2.3.

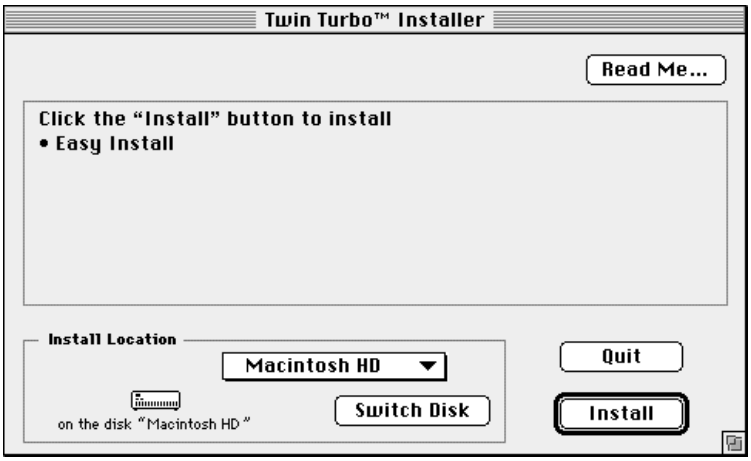


Figure 2.3

Installer Window

5. To install the files where they belong

Click on "Install".

6. When the copying is complete you must restart your computer for the software to take effect.

Restart the computer.

Chapter 3:
Control Panels

Chapter 3: Control Panels

The Twin Turbo Control Panel is used to control features of the Twin Turbo-128 such as resolution selection, color depth changes, panning and zooming, and general controls. The Twin Turbo Control Panel is shown in figure 3.1.

