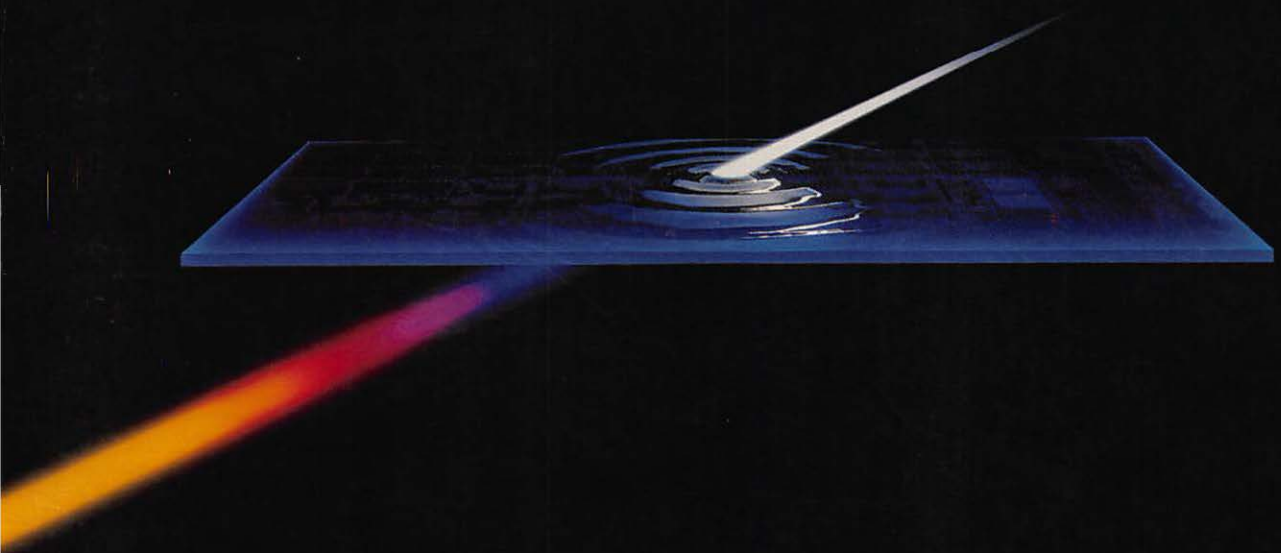
SPECTRUM/8 SERIES III

USER'S MANUAL



SUPERMAC TECHNOLOGY

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Contents

Spectrum/8 Series III™ is a video card (video graphics adapter) for the Macintosh® II family of computers, and may be installed in any of the NuBus slots within the computer. You can use multiple Spectrum/8 Series III cards, up to six in the Macintosh II and IIx, and up to three in the Macintosh IIcx and IIci, to drive multiple monitors attached to a single computer.

Spectrum/8 Series III is fully compatible with the Modular Macintosh family of computers such as the Macintosh II, IIx, and IIcx. Throughout this manual, any reference to the "Macintosh II" refers to the complete line of Modular Macintosh computers.

Spectrum/8 Series III will drive a color monitor at 8-bits per pixel — which means that 256 different colors can be displayed on screen at any instant, and those 256 can be selected from a palette of over 16 million available colors. For software compatibility, Spectrum/8 Series III can also operate in 4-bit (16 colors), 2-bit (four colors), and 1-bit (black-and-white) modes.

As shipped, Spectrum/8 Series III supports four types of monitors:

- 19" SuperMac 75Hz Color Display (1024 x 768 pixels)
- 19" SuperMac 60Hz Color Display (1024 x 768 pixels)
- 16" SuperMac 75Hz Color Display (832 x 624 pixels)
- Apple 13" High Resolution RGB and 12" monochrome monitors (640 x 480 pixels)

With the addition of a low-cost crystal oscillator, Spectrum/8 Series III can also support three more types of monitor systems:

- Apple Portrait Display (640 x 870 pixels)
- Any NTSC-specification RGB monitor (640 x 480 pixels)

- Any PAL-specification RGB monitor (768 x 576 pixels)

Spectrum/8 Series III is capable of driving the above monitors at a r
75Hz for a stable, flicker-free screen image.

Spectrum/8 Series III Features

In addition to full capability with 8-bit Macintosh software, Spectrum/8 Series III offers a variety of unique capabilities to give you control of your monitor(s):

- **Multiple screen sizes**
  Spectrum/8 Series III has 1024K (1mb) of video RAM, and will drive a 1024 x 768 (19") display with 256 colors. This is also enough RAM to create a Virtual Desktop™ of 4000 x 2000 pixels in 2 colors (1-bit, or black-and-white).

- **Hardware panning.**
  With the special circuitry incorporated in Spectrum/8 Series III, the SuperMac monitors can be used to *simulate* a display which is much larger than the actual monitor screen. Spectrum/8 Series III enables you to set the size of this simulated screen in a variety of sizes — for example, you can set a the standard 1024 x 768 pixel monitor to behave as though it were a full 4000 x 1500 pixel display. To maneuver across this large area, hardware panning can be activated on all monitors and in all Virtual Desktop resolutions, to combine the advantages of a large workspace and a large Virtual Desktop.

  It's important to note that this feature is implemented in *hardware*, and, as hardware, the screen response is lightning fast. The area of the screen simulation is stored completely in the Spectrum/8 Series III's memory. Software programs which simulate this effect are very slow by comparison.

- **Zooming features.**
  Shortcut keys are available to magnify the screen display by 200%, which is handy for checking out small details of complex diagrams. This Spectrum/8 Series III Zooming feature is also implemented in hardware, so it's fast and smooth. While zoomed in, you still have full control of your Macintosh: you can type text, work with graphics tools, or activate pull-down menus in the usual manner.

  The hardware panning, described above, works in conjunction with the zooming: it allows you to quickly navigate to the section of the screen you want to "zoom in" and examine.

- **Control Utilities**
  A Macintosh II equipped with a large external monitor can provide an enormous viewing area. The software supplied with Spectrum/8 Series III includes three utilities which makes it much easier to deal with the screen territory afforded by such a system.

  A keyboard activated **Home Cursor Utility** allows you to move the cursor to the upper left corner of either the internal or external monitor. The cursor can also be enlarged, or set to flash to make it easier to find.

  A **Dialog Control Utility** enables you to have dialog boxes appear in a convenient location. You can center all dialogs to the visible portion of your display, which is very useful if you are using a virtual display which is larger than your monitor screen. You can also specify to have the dialogs center on the *current cursor location,* which eliminates having to drag the cursor to the upper middle of your display to work with each dialog.

  Finally, when you need to quickly shift a portion of the virtual display, a keyboard activated **Hand Panning Utility** — similar to the hand tool used in MacPaint — can be used to reposition the screen display. As the screen is repositioned, the menu bar at the top of the screen can be "locked," so the menu selections are always conveniently available.

About This Manual

This manual provides information for installing, configuring, and using a Spectrum/8 Series III video card. The first chapter explains the physics of color; how the eye perceives color, and how that relates to the work you do on your Macintosh. Chapter two explains how color images are created on a computer monitor, and how Spectrum/8 Series III controls the Macintosh II's video system. Read these chapters to get an understanding of how color is specified and manipulated in the Macintosh environment.

The remainder of this manual explains how to install and use your Spectrum/8 Series III card.

This manual is divided into six chapters. It also includes an appendix describing Spectrum's cable requirements, a glossary of terms which relate to Macintosh video, and an index.

Chapter 1 ..... **What is Color?** This chapter provides information about the nature of color, how colors are created, and how we perceive color.

Chapter 2 ..... **Introduction to 8-bit color** explains 8-bit color theory, and how it is implemented in Spectrum/8 Series III. This chapter also includes an overview of the hardware components of Spectrum/8 Series III.

Chapter 3 ..... **Installing Spectrum/8 Series III** describes unpacking, installing, and configuring your Spectrum/8 Series III video board.

Chapter 4 ..... **Using SuperVideo** shows you how to use the software which controls the advanced features of the Spectrum/8 Series III video board.

Chapter 5 ..... **Reference** includes additional information, including specifications for unusual monitors which might be used with the Spectrum/8 Series III.

Words or phrases printed in **bold face** are explained further in the glossary.

Quick Start — *For Experienced Users Only*

This section offers an abbreviated set of instructions for getting a Spectrum/8 Series III up and running. This section is only for those who are already familiar with the Macintosh II; that is, those who have installed video cards in other Macintosh II systems, and are experienced in working with those systems.

This section is not for beginners! If you are new to the Macintosh and have just acquired your system, take the time to read this manual in its entirety. There are many tips, hints, and shortcuts described in this manual which will enable you to work easier and faster on your Macintosh system.

1. Install the Spectrum/8 Series III video card in any of the NuBus slots within the Macintosh II.

2. Using a video cable which is appropriate for the monitor you're working with, connect the video port on the back of the Spectrum/8 Series III to the video input socket(s) on the back of the monitor.

3. Start the Macintosh II system.

4. At this point, you need to configure Spectrum/8 Series III to accommodate the monitor you're working with. Spectrum/8 Series III will sequentially step through the various monitor possibilities. When the screen appears clear and undistorted, press the space bar to lock-in the monitor settings, and restart the Macintosh. If the screen never clears, you may have to install a TTL Clock Oscillator to accommodate your particular monitor. Refer to Chapter 3: *Installing Spectrum/8 Series III*.

5. Copy the files from the SuperMac Graphics Software disk (included in the Spectrum/8 Series III package), into the System Folder on your startup disk.

6. Restart the Macintosh, so that all of the new files in the System Folder are loaded into memory.

At this point, you can use the Monitors selection from the Control Panel to define the number of colors you want to work with. And, you can go ahead and work with your Macintosh system in the normal manner.

The Acceleration, and the SuperVideo Control Panel devices, offer a number of features which can make your work on the Macintosh faster, easier, and more convenient. A complete description of these features can be found in Chapter 4: *Using SuperVideo*.

Monitors Supported by Spectrum/8 Series III

The Spectrum/8 Series III card is equipped with four TTL Clock Oscillators: a 64 MHz oscillator, which accommodates the SuperMac 1024 x 768 19" and 16" 60 Hz display systems; an 80 MHz oscillator which controls the SuperMac 1024 x 768 19" and 16" 75 Hz display systems; and a 30.24 MHz oscillator to accommodate the Apple 12" Monochrome and 13" AppleColor monitors.

With the addition of a low-cost TTL Clock Oscillator, Spectrum/8 Series III will support additional monitor systems. The table below lists popular monitor systems which are compatible with Spectrum/8 Series III, and the oscillators required for the various systems:

Display System	Resolution	Oscillator
SuperMac High Res. Analog 60 Hz	1024x768 pixels	64.00 MHz
SuperMac High Res. Analog 75 Hz	1024x768 pixels	80.00 MHz
13" AppleColor	640x480 pixels	30.24 MHz
12" Apple Monochrome	640x480 pixels	30.24 MHz
15" Apple Portrait Display	640x870 pixels	57.28 MHz
PAL RGB	640x480 pixels	17.73 MHz
NTSC RGB	640x480 pixels	14.31818 MHz

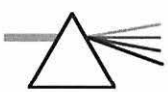
Oscillators supplied with Spectrum/8 Series III

Display systems supported by Spectrum/8 Series III with the appropriate oscillator.

What is Color?

This chapter offers a gentle introduction into the physics of color: how color is perceived by the eye, the differences between additive and subtractive color, and how the behavior of color relates to the work you do on the Macintosh computer.

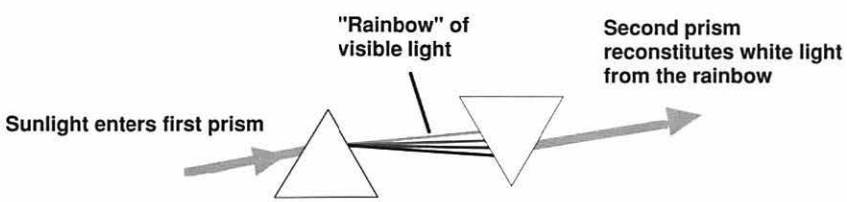
The color theory presented in this chapter will help you get the most out of your Spectrum/8 Series III video card, by enabling you to precisely manipulate color to take advantage of the color graphics available on the Macintosh II. However, this chapter is not required reading: if you want to get right to work with your Spectrum/8 Series III, skip ahead to Chapter 3, *Installing Spectrum/8 Series III*.



About Color

Simply stated, light is the source of color. This was first demonstrated in 1666 by Isaac Newton, who experimented with passing a beam of sunlight through a glass prism. The light which came out of the prism was divided into the rainbow array of the colors which make up sunlight. Of course, the effect of a prism had been noted well before Newton's time, but it had always been attributed to some sort of "latent color" embedded in the glass of the prism.

Newton's breakthrough came by taking the experiment a step further: he passed the resulting rainbow of light through a second prism, and found that the rainbow was re-assembled into white light, as shown in the diagram below:

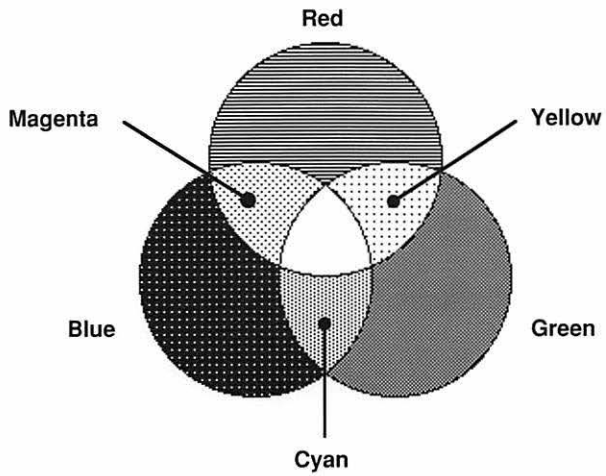


The key concept here is that what appears to be white light is actually a blending of colored light. Conversely, a rainbow of colored light can be blended back together to create white light.

Transmitted Light (Additive Colors)

In color theory, the process of blending colored light is referred to as Additive Color. It's been found that just three colors — red, green, and blue — are required to create white light. In other words, if you take equal amounts of red light, green light, and blue light, they will blend together to make pure white. Therefore, the colors red, green, and blue are referred to as the Additive Primary Colors.

