

Silicon Graphics® SD1100

Serial Digital Video Interface Card

Owner's Guide

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Introduction

Welcome to SGI Digital Video production!

The Silicon Graphics SD1100 Serial Digital Video Interface Card (referred to as “Digital Video Card” throughout this owner’s guide) supports the industry standard Serial Digital Interface (SDI) for digital video. You can use your Digital Video Card with the Silicon Graphics 540 to distribute and transfer professional quality video originals with no generation loss. Your Digital Video Card provides four 8-bit or 10-bit SDI channels (two in and two out). The four SDI channels interface directly to the Cobalt I/O Coprocessor that performs signal processing, such as optional square-non-square conversion, down-sizing, and color space conversion, and transfers DMA channels in and out of memory. Your Digital Video Card also supports SDTI (SMPTE 305M) transport streams at standard 1x speeds. This allows an application to capture horizontal and vertical blanking areas, closed-captioned information, embedded audio (SMPTE 272), or compressed digital video data.

The card also has a reference video input for locking to an external video source or a house sync generator, which is often used in a production studio. You can lock the output channels to transmit both a digital video program signal and a key signal to use in character generation or virtual set applications. Using standard encoding of color data, you can capture digital data directly to disk in the video native YCrCb color space. You can also use your Digital Video Card with the Silicon Graphics DA1100 Digital Audio Card to produce audio-for-video content on your Silicon Graphics 540 visual workstation, as described in Chapter 2 of this owner’s guide. You can use trigger capture and playback to facilitate coordination with external equipment using the General Purpose Interface (GPI) input and output ports.

The Digital Video Card does not alter the functionality of your system's on-board audio/video subsystem. All of the built-in software modules automatically detect the presence of the Digital Video Card. The digital video jacks appear as extra jacks in addition to the analog jacks in the base system. For a complete description of your system's audio/video subsystem and the video-related terminology used in this owner's guide, refer to your *Silicon Graphics Audio/Video User's Guide for the Silicon Graphics 320 and Silicon Graphics 540 Visual Workstations*.

Following is a description of each of the sections in this owner's guide:

- Chapter 1, "Digital Video Card Overview," explains how to verify proper installation of the card and describes the digital video-related software settings.
- Chapter 2 "Configuring the Digital Video Card," shows you how to set up your Digital Video Card in an example studio configuration.
- Appendix A lists the Digital Video Card specifications.

Additional References

For related information, refer to the following documents:

- *Silicon Graphics 540 Visual Workstation Owner's Guide*
- *Silicon Graphics DA1100 Digital Audio Card Owner's Guide*
- *Digital Media Programming Guide for Silicon Graphics Visual Workstations*

Note: You can also find some of the above documents and driver upgrades in the Silicon Graphics Supportfolio on the Web at: <http://support.sgi.com/nt>

Chapter 1

Digital Video Card Overview

This chapter shows you how to verify proper installation of your Digital Video Card and describes the digital video-related software settings. Before you read this chapter, refer to your *Silicon Graphics Audio/Video User's Guide for the Silicon Graphics 320 and 540 Visual Workstations* for detailed descriptions of the Audio/Video on-board subsystems, related software, and terminology.

Digital Video Card Components

Your Digital Video Card has external Serial Digital Interface (SDI) Video In and Video Out connectors for Video Channels 1 and 2, General Purpose Interface (GPI) In and Out connectors, and Reference Video (REF) In and Loop Thru connectors, as shown in Figure 1-1.

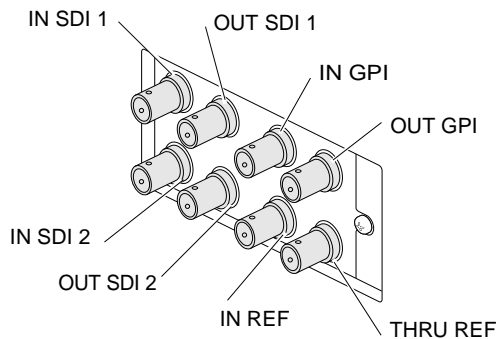


Figure 1-1 Digital Video Card Connectors

Installing the Digital Video Card

Figure 1-2 shows you how to insert the Digital Video Card inside your Silicon Graphics 540. For complete installation instructions, refer to your *Silicon Graphics 540 Visual Workstation Owner's Guide*.