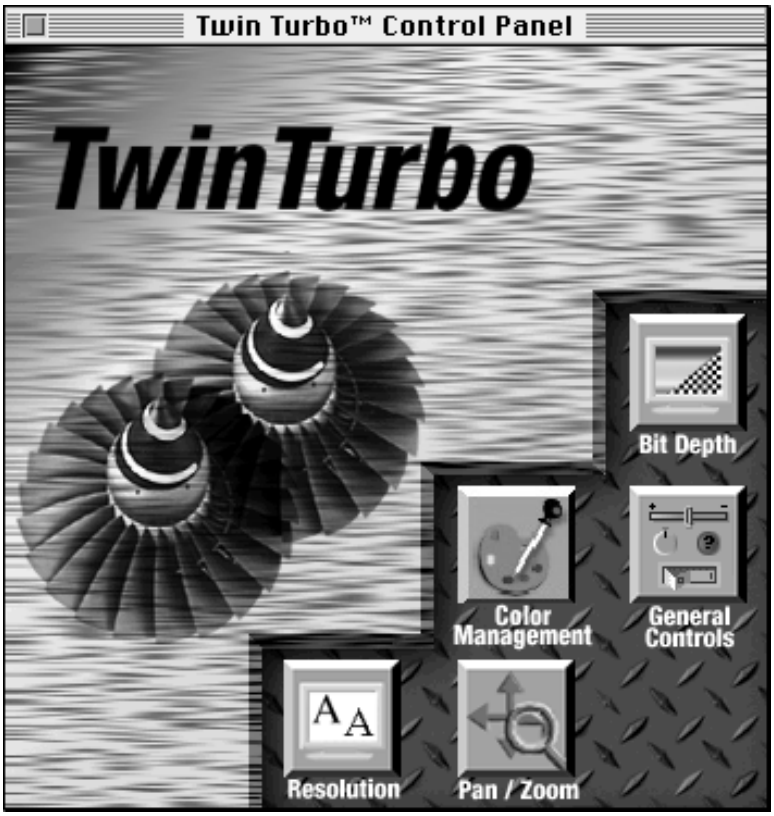


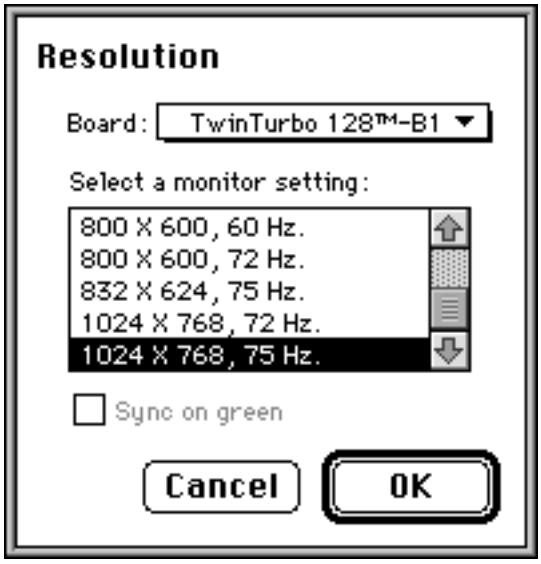
Figure 3.1

Twin Turbo Control Panel



The Resolution button provides a mechanism to select the desktop size that is being displayed by the Twin Turbo-128. The Resolution button is the preferred method of changing screen resolutions.

To display the sub-menu controls, click on the Resolution button icon.



On-the-fly resolution switching is selected by first selecting the board to be changed on the pop-up menu. The list of resolutions available to be selected is displayed. The resolution will change on-the-fly when the new resolution is selected. Sometimes the color depth will be reduced if there is insufficient video memory on the Twin Turbo-128 for the new resolution selected. Table 3.1 shows the available color depths and refresh rates for each resolution on the various Twin Turbo-128 Display Adapters. Not all resolutions may

be available if you are using a monitor which uses Apple's fixed monitor sense codes.

If you have installed an Apple compatible multi-sync monitor to the Apple standard video connector on the back of the board, you will be able to select only certain resolutions which are "safe" for the particular monitor connected.

If you have installed your VGA compatible monitor into the VGA connector on the board, you will see VGA compatible resolutions instead of the Apple standard resolutions.

If you are using the Apple 20" monitor or an equivalent with an external sense code adapter or using the VGA connector on the board, you will be able to select some of the higher resolutions such as 1600 x 1200 by holding down the "Option" key on the keyboard when you click the Resolutions button. A dialog box will be displayed for 5 seconds after the resolution is changed for confirmation. If the new resolution is not displaying properly, after 5 seconds, the display will revert to the previous resolution. This is added insurance to protect you from selecting a non-compatible resolution for your particular monitor.

Refer to Appendix A should you accidentally select an incompatible resolution.

Resolution	Color Depths	Refresh (Hz)
640 x 480	*256, Thousands, Millions*	*60, 66*
800 x 600	*256, Thousands, Millions*	*60, 72*
832 x 624	*256, Thousands, Millions*	*75*
1024 x 768	*256, Thousands, Millions**	*72, 75, 100*
1152 x 870	*256, Thousands, Millions**	*75, 100*
1280 x 1024	*256, Thousands*, Millions***	*75*
1360 x 1024	*256, Thousands*, Millions***	*75*
1600 x 1200	*256, Thousands*, Millions***	*60, 65, 75*
1920 x 1080	*256, Thousands*, Millions***	*60, 72†*

Table 3.1

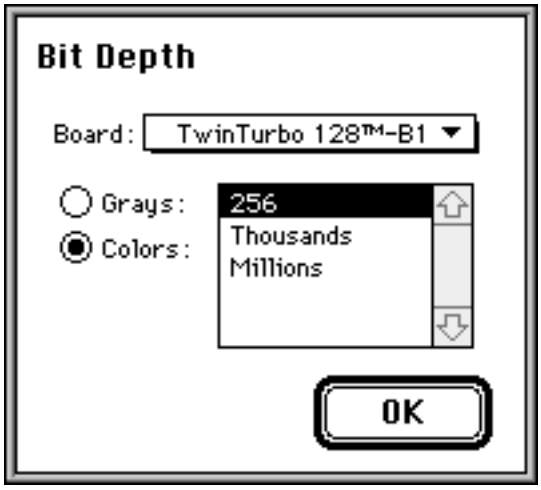
Display Resolution Chart

Note: The color depths marked with an asterisk (*) are only available on the Twin Turbo-128M or when the extra VRAM memory is installed on the Twin Turbo-128M2. The color depths marked with a double asterisk (**) are only available on the Twin Turbo-128M8. The refresh rate marked with the character (†) is not available in millions mode.