With transmitted light, all the colors of the rainbow can be generated by varying the intensity of the three Additive Primary colors. For example, equal amounts of blue and red light make magenta (deep purplish red). Surprisingly, equal amounts of red and green light make yellow light. The diagram below shows how red, green, and blue light can be added together to create other colors:



Notice that the center of the diagram, where all three colors overlap in equal amounts, the result is white light.

Reflected Light (Subtractive Colors)

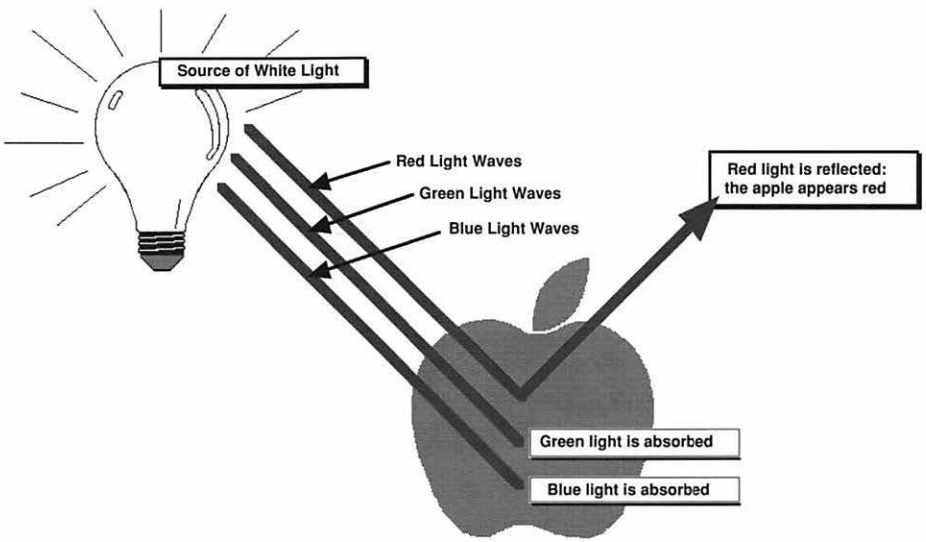
Of course, most objects that we perceive don't actually generate light; instead, they *reflect* the light from a light source.

To understand how light is reflected off objects requires a bit of explanation. In terms of physics, light is made up of waves of energy — just like the waves which are used to

broadcast radio and television signals. Each color of light has its own "wave length:" the colors towards the red end of the spectrum are made up of relatively long waves of energy, whereas the colors toward the blue end of the spectrum are made of relatively short waves of energy.

What makes objects appear in certain colors depends on how light waves reflect off the surface of the object. If an object appears to be pure white, it appears that way because the object *reflects* all colors of light waves equally. Likewise, if an object appears to be pure black, it looks that way because it *absorbs* all colors of light waves. Objects appear to be certain colors because they reflect the waves of energy which correspond to those colors.

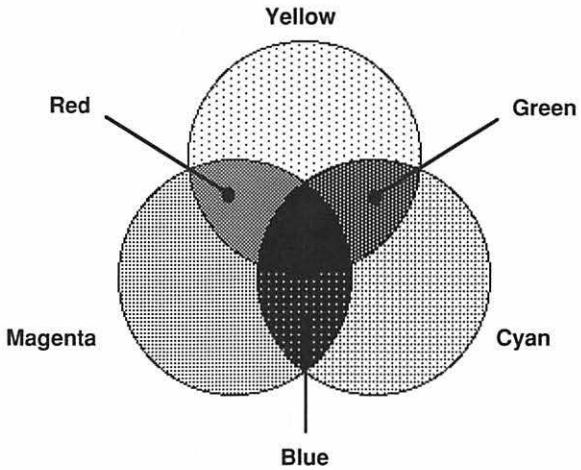
For example, the diagram below illustrates white light (comprised of red, green and blue light waves) reflecting off the surface of a red apple:



In this case, the apple appears red because the surface of the apple *absorbs* blue and green light waves, while it *reflects* red light waves. Likewise, a blueberry appears blue because it *absorbs* red and green light, and *reflects* blue light.

Unlike transmitted light which is an additive process, reflected light is a *subtractive* process. When light is reflected off an object, colors are subtracted — and the colors we perceive are the result of the colors which are *not absorbed* by the object. Therefore, objects which do not generate their own light are described by a different set of primary colors: the Subtractive Primaries — Cyan, Yellow, and Magenta.

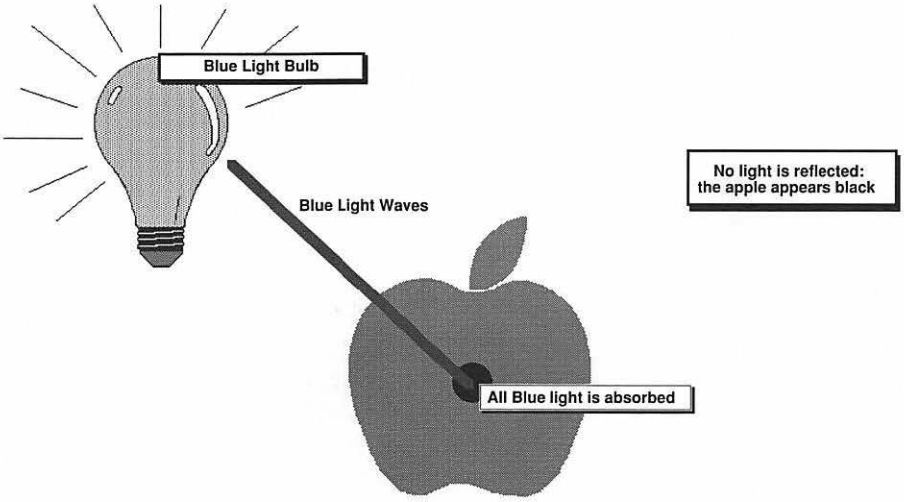
The diagram below shows how the three Subtractive Primaries can work together to create intermediate colors:



Note that the center of this diagram, where all three colors overlap in equal amounts, the result is black. In other words, the three Subtractive Primaries work together to *subtract* all colors of light — and the result is the absence of light. Pure black.

Perceiving Colors

All of the above describes how colors are transmitted and reflected, but overlooks a basic element of color perception: the nature of the light source. Using the example from earlier in this chapter, suppose a red apple were illuminated by a light bulb which gives off only pure blue light, as shown in the diagram on the next page:



In this case, the red skin of the apple absorbs all of the blue light, making the apple appear to be black. Conversely, if the apple were illuminated with a pure red light, *all of the light would be reflected* — making the apple appear bright red.

It's easy to take for granted that all the light sources of day-to-day life are basically the same. Not so. Sunlight, candlelight, incandescent light bulbs, and fluorescent lights put out distinctly different colors, and characteristics of light. In other words, while these light sources look "white," they are actually made up of slightly different mixes of colored light. Even though the human eye is sensitive to these differences, the brain is responsible for processing the input from the eye — and it is the brain's perception which allows us to perceive both candlelight and fluorescent light as being "okay" white light.

On an absolute scientific scale of color, candlelight is very red, incandescent light bulbs are slightly red, sunlight is neutral, and fluorescent lights are blue-green. Since photographic film doesn't have a brain to correct the perception of these differences, film is very sensitive to different qualities of light. This is why professional photographers carry a variety of color filters to compensate for lighting conditions.

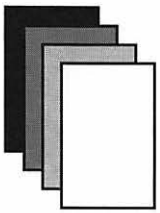
Just as the lighting conditions can vary, color perception varies from person to person. For example, some people are color blind — and perceive no colors whatsoever. Others may be particularly sensitive to blue, or some other color. To compound the problem of color perception, some people are *more* sensitive to particular colors at low levels of illumination, and *less* sensitive to the same colors when brightly illuminated.

Controlling Color

The preceding sections of this chapter have offered an introduction into the nature of light, and considerations for how color is perceived by the eye. How does this relate to the Macintosh? Three basic concepts about light are important:

- Light sources (transmitted light) can be described by the Additive Primary colors. The three Additive Primary colors of light, blended in equal amounts, equals white light.
- Objects (reflected light) are described by the Subtractive Primary colors. The three Subtractive Primary colors, present in equal amounts on the surface of an object, will absorb all colors of light and make the object appear black.
- For objects which are illuminated by some light source, the color that we perceive is influenced by the subtle characteristics of the light source.

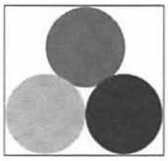
The 8-bit video system on the Macintosh II allows you to display up to 256 colors on your monitor screen, and those colors can be recreated by color printers, printed as color separations, or reproduced using other color imaging equipment. The color theory in the preceding sections will help you to get the exact colors and effects you want from your Macintosh II system.



For example, since a printed sheet of paper doesn't generate its own light, printed images are created using the Subtractive Primary colors. If printing inks absorbed and reflected light perfectly, then just three colors of ink — cyan, yellow, and magenta — would be able to create all the colors of the rainbow.

Unfortunately, under the current technology, cyan, yellow and magenta inks combine to produce a muddy-brown color, so a fourth color, black, is used to print full-color images. This is why commercial printers refer to full-color printing as the "four-color process."

Many advanced color applications, such as SuperMac's PixelPaint, allow you to create the four image "plates" required by the four-color printing process. With PixelPaint, you can make fine adjustments to each of the image plates, giving you control over the appearance of the final printed image. For example, if you were creating a color poster, you could specify different color adjustments depending on whether the poster were to be displayed in sunlight, or under fluorescent light.



Film recorders create images on photographic film by exposing the film to very fine beams of red, green, and blue light — the Additive Primary colors. With the right software, you could make very fine adjustments to the red, green, and blue output of Spectrum/8 Series III, and control the overall color balance of the finished image.

Finally, the color monitor that you use with Spectrum/8 Series III is, itself, a light source. As explained in the next chapter, color monitors create color using the Additive Primary colors. If your color images are to be presented directly on the monitor screen, understanding and controlling the three Additive Primary colors will enable you to very precisely control the colors which appear on the screen.

Chapter 2

Macintosh Color

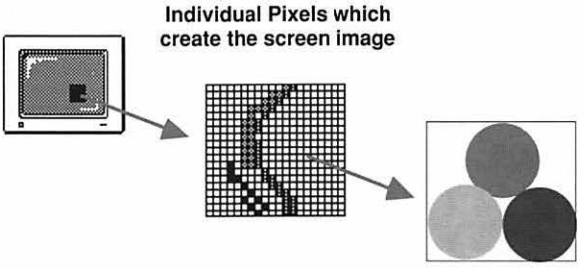
This chapter explains the theory behind how color is created on a computer monitor, and how Spectrum/8 Series III operates with the Macintosh II. This chapter also gives an overview of the hardware components of Spectrum/8 Series III, and how the Spectrum/8 Series III adapter interacts with the NuBus slots of the Macintosh II.

How Color Monitors Create Color

The image on the monitor screen is composed of "pixels:" the individual dots which create the image. The larger the monitor, the more pixels that the video card has to keep under control. For example, the standard AppleColor 13" monitor displays an image which is 640 pixels wide, and 480 pixels tall — for a total of 307,200 pixels. SuperMac's 19" Spectrum monitor displays 1,024 pixels horizontally, and 768 pixels vertically for a total of 786,432 pixels — more than twice the number of pixels displayed by the AppleColor monitor.

For standard monochrome video systems, working with the individual pixels is a simple matter: the pixel is either turned on (white) or turned off (black). This all-or-nothing approach is how computers such as the Macintosh Plus and Macintosh SE create their screen images.

Color is another matter altogether. Since the monitor itself acts as a light source, it creates color using the Additive Primaries described in Chapter 1. For a color monitor, each pixel is comprised of three small dots of color: red, green, and blue, as shown in the diagram on the next page:



Deep inside the monitor are three separate electron "guns" which illuminate the red, green and blue color dots. Each gun only fires electrons at its corresponding color dots. These guns can vary in intensity: if more electrons are directed at a particular color dot in a pixel, that color dot glows more brightly.

Colors are created by adjusting the intensity of the three guns on a single pixel. Obviously, if just one of the color dots of a pixel is illuminated, the pixel will glow in that single color.

If all three guns hit the color dots of a single pixel at full intensity, the three Additive Primaries blend to make the pixel appear white. If none of the color dots are hit, the pixel remains black. Colors are produced by varying the intensity of the three guns.

Since the intensity of the three electron guns can be so precisely tuned, color monitors have the ability to display *millions* of different colors. The important concept is that color monitors stand ready to produce any color of the rainbow; they simply must be instructed by the computer as to which pixel of the screen is to display which color.

How the Macintosh Defines Color

Since the monitor is capable of displaying such a wide range of color, it is the design of the video adapter, and how much RAM memory it has, which dictates how many colors can be displayed on the screen at one time.

Macintosh color systems are based on binary numbers — the bigger the binary number, the more colors it can describe. The first Macintosh computers were based on 1-bit binary numbers: each pixel on the monitor screen was either black or white. Grays were simulated by using a checkerboard pattern of black and white pixels.

Two-bit binary numbers can define four "colors" to be displayed (black, white, and two shades of gray). Four-bit binary numbers can define 16 colors, and an 8-bit number allows a color system to display up to 256 different colors on the screen at one time.

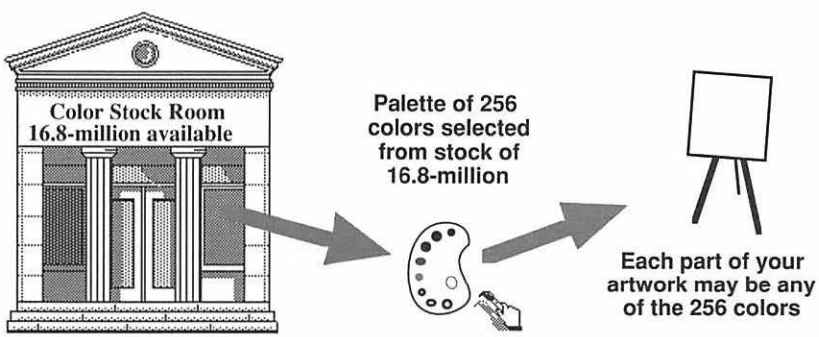
On a grander scale, the Macintosh "thinks" about a screen pixel using a much bigger binary number — in fact, it uses *three* 8-bit numbers: one number for red, one for green, and one for blue. Since an 8-bit number can define 256 intensities each for red, green and blue, 256 x 256 x 256 = 16,777,216 different colors on the Macintosh.