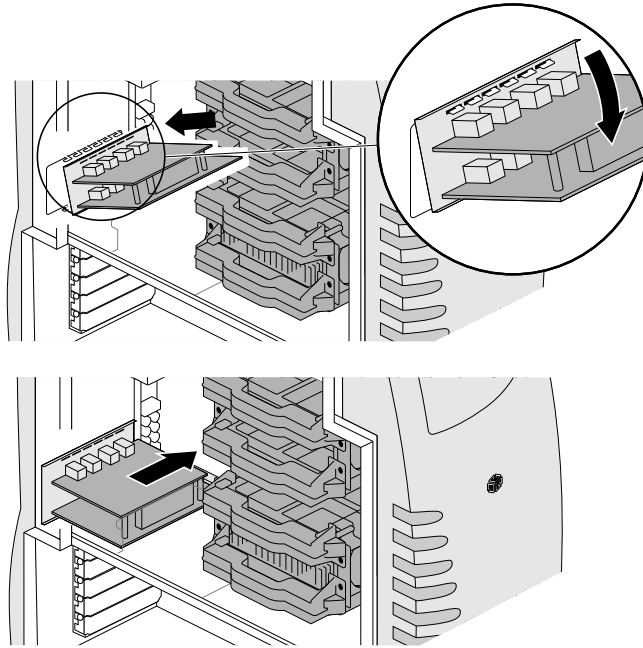


Figure 1-2 Inserting the Digital Video Card Inside the Silicon Graphics 540

Digital Video Card Connectors

You attach the Digital Video Card's connectors to external devices to perform various functions. Following is a description of each of these connectors.

SDI Channels 1 and 2/In and Out

You can attach the SDI 1 and 2 connectors to external devices to transmit and receive CCIR 601 digital video. The SDI 1 output channel is linked with the on-board composite output and S-Video output channels in your Silicon Graphics 540. This means that video transmitted to any of these video output channels is also transmitted to the other two video output channels.

GPI/In and Out

You can connect the GPI input and output connectors to external devices for triggered capture and playback.

Reference Video In/Reference Video Loop Thru

You can attach the analog Reference Video Input signal to the house sync signal from any video production environment to provide a genlock timing source to the Digital Video Card's video output channels.

The Reference Video Loop Thru signal is the unmodified Reference Video Input signal simply passed through the Digital Video Card.

Digital Video Card Software

After installing the Digital Video Card in your Silicon Graphics 540, the system automatically detects the card and activates the appropriate digital video software settings in the following locations:

- Silicon Graphics Video Control Panel
- Silicon Graphics Video for Windows (VFW) Capture Settings and Output Settings Panels
- Silicon Graphics QuickTime Output Settings Panel and QuickTime compatible Capture Settings Panels.

Verifying the Digital Video Card Installation

After you install your Digital Video Card following the procedures in your Silicon Graphics 540 Owner's Guide, verify proper installation of the card by following these steps:

1. Click the Silicon Graphics icon in the System Tray on the taskbar (near the clock).

The Silicon Graphics Control Panels menu appears, as shown in Figure 1-3 for a system with a Silicon Graphics Digital Audio Card installed.

If a Digital Audio Card is not installed in your system, the Digital Audio Meter Panel and the Digital Audio Control Panel are not displayed in the Silicon Graphics Control Panels menu.

Note: For more information on the Digital Audio Card, see the *Silicon Graphics DA1100 Digital Audio Card Owner's Guide*.

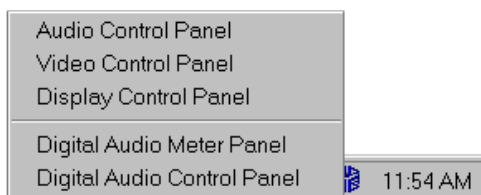


Figure 1-3 Silicon Graphics Control Panels Menu

2. Choose **Video Control Panel**.

The Silicon Graphics Video Control panel should appear, as shown in Figure 1-4. In this example, **Serial Digital 1** is selected as the jack to control.