The Bit-depth button provides a mechanism to select the available colors to be displayed by the Twin Turbo-128. The Bit-depth button is the preferred method of changing colors.

To display the sub-menu controls, click on the Bit-depth button icon.

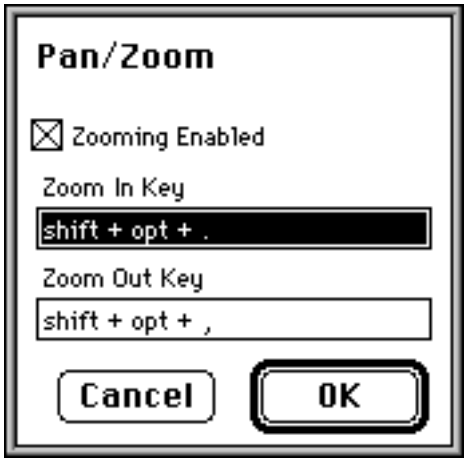


The color depth can be changed between 256 colors, Thousands (65,565) of colors, and Millions (16.7 M) of colors instantly via the Monitors Control Panel. Greyscale can be selected when using 256 colors mode. It is desirable to use the lowest colors possible for a particular application as the Twin Turbo-128 Display Adapter operates faster in reduced color depths. Refer to Table 3.1 for the available colors at a particular resolution.



The Pan-Zoom button provides a mechanism to select which keyboard-mouse sequence is used to zoom up the Twin Turbo-128. Pan-Zoom is only available when using multi-sync monitors.

To display the sub-menu controls, click on the Pan-Zoom button icon.



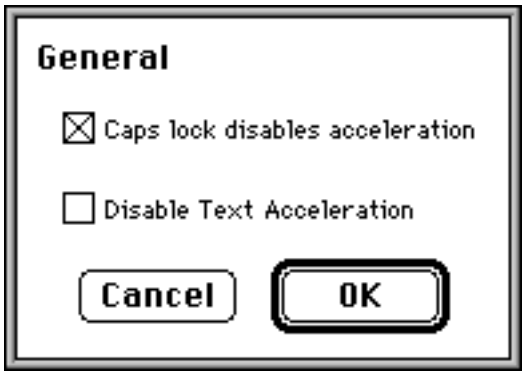
When you zoom up the screen using the keyboard-mouse sequence that is programmed, the monitor will blank momentarily, then reappear at the next lower resolution available on the resolution list described earlier in this chapter. Zooming up will stop once 640 x 480 resolution is reached. A different keyboard-mouse sequence is programmed for zooming down. Zooming down will stop once the original desktop resolution has been reached.

Panning is enabled whenever the screen is zoomed up from the origional desktop resolution. Whenever the mouse is near the edge of the monitor, the screen will shift to show the hidden areas.



The General Controls button is used to enable some of the hardware features on the Twin Turbo-128 Display Adapter.

To display the sub-menu controls, click on the General Controls button icon.

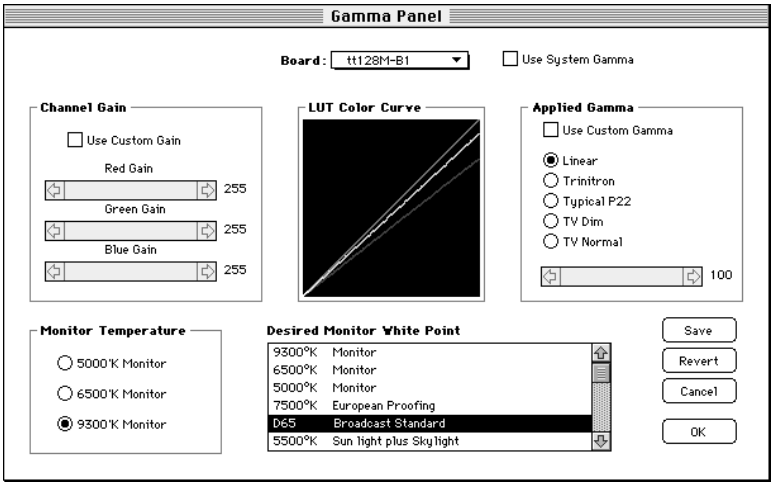


Graphics Acceleration on the Twin Turbo-128 can be disabled at any time by depressing the Caps-Lock key on the keyboard. This is useful for comparing the performance gains using Graphics Acceleration. To have the Caps-Lock key disable acceleration, check the box shown. Text caching can be disabled by checking the box shown.