8-bit color

With an 8-bit video system, the Macintosh itself stands ready to deliver any of those 16.8 million colors — but the video adapter is designed to display 256 colors at any one time. To determine *which* 256 colors, the Macintosh II brings into play what's known as a "**Color Look-Up Table**."

To understand how the Look-Up Table works, imagine that you're a painter, and that your stock room has a very large selection of paint colors for you to work with — in fact, 16.8 million different colors. This is an unusual paint in that the colors can't be mixed. Instead, each color can only be its own individual color.

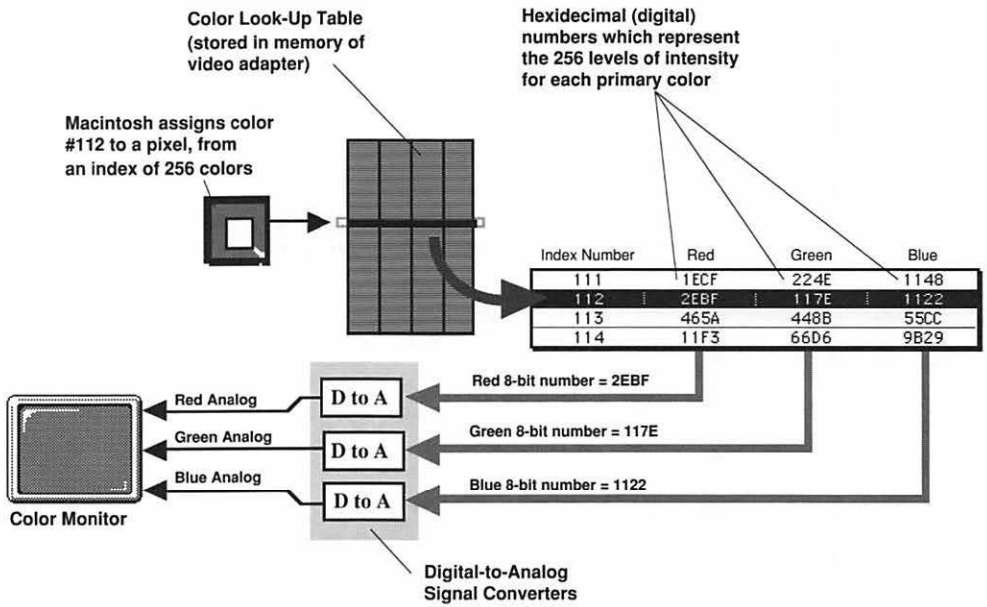
To stretch the imagination a bit further, suppose that as you're working with a painting, you have a palette which can hold dabs of 256 different colors of paint. So, for this example, you can choose any 256 colors from the 16.8-million available in your stock room, as shown in the diagram below:



This is exactly how an 8-bit Macintosh video system works. Of course, instead of dabbing paint on a canvas, the colors are defined electronically. From the 16.8-million color possibilities, 256 colors are chosen to be on the screen at any one time, and each pixel on the screen can be any of the 256 colors. When the Macintosh calls for a specific

color, say, for example, color number 112, the video adapter goes to the Look-Up table to see which of the 16.8-million colors *exactly* corresponds to that color number.

The diagram below shows how the Macintosh circuitry uses the Look-Up Table with an 8-bit system. For this example, the Macintosh has determined that a particular pixel must display color number 112 from the Look-Up Table:



8-bit Color System

As shown in the diagram, the Look-Up Table provides the binary numbers to describe the intensity for each of the three electron guns in the monitor. Once the Look-Up table has supplied the numbers, the video adapter uses Digital-to-Analog (D/A) convertors: special circuitry which changes the binary numbers into the electrical signals which operate the monitor.

So, for each and every pixel displayed on the monitor, the 8-bit color routine goes something like this: the Macintosh assigns an 8-bit number, 0 through 255, to a pixel. The video adapter goes to the Look-Up Table to extract the 24-bit number which generates that color, and, finally, the Digital-to-Analog convertors turn the 24-bit number into the signals which drive the monitor. The monitor receives the signal, and fires the three electron guns at the pixel with the exact intensity to produce the desired color. And then the Macintosh moves on to calculate the next pixel, and the next, and the next...

How fast does all this happen? For SuperMac's 19" color monitors, the refresh rate is about 75Hz — that's 75 times per *second.* Imagine: all 786,432 pixels are calculated and blasted with the monitor's electron guns *75 times per second.* Another way to think of it is that the Look-Up Table has .000000017 second to send out the color intensity information for each pixel.

The Look-Up Table is a very busy place in the Macintosh. Very busy, indeed.

About the Look-Up Table

The next obvious question is... where does the Look-Up table come from? How are the 256 color selected from the 16.8 million candidates? Good questions.

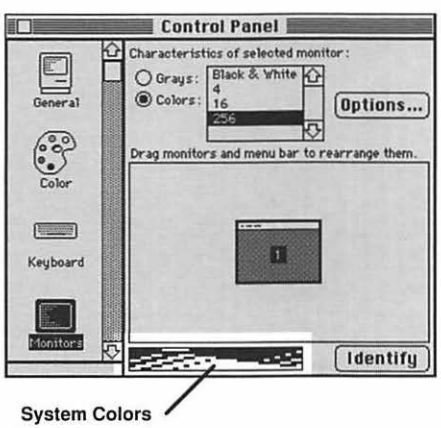
The Look-Up table is defined either by the Macintosh System (the System file in the System Folder on your startup disk), or by the color application that's currently running.

For example, the Finder of a color Macintosh system gives you the ability to specify a color for folders, applications, and data files. The colors that are allowed are among the 256 colors (in 8-bit mode) and 15 colors (in 4-bit mode) of the System's Look-Up table.

You can see the 256 actual colors of the System Look-Up table by using the following procedure:

1. Choose Control Panel from the Apple menu.

2. Scroll down through the Control Panel selections, and click on the Monitors selection. The Monitors Control Panel will appear, similar to the diagram below:



As shown in the diagram, the 256 colors specified by the System's Look-Up table appear at the bottom center of the Monitors Control Panel. You can experiment changing the number of colors displayed by the monitor to see the resulting colors defined by the System's Look-Up table.

Applications and the Look-Up Table

In addition to the Macintosh System, individual applications can define which 256 colors are displayed by an 8-bit Macintosh system.

For example, PixelPaint is an 8-bit color graphics program which allows the Look-Up table to be completely customized. With PixelPaint, each file can have its own unique Look-Up Table — using the 256 colors which best flatter the image displayed in the file.

If a custom Look-Up table is defined using PixelPaint, it will be displayed in the Monitors Control Panel (except when running under MultiFinder).

Installing Spectrum/8 Series III

This chapter explains how to install the Spectrum/8 Series III video card in your Macintosh II, and how to configure the card to accommodate the monitor you are using with your system.

Unpacking

The packing box for Spectrum/8 Series III should contain:

- a packing slip, which lists the contents of the box
- the Spectrum/8 Series III video card
- a disk labeled *SuperMac Graphics Software*
- this manual

If any of these parts are missing, contact your authorized SuperMac dealer.

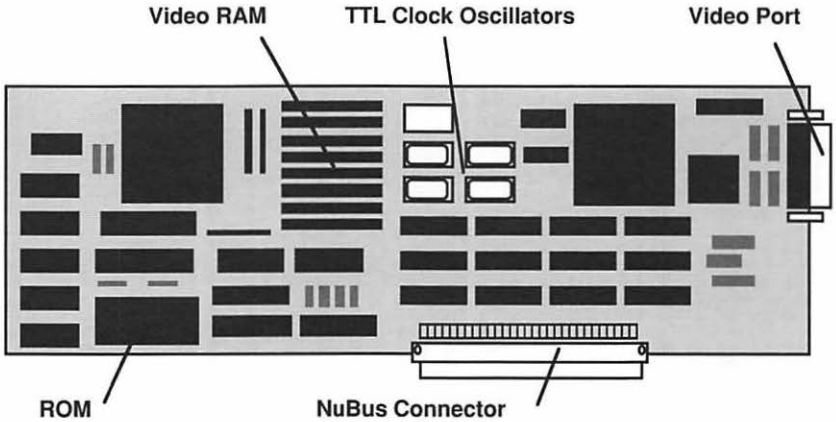
Important: The warranty/registration card appears in the center of this manual. Detach the warranty/registration card from this manual, fill it out, and mail it to SuperMac immediately to validate your warranty.

Equally Important: A copy of SuperMac's Limited Warranty appears on page 3 of this manual, just before the Table of Contents. Near the bottom of this page, there are spaces for you to fill in the date that you purchased Spectrum/8 Series III, and the serial number which appears on the back of your Spectrum/8 Series III video card. Take a moment to fill in this information, so that you can refer to it if you have any questions about this product.

Save all packing materials for transporting or mailing the video card in the future.

Spectrum/8 Series III Hardware Overview

Throughout the rest of this manual, references will be made to several of the key components on the Spectrum/8 Series III video card. The diagram below shows where these components are located, and the following paragraphs describe the purpose of each component.



Overview of the Spectrum/8 Series III Card Components

ROM

"ROM" stands for "Read Only Memory." The ROM chip contains the **firmware** — the built-in instructions which make the Spectrum/8 Series III hardware work with the Macintosh II. Firmware, like software, will be periodically updated to add new features to Spectrum/8 Series III. A label on top of the PROM identifies the version number of the ROM installed on your Spectrum/8 Series III card.

Video RAM

The Spectrum/8 Series III adapter is equipped with 1024K of video RAM. This is sufficient memory to drive a 1024 x 768-pixel display, with each pixel displaying any 256 colors from the 16.8-million colors available on the Macintosh II.

TTL Oscillator Module

Spectrum/8 Series III is equipped with four **TTL Oscillator Modules,** which are set to support the SuperMac 1024 x 768-pixel 16" and 19" color monitors, and the Apple 13" color and 12" monochrome monitors. An empty socket is provided for a fifth oscillator, which enables Spectrum/8 Series III to accommodate several other monitor configurations.

Connectors

NuBus Connector: The NuBus connector is used to connect the Spectrum/8 Series III to the Macintosh II.

Video Port: The Video Port is used to link the Spectrum/8 Series III with an external monitor. A description of the pin outputs for this Port may be found in Appendix A: *Video Connector Specifications.*

Installing Spectrum/8 Series III in a Macintosh II

Spectrum/8 Series III is designed to be used on a Macintosh II system, and is compatible with three families of monitors:

- SuperMac 1024 by 768 pixel 16" and 19" Displays running at 75Hz
- SuperMac 1024 by 768 pixel 16" and 19" Displays running at 60Hz
- 13" AppleColor monitor

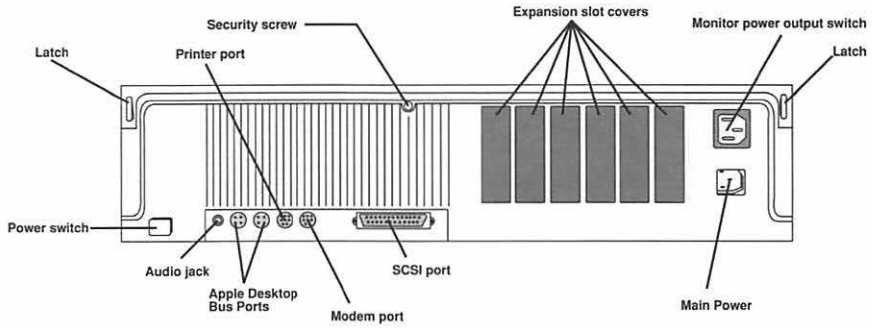
With the addition of a low-cost TTL Clock Oscillator, Spectrum/8 Series III can also operate:

- The Apple Portrait Display
- Any NTSC specification color monitor
- Any PAL specification color monitor

Note: Spectrum/8 Series III can be installed in the any of the Modular Macintosh computers: the Macintosh II, IIx, IIcx, or IIci. However, for clarity, the remainder of this manual will refer to this family of computers as the Macintosh II.

Use the following procedure to install Spectrum/8 Series III in a Macintosh II:

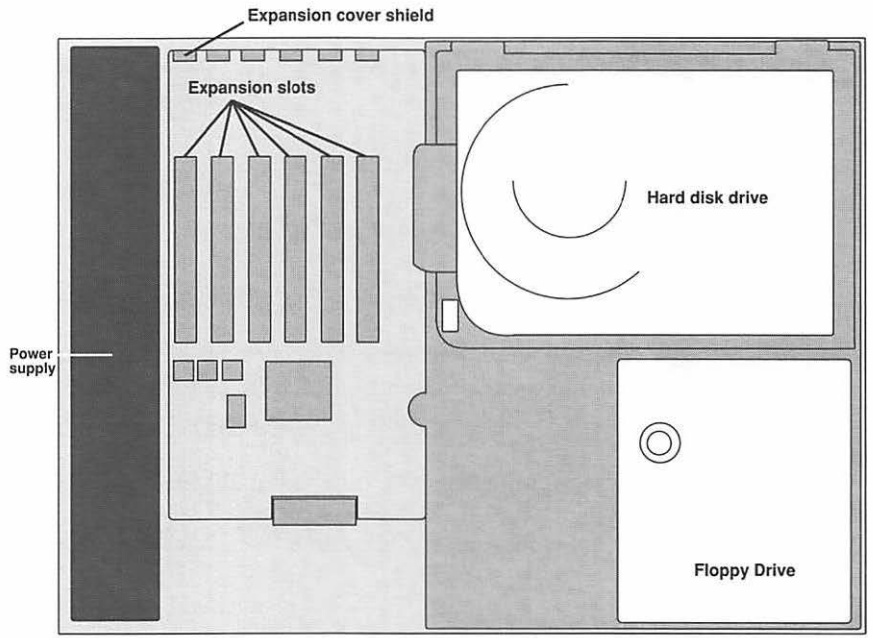
1. Shut down your Macintosh II and unplug its power cord. Also unplug the power cord for the monitor.



2. Using a Phillips screwdriver, loosen and remove the security screw from the back of the Macintosh II case.

3. Press the two latches on the back of the Macintosh II, and gently lift the cover up and away from the main computer unit. Be careful to disengage the three clips located on the front lower half of the case.