The Color Management button is used select alternate gamma and color temperature settings for your monitor.

To display the sub-menu controls, click on the Color Management button icon.



The color temperature of your monitor can be altered by selecting the monitor temperature setting (5000, 6500, 9300) that is closest to your monitor's factory setting and choosing the desired color temperature from the list.

The gamma setting of your monitor can be altered to make your monitor's intensities match your eye's response more closely.

All saved settings are automatically loaded during system startup unless you check the box indicated above.

The Monitors Control Panel is standard to most color Macintosh computers and allows the user to move the menu bar, select the resolutions, color depths, and gamma settings used by the Twin Turbo-128 Display Adapter. It is recommended that the user use the Twin Turbo Control Panel instead of the Monitors Control Panel when changing resolutions or color depths as there are extra features in the Twin Turbo Control Panel which adds productivity. The Monitors Control Panel is best used for moving the menu bar and moving the startup "Welcome" screen. Figure 3.2 shows the Monitors Control Panel.

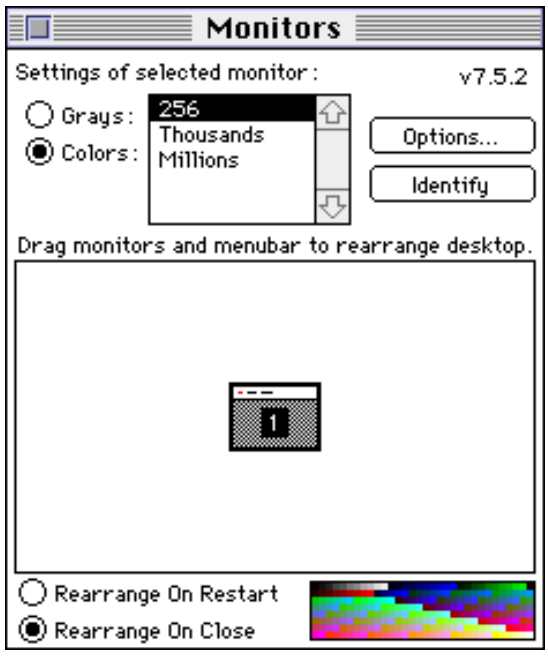


Figure 3.2

Monitors Control Panel

When operating with multiple monitors, the color depth and size of each monitor can be different. The position of each monitor relative to each other can be positioned by dragging the picture of the monitor in the control panel. The menu bar can be moved by dragging it to another monitor. Holding down the “Option” key while dragging the “Mac” icon allows the “Welcome to Macintosh” banner to be displayed on a different monitor on system startup. Any of the above described changes can be made to occur either upon closing the Monitors Control Panel or upon Restarting the computer. This is selected by the user with the buttons on the Monitor Control Panel.

The monitor’s gamma can be altered from the Macintosh default values by pressing the “Options...” button on the Monitors Control Panel. Gamma is used to match the eye’s natural response to varying light levels to that of the monitor response. The Gamma Control Panel is shown is Figure 3.3

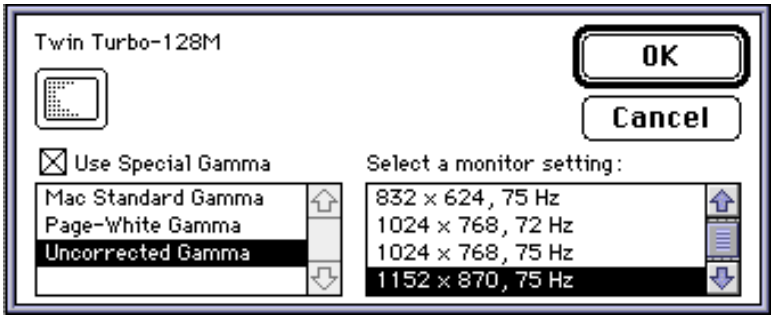


Figure 3.3

Gamma Selection

It is preferred to use the Color Management feature of the Twin Turbo control panel instead of using Gamma feature in the Monitor control panel as it is more flexible.