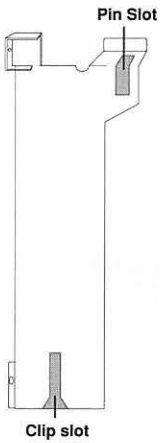
4. Touch the power supply located inside the Macintosh to discharge any static electricity that might be on your clothes or body.



Inside the Macintosh II

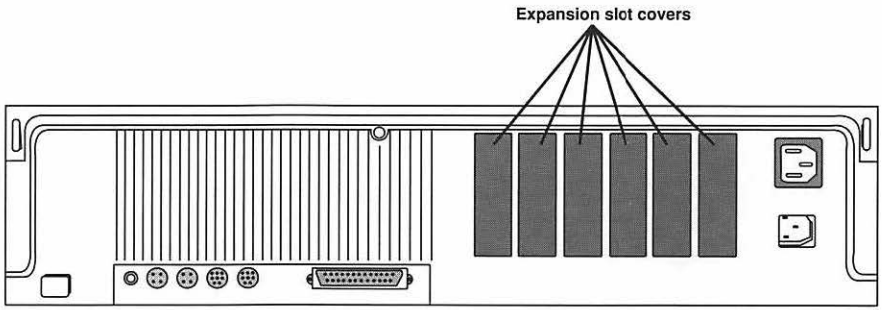
5. Select the NuBus expansion slots you want to use for Spectrum/8 Series III. The Expansion slots are narrow, plastic strips that run along the bottom on the main

computer unit. You may use any of the six slots (three on the Macintosh IIcx and IIci) for the Spectrum/8 Series III video card.



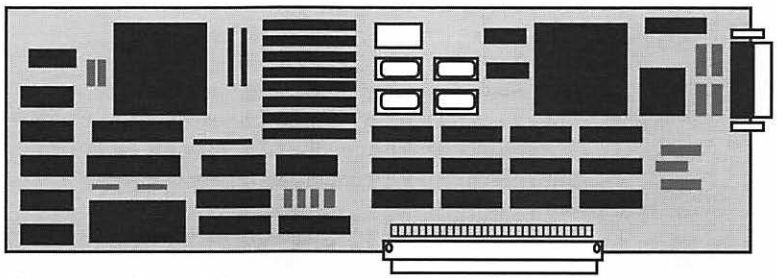
6. Remove the expansion cover shield which corresponds to the expansion slot you want to use for Spectrum/8 Series III. The cover shield is a bright metal bracket, and is located inside the main computer unit, along the back of the case. Lift the shield gently up and out of the computer, freeing it from the clip, and the pin that hold it in place. Save the shield; you will need to replace it if you remove Spectrum/8 Series III from it's slot.

7. Push out the plastic expansion slot cover located on the outside of the Macintosh cabinet. Be sure to push out the cover which corresponds to the slot where you'll be installing the video card. Grasp the cover from inside the computer, with your thumb inside and your fingers outside. Push the cover out with your thumb and put it in a Safe Place.



Back of Macintosh II

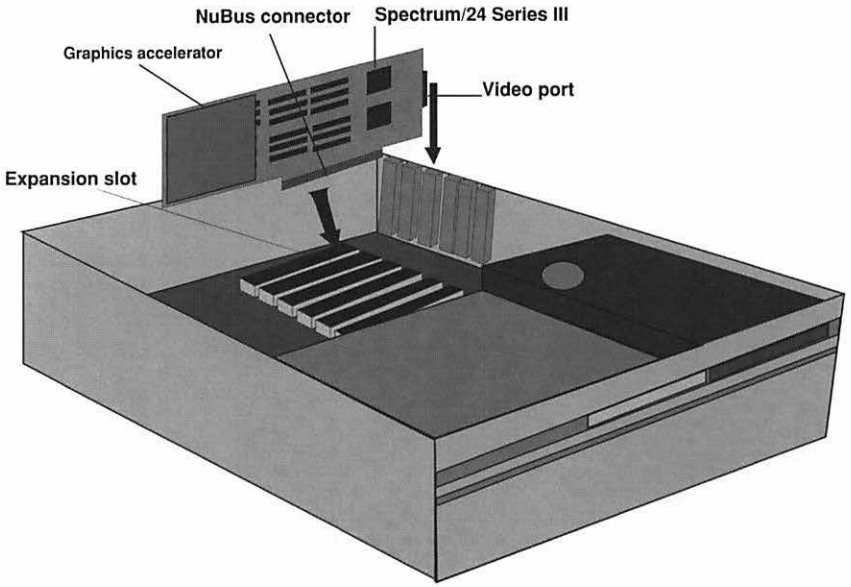
8. Grasp the Spectrum/8 Series III video card, and lift it into place over the NuBus slot. The side of the board with the chips should be facing the floppy disk drive, and the NuBus connector should be pointed down.



Spectrum/8 Series III

9. The end of the Spectrum/8 Series III card which is equipped with the video connector socket has a metal shield. This shield fits into the metal chassis of the

Macintosh II just like the shield you previously removed. Align the shield so that it slides into its guide near at the bottom, and over the locating pin at the top.



Inserting the Spectrum/8 Series III

10. Align the NuBus connector on Spectrum/8 Series III with the NuBus expansion slot on the Macintosh's main circuit board.

11. Place one hand along the top edge of the Spectrum/8 Series III video card and gently push the card into the slot until the card is fully seated in the connector.

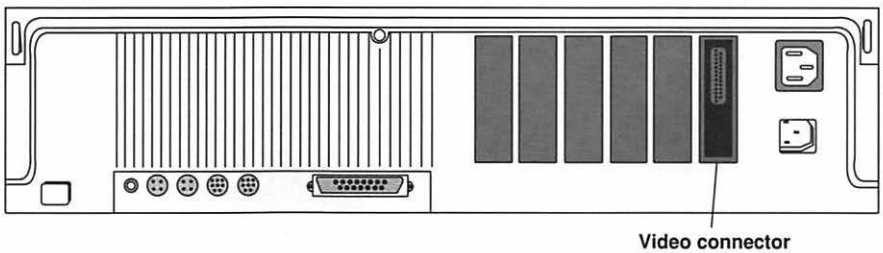
Warning: Don't force the Spectrum/8 Series III video card into place. If you are unable to properly seat the card in the connector, remove the card and try again. Don't wiggle the card back and forth while you insert it; this causes unnecessary stress on the card and the slot.

12. Locate the top cover of the Macintosh, which was removed at the beginning of this procedure. Align the front of the cover with the lower casing of the Macintosh, so that the slots on the cover match the tabs on the lower casing. Tip the top cover so that the three hooks under the lid are engaged.

13. Lower the back of the cover slowly into place, making sure is aligned with the lower casing of the Macintosh. When it's in position, press it down firmly until you hear the rear latches snap into place.

14. Locate and replace the security screw on the back of the Macintosh II case.

15. With the back of the computer facing you, locate the video connector on Spectrum/8 Series III. It should be visible protruding from the back of the slot where you installed the Spectrum/8 Series III video card.



Back of Macintosh II, showing the Spectrum/8 Series III video connector

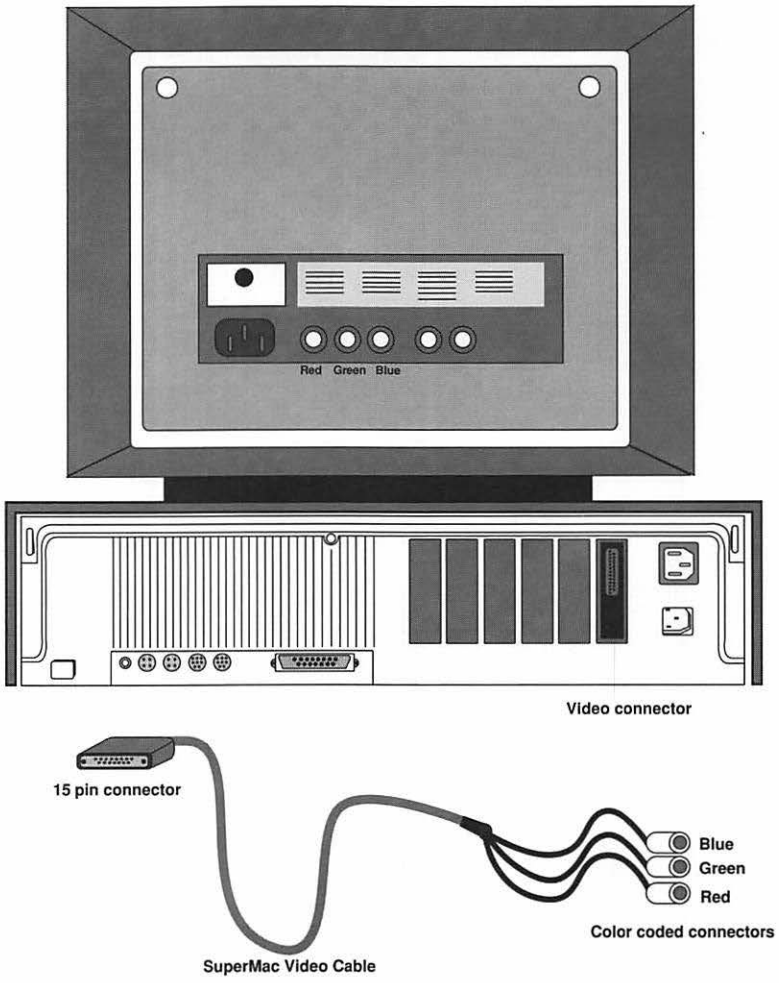
16. Locate the video cable to link the SuperMac Spectrum/8 Series III video card with your monitor. If you are using a SuperMac color monitor, this cable is supplied with the monitor. Connect the cable's 15-pin connector to the video connector protruding from the Spectrum/8 Series III video card.

17. Place your monitor next to the Macintosh II. If you want to place the monitor above the Macintosh II, it must be placed on a support stand, such as the SuperMac Tripod Stand.

    You can purchase the SuperMac Tripod Stand (part number STD 8405) from an Authorized SuperMac Dealer.

Warning: Never place the monitor on top of your Macintosh II without a stand. Monitors are big and heavy, and can cause serious damage to your Macintosh, the monitor, or both units.

18. Turn your display around so the back is facing you. The SuperMac video cable's free end has three color coded connectors. Plug each connector into its corresponding socket (e.g. plug the blue connector into the socket labeled "Blue" on the back of the monitor).



Back of Macintosh II and SuperMac Trinitron monitor

19. Plug in both your Macintosh II, and the monitor into a three-pronged, live, grounded outlet.

Important: The video cable must be shielded in order for Spectrum/8 Series III to comply with the specification for an FCC Class A computing device. All genuine SuperMac monitor cables are shielded for full compliance, as well as to minimize the chance of any radio interference. If you have any questions about the cable you intend to use for your particular installation, check with your Authorized SuperMac dealer.

Selecting a Monitor Configuration

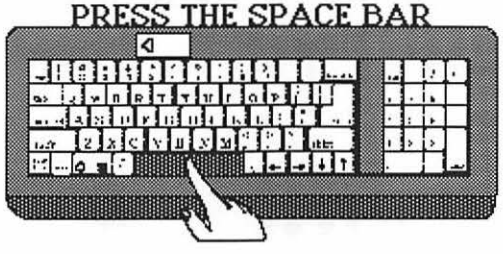
After you have set up your system, you need to tell the Spectrum/8 Series III video card which type of monitor is connected to your system. Spectrum/8 Series III supports a variety of monitors; therefore, each time you use it with a different type monitor, or remove and install Spectrum/8 Series III in a different NuBus slot, you must "configure" your system.

Use the following procedure to configure your system:

1. Turn on any devices you have connected to your system, such as hard disk drives, scanners, etc., and turn on your monitor.

2. Turn on your Macintosh. At this point, Spectrum/8 Series III will begin "cycling through" the various monitor possibilities. Each possibility will appear on the screen for a few seconds.

3. When the correct monitor configuration appears on the screen, the screen will clear, and prompt you to press the space bar to lock-in the screen configuration. This screen will appear similar to the diagram below:



4. When this screen appears, *immediately* press the space bar on the keyboard, and the Macintosh will restart to lock-in in the configuration.

   This configuration will automatically be used every time you start your Macintosh.

Note: If you do not press the space bar, Spectrum/8 Series III will continuously cycle through all the possible monitor configurations. Each configuration will be displayed on the screen for approximately 5 seconds. You can press the space bar any time the screen is clear to lock-in the correct monitor configuration.

Resetting the Configuration Sequence

If you accidentally hit the space bar before the Macintosh desktop is visible, an incorrect monitor configuration will be locked-in and used by Spectrum/8 Series III. For this sad

circumstance, you must instruct Spectrum/8 Series III to re-run the configuration sequence.

To do this, restart the Macintosh while holding down the Option key. This will force Spectrum/8 Series III to run the configuration sequence again, enabling you to select the correct configuration.

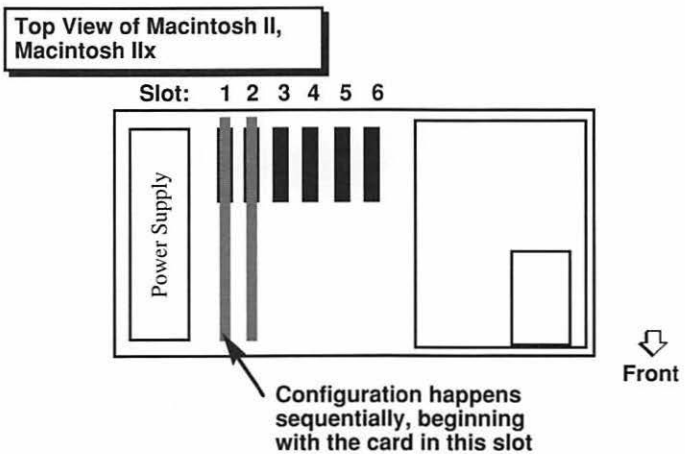
Using Spectrum/8 Series III with Multiple Monitors

Each Spectrum/8 Series III video card is designed to operate a single monitor. However, you can use multiple Spectrum/8 Series III video cards to drive multiple monitors with a single Macintosh II.

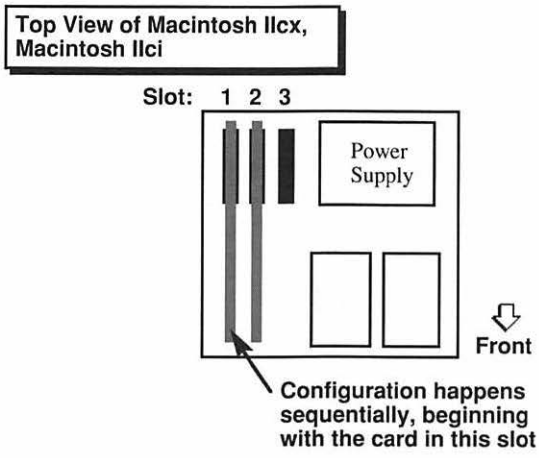
If you have more than one Spectrum/8 Series III video card installed in a single Macintosh II, then the configuration procedure must be run for each of the cards.

The Configuration Sequence

When the Macintosh is first started, the configuration sequence will begin with the video card in NuBus slot #1. For the Macintosh II and IIx, this is the NuBus slot which is *closest to* the power supply, as illustrated by the diagram below:



For the Macintosh IIcx and IIci, this is the NuBus slot which is *farthest from* the power supply, as illustrated by the diagram on the next page:

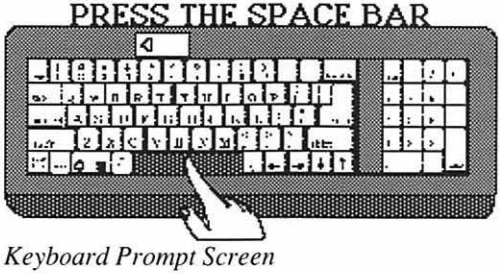


Use the following procedure to configure multiple Spectrum/8 Series III video cards which will be used with your system:

1. Install the first Spectrum/8 Series III in NuBus slot #1, and connect the monitor, using the installation procedure detailed earlier in this chapter.

2. Turn on your Macintosh. At this point, Spectrum/8 Series III will sequentially step through the monitor possibilities.

3. In a few seconds, the screen will clear, and prompt you to press the space bar to lock-in the screen configuration. This screen will appear similar to the diagram below:



Keyboard Prompt Screen

4. When this screen appears, *immediately* press the space bar on the keyboard, and the Macintosh will restart to lock-in in the configuration.

5. When the familiar Macintosh Finder appears, choose Shut Down from the Special menu.

6. Install the second Spectrum/8 Series III in NuBus slot #2, and connect the second monitor to that card.

7. Restart the Macintosh.

8. Since the first Spectrum/8 Series III has been configured, the configuration screen will be skipped for that card. In a moment, the monitor which corresponds to the second Spectrum/8 Series III video card will prompt you to press the space bar to lock-in the screen configuration.

9. Immediately press the space bar on the keyboard, and the Macintosh will restart to lock-in the configuration.

At this point, you can use the above procedure to install additional Spectrum/8 Series III video cards in your Macintosh system. Each card should be installed in the next-higher slot number to insure that it will be addressed by the monitor configuration sequence.

When you have finished installing video cards in your system, you will need to use SuperVideo to set the spatial alignment for all of the monitors. This procedure is described in detail in Chapter 4: *Using SuperVideo.*

Installing Spectrum/8 Series III to Drive an Alternate Monitor

In addition to the standard monitors supported by Spectrum/8 Series III, you can add a low-cost TTL Clock Oscillator to work with the Apple Portrait Display, any NTSC RGB specification monitor, or any PAL RGB specification monitor.

The table below lists the frequency of the oscillator required for these monitors:

Monitor:	**Oscillator Frequency:**
Apple Portrait Display	57.28 MHz
NTSC RGB color	14.31818 MHz
PAL RGB color	17.73 MHz

To obtain these oscillators, contact your authorized SuperMac dealer, or one of the sources listed in the Reference section near the end of this manual.

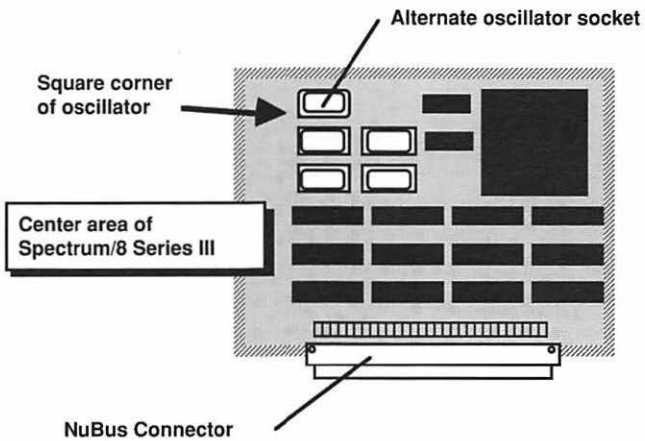
Installing the Oscillator

Use the following procedure to install the TTL Clock oscillator on the Spectrum/8 Series III video card.

1. Shut down the Macintosh II, unplug its power cord, and unplug the power cord for the monitor.

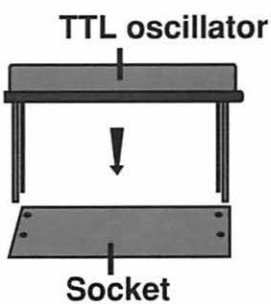
2. If Spectrum/8 Series III is installed in your Macintosh, remove it gently pulling upward, lifting the board up and off the NuBus connector.

3. Set Spectrum/8 Series III down gently on a flat surface, so that the side with the chips are facing up. Position the board so that the NuBus connector is pointing toward you. Locate the TTL Clock Oscillators on Spectrum/8 Series III: they are near the top of the video card, above the NuBus connector, as shown in the diagram below:



TTL Clock oscillators

4. The empty socket is the one nearest the top of the video card. Align the TTL Clock Oscillator over this socket so that the square corner of the oscillator is pointing toward the NuBus connector, and the four pins are over the four "holes" in the empty socket on the Spectrum/8 Series III.



Installing an oscillator

5. Gently push the TTL Clock Oscillator into the socket, making sure that all four pins are guided straight into the holes of the socket.

After you have installed your additional TTL Clock oscillator, follow the procedure at the beginning of this chapter to install the Spectrum/8 Series III video card, and configure it to work with your monitor.

With the new oscillator installed and the PAL RGB or NTSC RGB monitor connected to the system, the oscillator will be selected, in turn, during the configuration procedure.

If you follow the procedure to use multiple monitors with your Spectrum/8 Series III system, this new TTL Clock Oscillator will automatically be used as one of the monitor configurations.

Parameter RAM and NuBus Slots

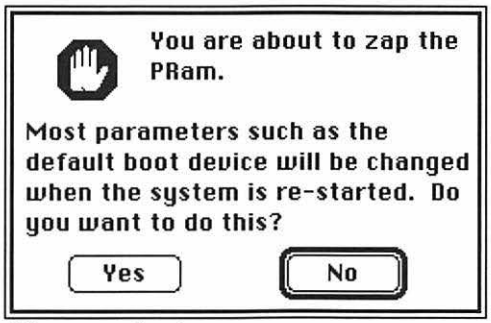
The NuBus Slots of the Macintosh are given a special area of memory (parameter RAM), where information is stored about what kind of monitor is attached to the video port. This parameter RAM is powered by a battery on the main circuit board of the Macintosh, and is therefore permanent (non-volatile) memory. In other words, the information stored in this memory is retained even if the Macintosh II is turned off or unplugged.

After you have selected the configuration which matches your monitor, the information is transferred to the parameter RAM of the Macintosh. During subsequent start-ups, the Macintosh will check this parameter RAM to determine what kind of monitor is connected, and will address the monitor appropriately.

Here are some considerations for how parameter RAM can effect the behavior of the Macintosh:

- You can change the contents of Spectrum/8 Series III's parameter RAM by using the SuperVideo Control Panel device (described in the following chapter).

- You can clear the parameter RAM for the NuBus Slot by holding down the Command-Shift-Option keys, while selecting Control Panel from the Apple menu. A dialog box will appear, similar to the diagram on the next page:



PRam zap alert box

As stated in the dialog box, if you "zap" the PRam (parameter RAM), a number of settings will change when the Macintosh is re-started. Most important is: it will clear the information about what kind of external monitor is attached to your system.

Certain types of program "crashes" can damage the information stored in the parameter RAM. This is particularly true of untested "beta" software, and of "Public Domain" software which may be outdated, or wasn't designed to be compatible with the high-speed processor of the Macintosh II.

If, for any reason, the information stored in the parameter RAM is damaged, modified, or deleted, Spectrum/8 Series III will again cycle through the various monitor configurations when the Macintosh is restarted. If this happens, simply press the space bar when the screen clears to re-configure the monitor setting for Spectrum/8 Series III.

Using SuperVideo

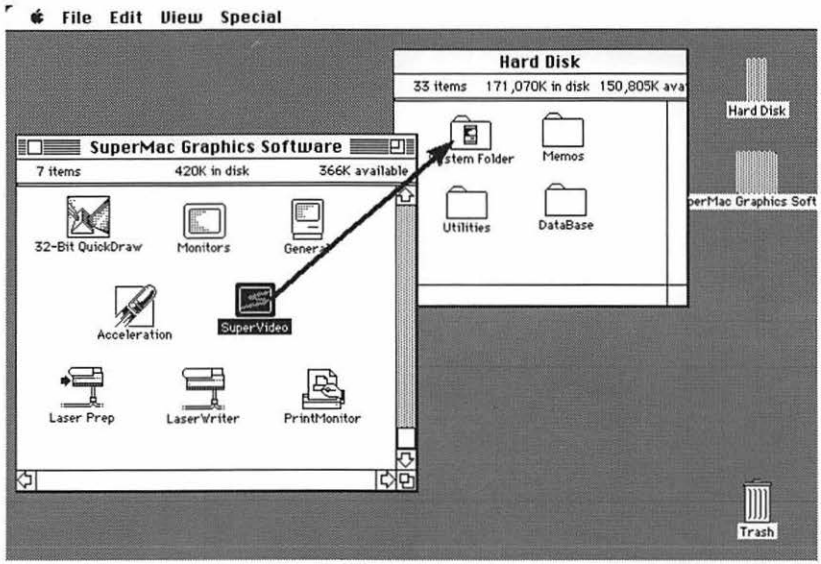
This chapter explains how to use the SuperVideo Control Panel Device: how to adjust the settings for the Virtual Desktop, and how to control the panning and zooming features incorporated in Spectrum/24 Series III.

Installing SuperVideo

In order to use SuperVideo, it must be installed in the System Folder of your startup disk.

Use the following procedure to install SuperVideo:

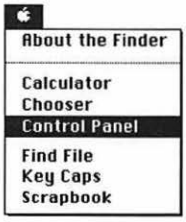
1. Start your Macintosh II system from your regular hard disk drive.
2. When the Finder appears, insert the *SuperMac Graphics Software* disk into the drive.
3. Double-click on the disk *SuperMac Graphics Software* icon to open the disk window.
4. Copy *SuperVideo* file into the System Folder of the hard disk or startup disk, as shown in the diagram on the next page:



5. Restart your Macintosh II.

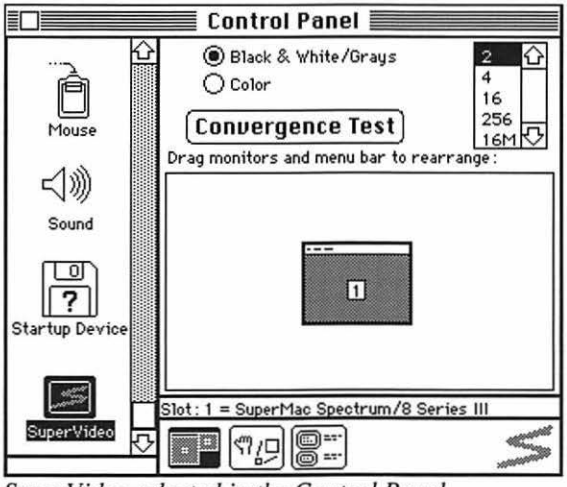
6. Store the *SuperMac Graphics Software* disk in a Safe Place in case you need it for a future installation.

Note: Some color graphics applications (such as SuperMac's *PixelPaint Professional*) are designed for 24-bit Macintosh systems — but can also be used in 8-bit mode on Spectrum/8 Series III. For these applications, you must also install the 32-bit QuickDraw file into your System Folder. Consult the user's manual supplied with the application to see if the 32-bit QuickDraw file is necessary.



Using SuperVideo

In order to use SuperVideo, choose Control Panel from the Apple menu, and select the SuperVideo icon by clicking on it. Control Panel Devices are listed alphabetically. Therefore, SuperVideo will be located near the bottom of the list, similar to the diagram below:

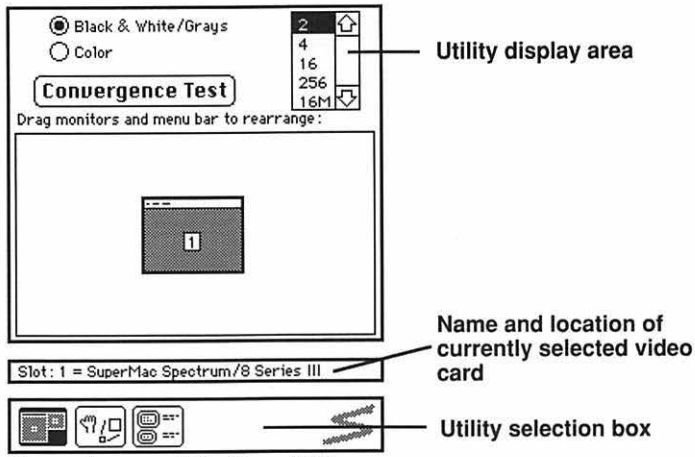


SuperVideo selected in the Control Panel

When you select the SuperVideo icon, a screen will appear on the right side of the Control Panel window. This screen is very similar to the screen you see when you select the "Monitors" Control Panel Device. However, the difference between the two is that the SuperVideo screen includes a series of utility buttons that control the special features available with Spectrum/8 Series III video card.

Monitor Utilities

The SuperVideo Control Panel Device (cdev) operates like a miniature Control Panel. The lower portion of the SuperVideo screen has a Utility selection box, with a series of icon buttons that enable you to select various special utilities. SuperVideo contains four utilities, which are described in the following section.