The Monitors & Sound Control Panel (available in system 7.5.3) has replaced the Monitors Control Panel on some newer Macintosh models. The Monitors & Sound Control Panel can be used to select which display has the menu bar, the "Welcome to Macintosh" banner and gamma settings. The Monitors & Sound Control Panel is shown in figure 3.4.

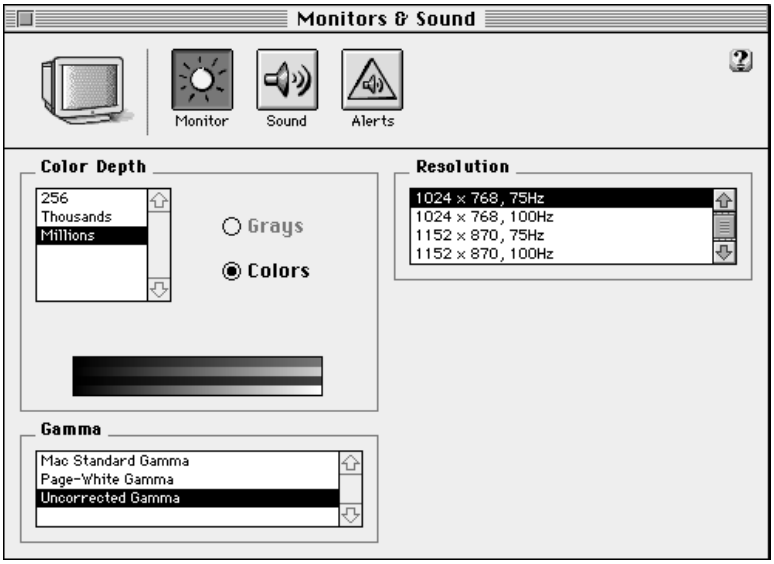


Figure 3.4

Monitors & Sound Control Panel

If you need more information on the Monitors & Sound Control Panel you can press the "?" on the bottom left corner. The Monitors & Sound Help Guide is displayed as shown in figure 3.5.

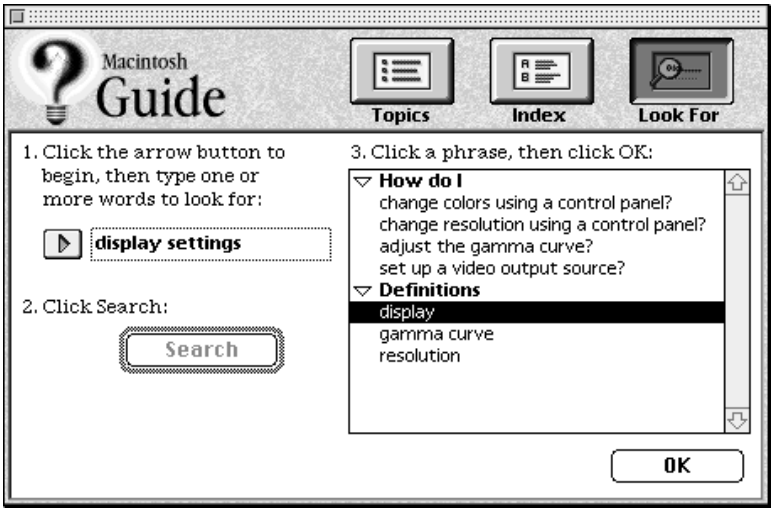


Figure 3.5

Monitors & Sound Help Guide

Certain Macintosh models include a Control Strip on the desktop which allows a shortcut to commonly used functions such as setting the sound level or the color depth of the monitor. The Twin Turbo Installer will add a “Twin Turbo logo” button to the Control Strip if it is available. When depressed, the Twin Turbo Control Panel will be opened automatically for user convenience. The button is shown in figure 3.6.