Control areas of the SuperVideo screen

Control Utility. Enables you to select parameters for the display that is connected to the Spectrum/8 Series III. The Control Utility enables you to choose between black and white and color output, choose the number of colors that are displayed, and perform a convergence test (if you have a color display). If you have two displays connected to your system, the Control Utility also enables you to choose which monitor will display the Apple menu bar, and to adjust the spatial alignment of the two monitor screens.

Options Utility. The Options utility enables you to choose a Virtual Desktop size for your display, as well as enable or disable the Zoom-In, Home Cursor, Dialog Centering, Hand Panning, and Menu Bar Lock utilities. You can also modify the special key sequences that are used to activate these utilities.

Monitor Configuration Utility. This utility enables you to use SuperVideo to configure the older series of SuperMac Spectrum video cards, such as Spectrum/8 Series II. For complete information about using the Monitor Configuration Utility, refer to the owner's manual supplied with that video card.

"About..." Utility. This utility is equivalent to the About... option normally found under the Apple menu. By clicking on this button, a description of SuperVideo appears, in addition to information about the version of SuperVideo you are using, and pertinent copyright information.

Note: If you are using a brand other than a genuine SuperMac video card, you won't be able to take advantage of all four of the SuperVideo monitor utilities. These utilities are designed specifically to control functions of SuperMac video cards, such as Spectrum/8 Series III.

If a SuperVideo monitor utility is available for the currently selected video card, the icon for the utility will have a normal appearance. If a utility *cannot* be used by the currently selected video card, the icon for that utility will be dimmed. When a particular utility is in use, its icon will be blackened (selected).


Normal: available


Dimmed: unavailable


Blackened: in use

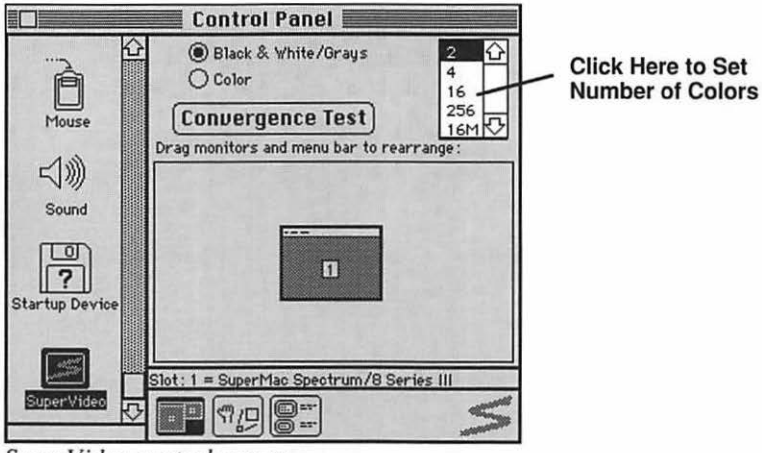
Control Utility

The SuperVideo Control Utility is a lot like Apple's Monitors cdev which is available from the Control Panel. The SuperVideo Control Utility performs five functions on the Macintosh II:

- Enables you to set which mode you want to use with each monitor you have connected to your system, and the number of colors (or shades of gray) that are displayed.
- Enables you to identify which slot(s) in your Macintosh are currently being used for video card(s).
- Allows you to perform a screen convergence test on your color monitor.
- Lets you adjust the spatial alignment of the monitors if you are using a multi-monitor Macintosh II system.
- Enables you to select which monitor (on a multi-monitor system) will display the Menu Bar.

Choosing the Number and Type of Display Colors

While the Control Utility is selected (highlighted in black), a box appears that enables you to set the number colors, or shades of gray that is displayed by the selected external monitor. You can select either 1 bit, 2-bit, 4-bit, or 8-bit,which corresponds to 2, 4, 16, or 256 colors or shades of gray.

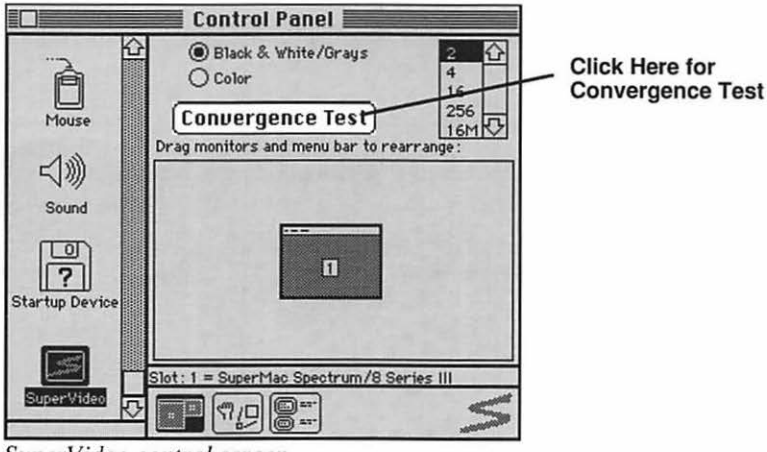


SuperVideo control screen

To change these settings, first click on the image of the monitor you want to set in the SuperVideo screen, then set the number of colors and/or grays from the top of the Monitor Utility display area. These changes will take effect immediately.

Convergence Test

The Convergence Test button is used to check the internal alignment settings on color monitors. When you select the Convergence Test button, the screen will appear black, with a grid of fine white lines. If the convergence is correct, the lines on the screen should appear to be pure white. If they aren't pure white, or if there's a color fringing at the edges of the lines, the monitor should be aligned by your dealer.



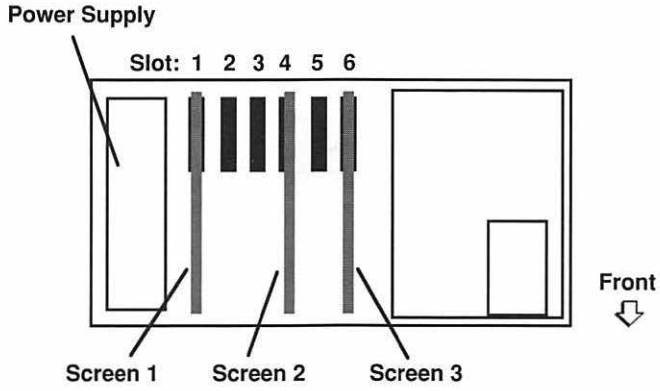
SuperVideo control screen

Choosing a Monitor with SuperVideo

The center of the Control Utility contains a scaled down icon of the each display connected to your system. If more than one video card and monitor are connected, an icon representing the size and location of the display will appear in the center of the SuperVideo control screen.

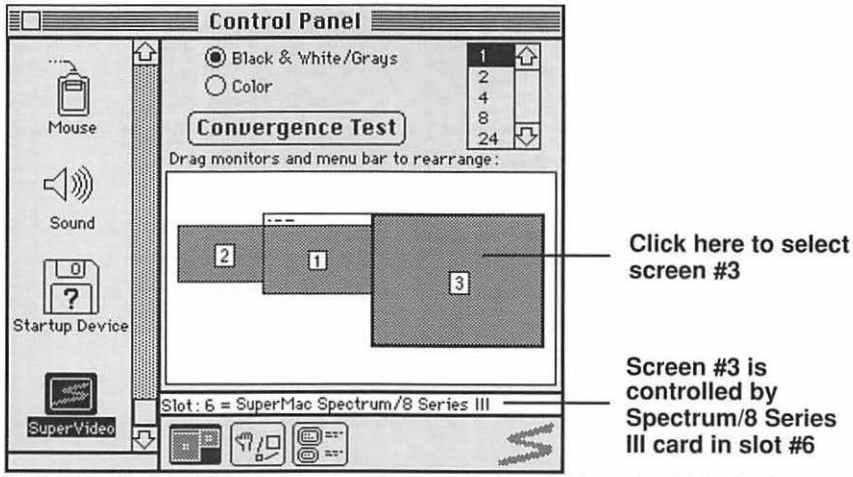
Each miniature screen icon is numbered beginning with 1. The number in the screen corresponds to the location of the video card in the Macintosh II. The Macintosh numbers video cards from left to right (from slot 1 to slot 6); therefore screen number 1 corresponds to the video card that is the closest to the power supply — which may or may not be in slot number one.

For example, the diagram below illustrates a top view of a Macintosh II with three video cards — installed in slots 1, 4, and 6. The video card in slot 1 would become screen 1; the card in slot 4 would become screen 2, and the card in slot 6 would become screen 3:



Screen numbers for video cards in slots 1, 4, and 6

Using the above example, when the Macintosh II was started, and SuperVideo selected from the Control Panel, a screen similar to the diagram on the next page would appear:



Using the Control Utility to select Screen #3, installed in slot 6 (the farthest right)

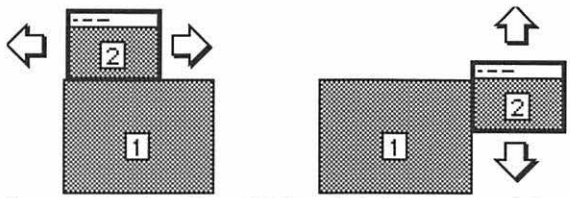
To change the location or number of colors/levels of gray for a particular video card, click on the icon that represents the screen you want in the SuperVideo control screen. The diagram above depicts selecting screen 3. When a screen is selected, its outline will be framed with a thick black border. The card's slot position, and type of video card will be listed immediately below the Monitor Utility display area.

Setting Spatial Alignment

SuperVideo makes it easy to adjust the spatial alignment for all monitors connected to your Spectrum/8 Series III system. It is desirable to have the screen alignment in SuperVideo match the physical position of your monitors. When the displays are correctly aligned, the cursor will make a smooth transition when it moves between monitors.

For a multiple-monitor Macintosh II system, you can use any other video card along with your Spectrum/8 Series III: 24-bit cards, monochrome cards, or any combination of these cards. The color monitor connected to Spectrum/8 Series III will always be able to display up to 256 colors.

To align the screens connected to your system using SuperVideo, click on the image of the screen you want to adjust and drag it to the desired height/position. Screens can be positioned beside one another, or above and below one another, as shown in the diagram on the next page:



Screens can be aligned left and right, or up and down with respect to other screens

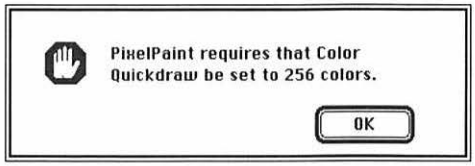
At some point, you may run out of room to reposition a screen within the Monitor Utility display area. Hold down the option key while you drag a particular monitor icon and all the screens will move as a group.

Moving the Menu Bar

For a multi-monitor Macintosh system, you can assign the Menu Bar to appear at the top of any monitor. To move the Menu Bar to a different display, click *precisely on the image of the Menu Bar*, and drag it to the new location. When you release the mouse button, the menu bar will "snap" to the upper edge of the new screen. Restart your Macintosh for the change to take effect.

The monitor with the menu bar will automatically become the "startup screen"; that is, the screen which will display the smiling Macintosh face, and the "Welcome to Macintosh" message when the computer is first started.

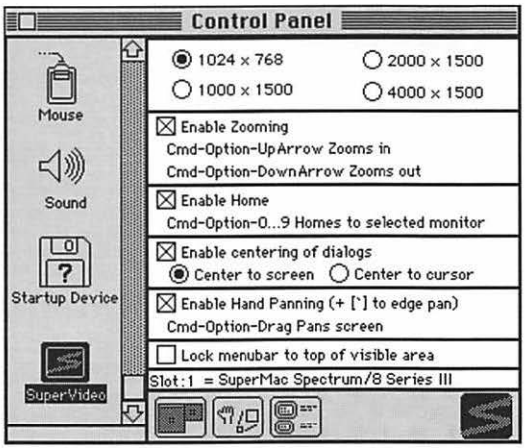
Important: With a color Macintosh system, most color software requires that the menu bar be assigned to a color monitor. For example, SuperMac's PixelPaint 2.0 requires that the screen with the menu bar be a color monitor, and that the monitor be set for 256 colors. If a monochrome monitor is set for the menu bar, PixelPaint will refuse to launch — displaying a dialog box similar to the diagram below:



Options Utility

The Options Utility is only available when a display which corresponds to a Spectrum/8 Series III video card has been selected (highlighted) in the SuperVideo control screen.

Select the Options Utility button from the bottom of the SuperVideo control screen. You should see a screen similar to the illustration below:



The SuperVideo Options Utility screen

The Options Utility enables you to control the special display features available with Spectrum/8 Series III — particularly, how the Virtual Desktop is addressed.

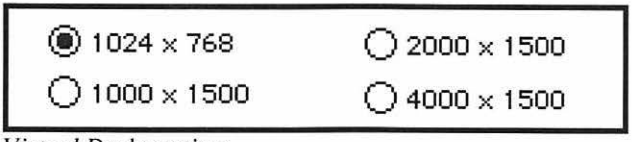
The following section describes these features, and how to make the most of these features while you are using various applications.

Virtual Desktop Size

The Spectrum/8 Series III is capable of generating a workspace much larger than the actual dimensions of the display. Ordinary video cards that are available for the Macintosh II operate monitors on a 1:1 basis. In other words, if the external monitor displays 640 by 480 pixels (AppleColor monitor), the video card will generate a 640 by 480 pixel workspace.

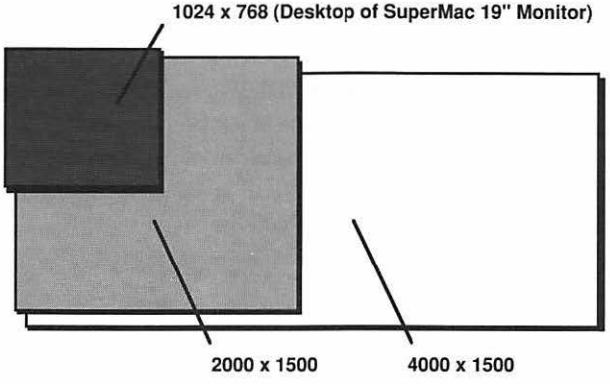
Spectrum/8 Series III differs in that a large workspace — the Virtual Desktop — can be created, and stored in video memory on the video card. A portion of the Virtual Desktop is sent to the display, making the monitor a "window" into the larger workspace.

At the top of the Options Utility screen there are a series of control buttons which correspond to the Virtual Desktop sizes that are available.



Virtual Desktop sizes

The smallest size, 1024 by 768, corresponds to the display area of the SuperMac 19" displays (both color and monochrome). The larger sizes, up through 4000 x 1500 make it possible to work with large documents or graphics, displayed *actual size* on the Virtual Desktop.



Comparison of Virtual Desktop Resolutions (to scale) available with Spectrum/8 Series III

Note that you cannot select a Virtual Desktop size which is smaller than the display area of your monitor system.

Since larger Virtual Desktops are calculated and stored in the video memory of the Spectrum/8 Series III, a large Virtual Desktop will mean that you will be able to display fewer colors (or shades of gray). The chart below compares the various Virtual Desktop sizes, and the maximum number of colors (or shades of gray) available for each size:

Virtual Desktop:	Colors/Grays Available:
1024 x 768	256
1000 x 1500	16
2000 x 1500	4
4000 x 1500	2

Colors/Grays available with the various Virtual Desktop sizes

When a Virtual Desktop is selected which is larger than your selected display, you can access the extra space by using one of Spectrum/8 Series III's three Panning modes: Free Panning, Hand Panning, or Edge Panning.

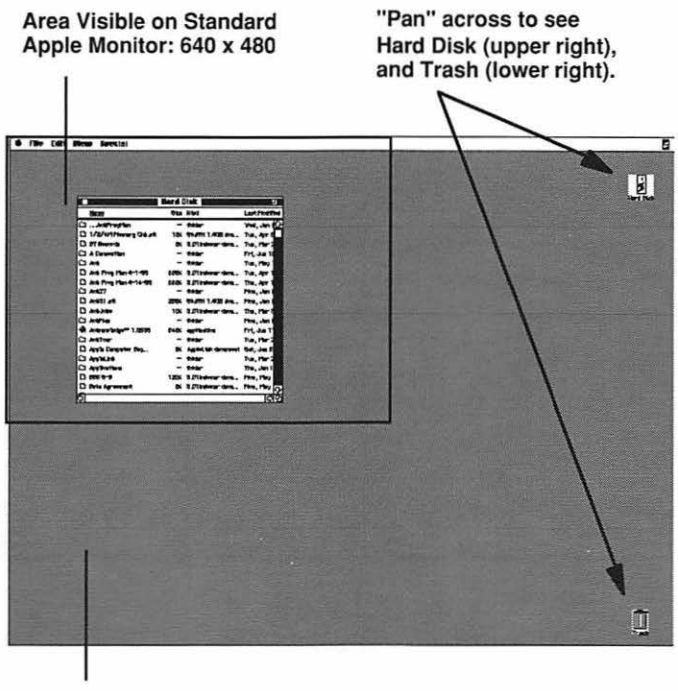
The area you select for the Virtual Desktop, and the combinations of Panning features you employ, should reflect the kind of work you do with your Macintosh.

Free Panning

Free Panning is the default selection for the Spectrum/8 Series III: that is, the Panning feature which is activated when no other Panning options are selected.

With Free Panning is selected, when the mouse cursor reaches the edge of the screen, the image on the screen scrolls to reflect the movement of the mouse.

The diagram below illustrates the Free Panning feature for a Virtual Desktop of 1000 x 768, viewed on a standard Apple 640 x 480 monitor. The image that would appear on the Apple display is contained within the black box in the upper right hand side of the diagram. The rest of the screen is the area corresponds to the Virtual Desktop. The icons for the hard disk drive and the Trash will be off in the corners of the Virtual Desktop, as shown in the diagram on the next page:



In the example illustrated above, by moving the mouse to the right, and down, using Free Panning, you will be able to scroll across the screen to reveal those areas of the Virtual Desktop that were previously hidden.

Free Panning feature works with all Macintosh applications which recognize a large screen. Using a graphics application, for example, you can define a large drawing area, begin drawing a line, and have that line continue across the document into other areas of the Virtual Desktop. With graphics applications that employ a "paint bucket" for fill effects, those fill effects will apply *to all areas of the Virtual Desktop* — even the areas not immediately displayed.

Locking the Menu Bar to the top of the screen

When you are working in a far corner of a document using a large Virtual Desktop, locating the Menu Bar, and activating the pull-down menus can be less than convenient. Spectrum/8 Series III enables you to "lock" the Menu Bar to the top of the screen. With the Menu Bar locked, it will always appear at the top of the screen — regardless of where the screen is with respect to the Virtual Desktop.

However, locking the Menu Bar disables the Free Panning feature of the Spectrum/8 Series III. When you have the Menu Bar locked, you can access the entire area of the Virtual Desktop by using the Hand Panning and Edge Panning features.

The chart below describes how the panning features interact in SuperVideo:

Panning Options:	Free Pan	Hand Pan	Edge Pan
No Options Selected	Yes	No	No
Enable Hand Pan	Yes	Yes	Yes
Lock Menu Bar	No	No	Yes
Enable Hand Pan and Lock Menu Bar	No	Yes	Yes

Hand Panning

When you are working with a large Virtual Desktop, there may be times when it is inconvenient to move the cursor to the edge of the screen to activate the Free Panning feature. For example, when you are working with a large spreadsheet, you may need to enter data in cells just past the edge of the visible area of the screen.

The Hand Panning option is ideal for this situation. To activate the Hand Panning feature, hold down the Command and Option keys while clicking the mouse button. The cursor will change into a miniature "hand" symbol, which enables you to reposition the screen.

With the Command and Option keys depressed, hold down the mouse button, and drag the mouse to reposition the screen. Hand Panning can be used to reposition the screen view anywhere within the limits defined by the Virtual Desktop.

Edge Panning

Edge Panning works exactly like the standard Free Panning mode of the Spectrum/8 Series III — except that it can be activated when the Menu Bar is locked to the top of the screen.

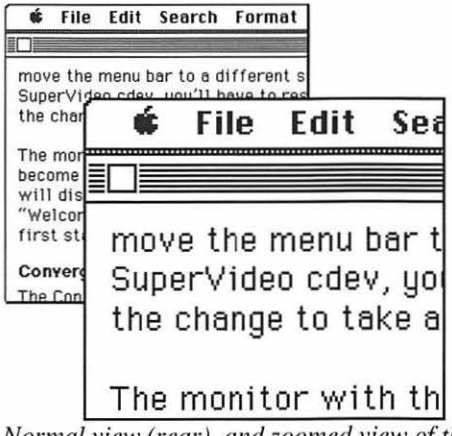
With the Menu Bar locked, Edge Panning is activated by holding down the Command-Option-` (tilde) keys at the same time (the tilde key is to the left of the space bar on the Apple Standard Keyboard, and in the upper-left corner of the Extended Keyboard). With these three keys held down, you will be able to pan freely across the entire Virtual Desktop, when the mouse cursor nears the edge of the screen

Tip: When activating Edge Panning, be sure to hold down the Command and Option keys first, and then hold down the tilde key: if the tilde key is hit first, Edge Panning may not be activated.

Zooming

When the monitor is set to 256 colors, Spectrum/8 Series III's zooming feature allows a "close up" view of any portion of the screen (or Virtual Desktop). This feature is similar to the "Fat Bits" view offered by several Macintosh graphics applications. Zooming is available with any application — including the Finder.

The Zooming feature is activated by pressing the Command and Option keys while pressing the up arrow key on the keyboard. The screen will zoom in to the area around the cursor. This will also activate the Free Panning feature — regardless of the size of the Virtual Desktop you have specified.



Normal view (rear), and zoomed view of the screen

When Zooming is activated, you still have full control of your Macintosh: you can edit text, work with any graphics tools, enter numbers from the keypad, cut, copy, and paste, or choose any selection from the pull-down menus.

You may find the Zooming feature most useful with graphics applications — whether or not those applications provide their own "close up" views of a document. Since Spectrum/8 Series III's Zooming feature is hardware-based, it's extremely fast — much faster than software-based close-up views. In addition, Spectrum/8 Series III's Zooming feature is always just a keystroke away — you don't have to click on special tools, or make remote menu selections.

If the Zooming is activated when the Menu Bar is locked to the top of the screen, the Free Panning feature will be disabled. In order to move across a large Virtual Desktop, activate the Edge Panning feature by holding down the Command-Option-` keys to pan to other regions while you are in the zoomed-in view.

Homing the Cursor

With a multi-monitor Macintosh system, it is sometimes difficult to keep track of the cursor. Spectrum/8 Series III's cursor Homing feature enables you to instantly locate the cursor to the upper-left corner of the viewable area on any active screen.

In order to keep from moving the cursor to a corner of the screen that is not visible, the Homing feature positions the cursor at the upper-left corner of the screen — *not* at the upper-left corner of the Virtual Desktop.

To Home the cursor to a particular screen, hold down the Command and Option keys, and use the numeric keypad to select a screen number (for more information about screen numbering, please refer to the beginning of this section). For example, to Home the cursor on screen number 1, press Command-Option-1.

Note that the numbers used for the Homing feature correspond to the *screen numbers*, rather than slot number where a particular card is installed. The screen numbers are those displayed in SuperVideo's Control screen Utility.

Dialog Management

The Enable Centering of Dialogs feature is designed to make it easier to deal with dialog boxes — for both large screen monitors, and for large Virtual Desktops.

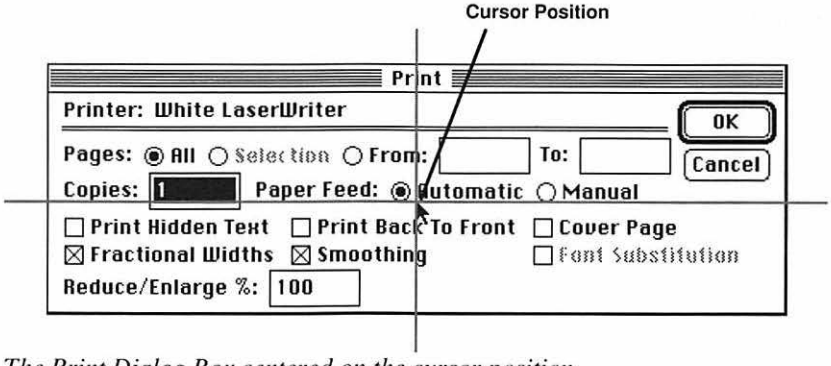
Dialog boxes — such as the boxes which appear to select print options, search for a word, etc. — are usually designed to appear in a *specific area* of the Macintosh screen. When working with a large Virtual Desktop, this can be particularly annoying: dialog boxes

may appear up near the menu bar while you're working in the lower right corner of the Virtual Desktop.

With the Enable Centering of Dialogs feature selected in the Options Utility screen, you can select where the dialog boxes will appear — in the center of the screen, or centered around the current cursor position.

If you have chosen to have dialog boxes centered on the screen, they will appear in the center of your monitor screen — *not* in the center of the area defined by the Virtual Desktop.

If you have chosen to have dialog boxes centered around the cursor position, they will appear with the center of the dialog box around the present location of the mouse cursor. This is usually the more convenient arrangement: since dialog boxes always require clicking on check boxes or buttons. Having these boxes centered on the cursor location means the mouse is already in position to select options.



The Print Dialog Box centered on the cursor position

Experiment with both settings to see which method of centering is easiest for the kind of Macintosh applications you use.

Note: The Enable Centering of Dialogs feature works with *most* dialog boxes. Certain software applications can bypass Spectrum/8 Series III's centering commands, forcing the dialog boxes to appear at some specific location.

Changing the Hot Keys

Many of the features in the Options Utility screen are activated with a combination of keystrokes, or "Hot Keys." These Hot Keys have been carefully chosen so that they don't conflict with shortcut keys most commonly used by most Macintosh applications (such as Command-P to activate printing).

However, it's inevitable that — at some point, with some application — a conflict will occur. In other words, when you don't expect it, the Hot Keys that are used to activate a Spectrum/8 Series III feature will perform some other function in a particular application.

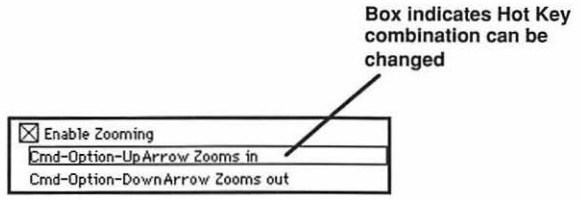
Therefore, SuperVideo enables you to re-define the keys which activate the features in the Options Utility screen.

To change the Hot Key definition for any Options Utility, use the following procedure:

1. Select SuperVideo from the Control Panel.

2. Click on the Options Utility button from the Monitor Utility selection screen.

3. Click on the definition (the actual words) of the Hot Key for a particular feature. A box will appear around the definition, indicating it's selected to be changed. The diagram on the next page depicts selecting the Hot Key which is used to enable the Zooming utility:



4. Press the combination of keys you want to use to activate the feature on the keyboard. While Holding down the desired Hot Key combination, hit the space bar to lock-in your selection.

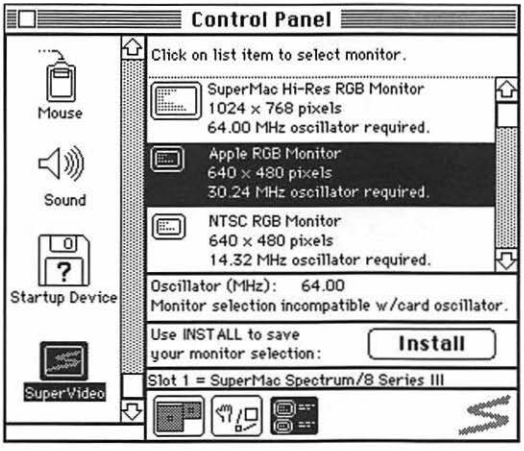
   When the new Hot Key combination is locked-in, a description of your new Hot Key will appear in the box. For example, if you re-assigned the Zooming feature to be activated by pressing the Command, Shift, Option, Control and Up-Arrow keys, the box would show "Cmd-Shift-Option-Ctrl-Up Arrow Zooms in."

Important: If you're using an Apple Extended Keyboard with your Macintosh, be aware that the Function keys (the row of keys at the top of the keyboard) can't be used to define "Hot" key combinations.

Monitor Configuration Utility

The Monitor Configuration Utility is provided so that SuperVideo can be used to configure previous versions of SuperMac Spectrum video cards.