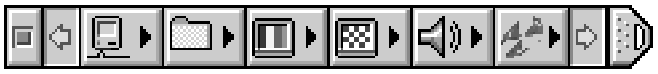


Figure 3.6

Macintosh Control Strip

The Control Strip may be positioned anywhere vertically, or be placed on the left or right edge by holding down the “Option” key while dragging the right tab.

Appendices

Appendix A: Troubleshooting

Computer seems to boot but there is no display:

Check the following items:

- Make sure that the Twin Turbo-128 card's edge connector is firmly inserted in the PCI connector on the motherboard.
- Make sure that the monitor is turned on and its video cable is firmly attached to the Twin Turbo-128 display adapter.
- The monitor that you are using is a multi-sync type or is a fixed frequency type which supports the selected resolution. The Twin Turbo-128 supports Apple's monitor sense codes for fixed frequency monitors.
- Your monitor is capable of running at the resolution or refresh rate selected in the Twin Turbo Control Panel. See Chapter 3 for detailed information on using the Twin Turbo Control Panel.
- If you have accidentally selected an incompatible resolution for your monitor, shut down the computer, remove the Twin Turbo-128 display adapter, restart the computer using built-in video or another video card. Remove the "Display Preferences" file from the "Preferences" folder inside the "System" folder. Shut down the computer, and replace the Twin Turbo-128 display adapter. The display will return to the default resolution for your particular monitor. If you do not have access to another video card, then you may "Zap" the PRAM to erase this monitor setting. Zapping the PRAM also resets other hardware information such as disk cache memory allocation, etc. To "ZAP" the PRAM, hold down the "Command-Option-P-Z" keys simultaneously during restart. When the PRAM has been cleared, the computer will sound its startup alert again. Release the keys at this point.
- If your monitor has a "Greenish" or "Purplish" cast to it, then disable sync on green in the Twin Turbo Control Panel.

Appendix A: Troubleshooting

I can not access the Twin Turbo Control Panel:

Check the following items:

- The Twin Turbo Control Panel has been loaded into the "Control Panels" folder and the computer has been re-started.
- The Twin Turbo-128 display adapter is not installed.

The Twin Turbo-128 is not accelerated:

Check the following items:

- The Twin Turbo Acceleration Extension has been loaded into the "Extensions" folder and the computer has been restarted.
- The Caps-Lock key is depressed.
- Disable Extensions with the "Extensions Manager" Control Panel to see if there is a conflict with the Twin Turbo-128 software.

My resolutions do not match those in the manual:

Check the following items:

- An inadequate monitor sense code is being sent to the Twin Turbo-128 display adapter from your monitor. Third party monitor sense adapters are available to overcome this if you are using the Mac standard video connector. If you are using the VGA style connector, you must hold down the "option" key to view all of the available resolutions.

Appendix B: Specifications

Hardware Specifications

System Requirements	PCI Power Macintosh or Compatible computer
Bus Interface	32-bit or 64-bit PCI computer slot
Memory	4 Meg VRAM on the Twin Turbo-128M. 8 Meg VRAM on the Twin Turbo-128M8. 2 Meg VRAM upgradeable to 4 Meg with VRAM modules on the Twin Turbo-128M2.
Monitor	Multi-sync recommended for maximum resolutions.
Output Signal	RS-343 RGB with selectable sync on green. Separate syncs included.
Sync Requirements	Horizontal 31 khz to 93 khz Vertical 60 hz to 100 hz
Supply Voltage	4.75 to 5.25 volts
Supply Current	1.7 amps
Operating Temperature	0 to 40 degrees Centigrade
Storage Temperature	-65 to 150 degrees Centigrade
FCC Class B	Twin Turbo-128M and M2 are Compliant for resolutions up to 1600 x 1200 x 65 hz. The Twin Turbo-128M8 is FCC class A only.

Appendix B: Specifications

Adding VRAM to the Twin Turbo-128M2

The Twin Turbo-128M2 can be upgraded from 2 megabytes of VRAM to 4 megabytes of VRAM by the user. Certain versions of the Twin Turbo-128M2 use VRAM DIMMs (Dual Inline Memory Modules) to upgrade the board. These modules are the same type as used with the on-board-video on certain PCI Macintosh computers. Figure A.1 shows the installation of the VRAM modules.

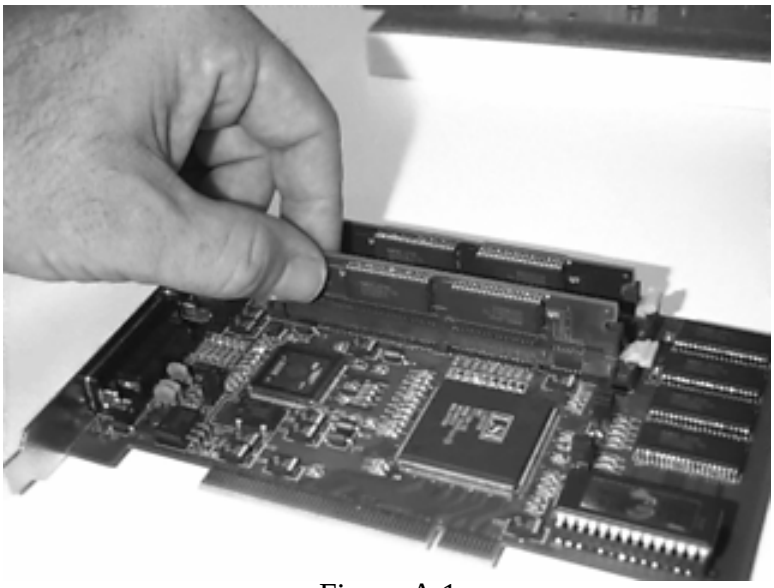


Figure A.1
VRAM Installation

Appendix B: Specifications

Table A.1 lists the VRAM modules that have been tested for compatibility with the Twin Turbo-128M2 display adapter.

VRAM Type	Compatibility
NEC uPD482234-60 or -70	Yes
NEC uPD482235-60 or -70	No
Toshiba TC528257-60 or -70	Yes
Toshiba TC528267-60 or -70	No
OKI M548262-60 or -70	Yes
OKI M548263-60 or -70	No
Samsung KM428C256-60 or -70	Yes (Note 1)
Samsung KM428C257-60 or -70	No

Table A.1
VRAM DIMM Compatibility

Note 1 - The Jumper at JP2 may need to be removed for proper operation. If you experience vertical stripes on your screen, then remove the jumper at JP2.

Appendix B: Specifications

Apple Standard Video Connector Pinouts

Pin	Signal Description
1	Ground
2	Red Video
3	Composite Sync
4	Monitor ID[0]
5	Green Video
6	Ground
7	Monitor ID[1]
8	Not Used
9	Blue Video
10	Monitor ID[2]
11	Ground
12	Vertical Sync
13	Ground
14	Ground
15	Horizontal Sync

Appendix B: Specifications

Mini D-Subminiature Video Connector Pinouts

Pin	Signal Description
1	Red Video
2	Green Video
3	Blue Video
4	Not Used
5	Ground
6	Ground
7	Ground
8	Ground
9	5 volts
10	Ground
11	Not Used
12	Not Used
13	Horizontal Sync
14	Vertical Sync
15	Not Used

Appendix C: FCC Class B Statement

FCC I.D. #'s

MAJPCI9501 (Twin Turbo-128M)

MAJPCI9521 (Twin Turbo-128M2)

This equipment has been tested and found to comply with the limits for a Class B 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 residential 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. The user is encouraged to try to correct any interference problems by one or more of the following measures:

Reorient the receiving antenna.

Increase the separation between the equipment and the receiver.

Connect the equipment into an outlet which is different from that which the receiver is connected.

Consult the dealer or an experienced radio/TV technician.

Warning - To meet FCC class B requirements, use only shielded interface cables and power cords and connect to Class B certified computers and monitors only. Operation with non-certified peripherals is likely to result in interference to radio and TV reception. Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

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