When you click on the Monitor Configuration Utility, the Monitor Configuration Window will appear, similar to the diagram below:



For complete information about using the Monitor Configuration Utility, refer to the owner's manual which was supplied with your SuperMac Spectrum video card.

"About..." Utility

The "About..." Utility displays information about the revision level of SuperVideo. Activating the "About..." Utility will show which video cards are compatible with SuperVideo, the version number of SuperVideo, and, in the future, other information which may pertain to configuring the Spectrum/8 Series III for a particular monitor.

The SuperVideo Control Panel Device "About..." Screen

Reference

This chapter contains additional technical information which relates to your Spectrum/8 Series III. It begins with a troubleshooting section, followed by sections which contain information about TTL Clock Oscillators, and cabling considerations for the various monitors which can be used with Spectrum/8 Series III.

Troubleshooting

This section discusses some common problems encountered when using Spectrum/8 Series III. If you are unable to solve a problem yourself, contact your authorized SuperMac dealer, or call SuperMac Technical Support at (408) 245-0646 for assistance.

Problem: *The screen image flickers, and is unreadable. However, every few seconds, the screen becomes clear, and an image of a keyboard appears.*

Solution: Either Spectrum/8 Series III was never configured for the monitor that it's trying to work with, or the information about the monitor stored in the Macintosh's parameter RAM has been damaged. Either way, Spectrum/8 Series III must be configured for the monitor you're working with. Press the space bar when the image of the keyboard appears. If you're unsure about the configuration procedure, refer to Chapter 3: *Installing Spectrum/8 Series III*.

Problem: *I've installed the TTL Clock Oscillator to use Spectrum/8 Series III with the NTSC RGB (or PAL RGB monitor), but the screen never becomes clear and readable during the installation procedure.*

Solution: The TTL Clock Oscillator may be installed upside-down. Check to make sure that the square corner of the oscillator is installed with its square corner pointing down, toward the NuBus connector. Also, check to make sure that all four of the pins for the TTL Clock Oscillator are seated in the socket on Spectrum/8 Series III — that one of the pins isn't bent out, and not seated in

the socket. Finally, the TTL Clock Oscillator may be defective, or it may not be the correct frequency for the monitor you're working with.

Problem: *After installing Spectrum/8 Series III and trying the installation procedure, nothing appears on the monitor.*

Solution: Check to make sure that Spectrum/8 Series III is firmly seated in its NuBus slot within the Macintosh. If so, remove Spectrum/8 Series III, and inspect the pin connectors on the bottom of the NuBus connector: one, or more of the pins may be bent or otherwise damaged. If any of the pins are damaged, Spectrum/8 Series III must be returned to SuperMac for repair. Contact SuperMac Technical Support at (408) 245-0646 for information about returning the card and having it repaired.

If all the pins on the NuBus connector are okay, check to see that the video cable is firmly seated in both the port on the back of Spectrum/8 Series III, and on the back of the monitor. If the cable is properly connected, it could be that the cable itself is defective.

TTL Clock Oscillators

TTL Clock Oscillators are available from a variety of sources, and will cost about $5.00 with shipping and handling. Be sure to specify the exact frequency, and be sure to make it clear that you need a *TTL Clock Oscillator Module*, rather than a simple crystal oscillator (such as those used in CB radios and police scanners). If you can't locate the TTL Oscillator Module you need locally, try it from one of the following sources:

Fry's Electronics
541 Lakeside Drive
Sunnyvale, CA 94086
(408) 733-1770

Halted Specialties
3500 Ryder St.
Santa Clara, CA 95051
(408) 732-1573

Quement's Electronics
1000 S. Bascom
San Jose, CA 95128
(408) 998-5900

Cal Crystal Labs
1- (800) 333-9825

NTSC and PAL Encoders

Using Spectrum/8 Series III to output NTSC signals for devices such as video cassette recorders requires the appropriate oscillator, and an NTSC encoder (which converts RGB output into composite video signal). If single monitor operation with just NTSC or PAL output is desired, then no additional cable should be required.

Important: Be aware that the Spectrum/8 Series III video card *does not* produce pure "broadcast-standard" output, but does produce high-quality, NTSC-compatible output which should be suitable for most applications.

The Spectrum/8 Series III Color Display Signal

When the SuperVideo (or Apple "Monitors") control panel device has been set for color output, Spectrum/8 Series III will produce four signals: red display signal, blue display signal, green display signal mixed with a sync signal, and a sync signal. The red, blue, and sync signals are output on the red, blue, and sync pins of the video card connector. The green signal is mixed with the sync signal and output on the green pin. Mixing the green and sync signals allows Spectrum/8 Series III to be used with a wider variety of monitors.

When the SuperVideo (or Apple "Monitors") control panel device has been used to select black and white output, the video card will produce two signals: a luminance display signal and a sync signal. The luminance signal specifies which shade of gray best represents a color as shown on a color display. The luminance signal is output on the red and blue pins. The sync signal is output on the sync pin, and is also mixed with the luminance signal and output on the green pin.

Monitor Types Compatible with Spectrum/8 Series III

The following monitor types are directly compatible with the display signal generated by the Spectrum/8 Series III video card:

- Non-Composite RGB Color Monitor
  Non-Composite NTSC RGB Color Monitor
  Non-Composite PAL RGB Color Monitor
  Composite Monochrome Monitor
  Non-Composite Monochrome Monitor

The following paragraphs describe how a Spectrum/8 Series III color video card may be used with these various monitor types. (Note: Although the Spectrum/8 Series III color display signal is directly compatible with the input signal required by these monitors, special video cables and oscillators may be required.)

Non-Composite RGB Monitor
Attach the red, green, and blue connectors on the Spectrum/8 Series III color video cable to the corresponding red, green, and blue monitor inputs. Note that the presence of sync information in the green display signal will not disturb your monitor. All of SuperMac's color monitors are non-composite RGB monitors.

Non-Composite Monochrome Monitor
Use the SuperVideo (or Apple "Monitors") control panel device to select black and white output. Attach either the red, green, or blue connector from the Spectrum/8 Series III

color video cable to the monitor display-input connector. Attach the Spectrum/8 Series III video sync connector to the monitor sync-input connector.

Composite Monochrome Monitor
Use the SuperVideo (or Apple "Monitors") control panel device to select black and white output. Attach the green connector from the Spectrum/8 Series III video cable to the monitor signal-input connector. The Apple Monochrome monitor is a composite monochrome monitor (you can also connect the cable provided with the Apple monitor directly to the Spectrum/8 Series III).

Non-Composite NTSC RGB Color Monitor
Install a NTSC oscillator in your Spectrum/8 Series III color video card. Connect the red, green, and blue connectors on the Spectrum/8 Series III video cable to the corresponding red, green, and blue inputs on the monitor.

Display Signal Conversion

The section below describes how to convert a Spectrum/8 Series III color display signal to a signal which is appropriate for monitors/receivers which are not compatible with the standard output signal:

Non-Composite NTSC Color Monitor
Attach the three Spectrum/8 Series III video display connectors to the corresponding color-input connectors of an NTSC **color encoder**. If the encoder output is a composite signal, connect the output cable directly to the monitor signal-input connector. Otherwise, use a hybrid coupler or mixer to connect the color-encoder display and sync output cables to the monitor signal-input connector.

Monochrome Receiver
Use the SuperVideo (or Apple "Monitors") control panel device to select black and white output. Attach the green display connector on the Spectrum/8 Series III color video cable to the input connector of an RF modulator for the selected TV channel. Connect the RF-modulator output cable to the receiver signal-input connector.

NTSC Color Receiver
Attach the three input-signal connectors on the Spectrum/8 Series III color video cable to the corresponding color-input connectors of an NTSC color encoder. If the encoder output is a composite signal, connect directly to an RF-modulator input connector for the selected TV channel. Otherwise, use a hybrid coupler or mixer to connect the color-encoder display and sync output cables to the input connector of an RF-modulator for the selected TV channel. Attach the Spectrum/8 Series III color video outputs to the inputs of the corresponding color drive amplifiers.

Where to Find More Help

If you are unable to solve a problem yourself, contact your authorized SuperMac dealer, or call SuperMac Technical Support at (408) 245-0646 for assistance. You can call Monday through Friday from 7:00 a.m. to 5:00 p.m. (Pacific time).

SuperMac also maintains a bulletin board with the latest information about SuperMac products, and the latest software updates. You are invited to post questions about SuperMac software and hardware products, and pass along tips and shortcuts you've found while using our products. The bulletin board supports 300/1200/2400 baud, and is on-line 24 hours a day. The number to call is (408) 773-4500. Your modem should be set to 8 data bits, no parity, 1 stop bit, and full duplex (8-N-1-FULL).

Federal Communications Commission Notice

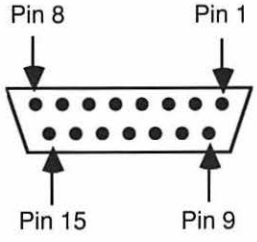
Warning: This equipment generates and uses radio frequency energy, and if not installed and used properly, that is, in strict accordance with the manufacturer's instructions, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device, pursuant to the specifications in Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment.

Operation of this equipment in a residential area is likely to cause interference in which case the user, at his own expense, will be required to take whatever measures may be required to correct the interference.

If necessary, the user should consult the dealer or an experienced radio/television technician for additional suggestions. The user may find the following booklet prepared by the Federal Communications Commission helpful: "How to Identify and Resolve Radio-TV Interference Problems." This booklet is available from the U.S. Government Printing Office, Washington, DC 20402, Stock No. 004-000-00345-4.

Important: This product was FCC-certified under test conditions that included use of shielded cables and connectors between system components. Genuine SuperMac video cables are shielded to comply, as per the test. It is important that you use shielded cables and connectors to reduce the possibility of causing interference to radio, television, and other electronic devices.

Video Port Specifications



Close Up of the Spectrum/8 Series III Video Port

Pin	Function
1	Ground
2	Red video
3	C sync
4	Ground
5	Green video
6	Ground
7	V sync
8	H sync
9	Blue video
10	Reserved
11	Ground
12	Green video
13	Ground
14	Ground
15	Reserved

cdev: Abbreviation for Control panel DEVice. When you choose "Control Panel" from the Apple menu, the Control Panel will search through he System Folder looking for files of type "cdev." For each file of type "cdev" it finds the Control Panel inserts the file's icon into it's scrollable list of selectable Control Panel devices.

color encoder: A device which produces an encoded-color signal from separate red, green, and blue color inputs.

Color Look-Up Table: A table used in an 8-bit video system, whose entries specify the values of the red, green, and blue intensities used to drive a color monitor.

composite color signal: A color display signal which includes blanking and synchronizing signals and color burst.

composite color sync: A signal which includes all the sync signals, plus the color-burst reference signal in its proper time relationship.

composite display signal: A blanked display signal combined with all of the appropriate synchronizing signals.

device driver: The device-dependent part of a host-computer graphics software package. The device driver generates a device-dependent output and handles all device-dependent interactions with the host-computer software and hardware. The Spectrum/8 Series III device driver is located in an EPROM on the Spectrum/8 Series III board. The Spectrum/8 Series III device driver handles all interactions between QuickDraw, the Macintosh graphics package, and the monitor being used with the Spectrum/8 Series III board. The Spectrum/8 Series III device driver tells QuickDraw where the video memory associated with its attached monitor is located and makes sure that all QuickDraw drawing which occurs in that video memory is properly displayed on the monitor.

display device: A device (for example, refresh display, storage tube display, or plotter) on which display images can be represented. In this manual, the display device is always the monitor attached to your SuperMac video card.

file type: A four-character sequence, specified when a file is created, that identifies the type of the file.

firmware: A program which resides in EPROM or ROM. Once placed into the EPROM or ROM, it cannot be modified/damaged/discarded by the user. The Spectrum/8 Series III firmware includes the Spectrum/8 Series III device driver and the data which describes the characteristics of the six factory supported monitors.

firmware revision number: The firmware revision number is used to identify which version of the Spectrum/8 Series III firmware is installed on a particular board. The firmware revision number is listed on the label on top of the EPROM which contains the firmware.

genlock: A circuit used to lock the frequency of an internal sync generator to an external source.

line frequency: The number of horizontal scan lines per second, including both the visible raster lines and those that occur during the vertical-retrace intervals.

non-composite: The red, green, blue, and sync signals used to generate a color display are provided on separate inputs/outputs.

oscillator: An electronic device which generates a precisely timed signal. Oscillators are categorized by the frequency (signals per second) at which they output their signal. The Apple monitors use a 30.24 MHz (Megahertz) oscillator. This Apple oscillator outputs a timing signal 30,240,000 times per second. Most monitors have very tight display timing requirements. For best results, you should always use an oscillator with the exact frequency required by your monitor. .

NTSC: Abbreviation for the National Television Standards Committee. Used to identify the color-encoding method adopted by the committee in 1953. The NTSC standard was the first monochrome-compatible, simultaneous color system used for public broadcasting. The NTSC standard is used by all government-regulated broadcast color systems in the United States.

palette: A collection of colors from which a single color, or multiple colors may be chosen.

pixel: The smallest segment of a raster line which can be discretely controlled by the display system.

PRAM: Abbreviation for Parameter RAM. The Macintosh II provides the Direct Slot with a small amount of non-volatile RAM to be used as a storage area for important information. Because the RAM used for parameter RAM is non-volatile, data stored there will be retained even when the Macintosh II is turned off.

raster graphics: Computer graphics in which a display image is composed of an array of pixels arranged in rows and columns.

Safe Place: A special location used to store original software master disks, as well as the small, seldom-used hardware bits supplied with computer products. A Safe Place must be a good distance away from the computer system itself, and should never used to store disks and other stuff associated with day-to-day work. Finally, a Safe Place never gets hot or humid, is far away from all magnetic things, cannot be reached by small children, and is impervious to spilled coffee.

software: A program which resides on floppy disk or hard disk media. Software can be modified/damaged/discarded by the user.

sync signal: A signal that synchronizes the scanning operation of a raster-scan monitor. May also include a phase reference for an encoded-color monitor.

vertical retrace: The return of the electron beam to the top of the CRT screen at the start of each field or frame interval.

Virtual Desktop: The desktop workspace stored in the memory of Spectrum/8 Series III. The Macintosh II addresses the Virtual Desktop as though it were a huge monitor, and enables the Macintosh monitor to act as a window into the area of the Virtual Desktop.

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