You can also use the taskbar to display this control panel by choosing **Start > Settings > Control Panel > SGI Video**.

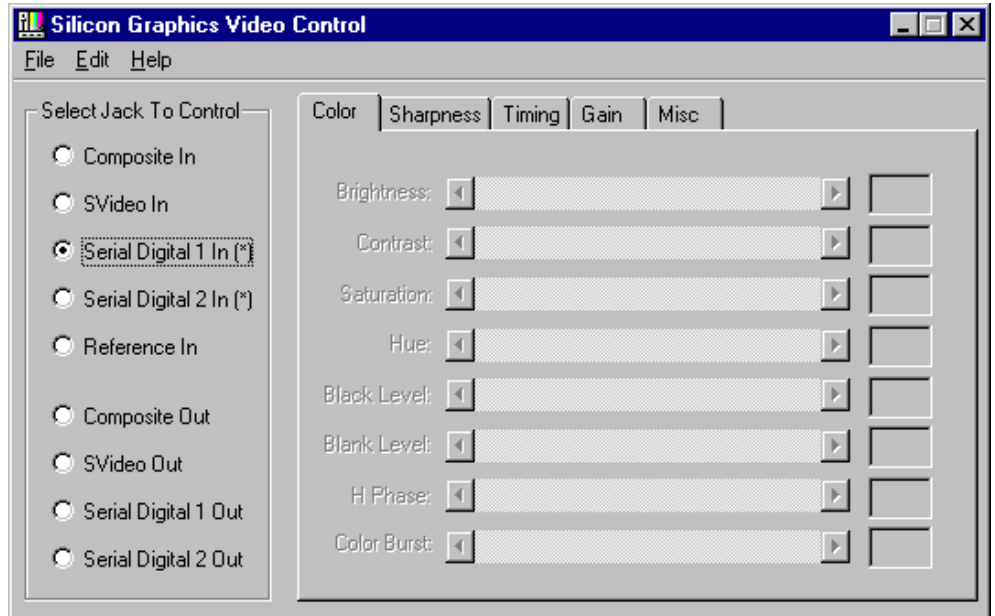


Figure 1-4 Silicon Graphics Video Control Panel

This is the same control panel that appears without a Digital Video Card installed but make sure the digital video options are now activated. If you installed your Digital Video Card properly, the following digital video options are activated under the **Select Jack To Control** settings (refer to Figure 1-4):

- Serial Digital 1 In
- Serial Digital 2 In
- Serial Digital 1 Out
- Serial Digital 2 Out
- Reference In

If an asterisk within brackets(*) appears next to a Digital In option, this indicates the presence of a digital video input signal.

Note: If the digital video options are not activated in the Silicon Graphics Video Control panel, use your Silicon Graphics Recovery CD 2 to reinstall the required software, or refer to your *Silicon Graphics Audio/Video User's Guide for the Silicon Graphics 320 and 540 Visual Workstations*.

Using this control panel, you can set up the appropriate Timing and Misc control panel settings for the selected digital video card jack. When you click one of the digital video options, the analog video settings on the right side of the control panel are deactivated (grayed out). The Color, Sharpness, and Gain tabs display only analog video settings.

Note: The settings you choose in the Silicon Graphics Video Control panel can be overridden by the settings you choose in other control panels (for example, VFW or QuickTime) or other video-related applications. If you override these settings, the changes are reflected in the Silicon Graphics Video Control panel.

Setting Up the Silicon Graphics Video Control Panel

You can use the Silicon Graphics Video Control panel to configure each digital video jack. You can do this by following these steps:

1. Click **Serial Digital 1 In** as the jack to control, then click the **Timing** tab.

The Serial Digital 1 In Timing window appears, as shown in the example in Figure 1-5.

In this window, there are two digital video-related areas, **Signal Present** and **Jack Timing**. The Signal Present setting (NTSC, PAL, or None) indicates the current signal on the input jack. Your Jack Timing selection should match this input signal.

The Serial Digital 2 In timing settings are identical to the Serial Digital 1 In timing settings.

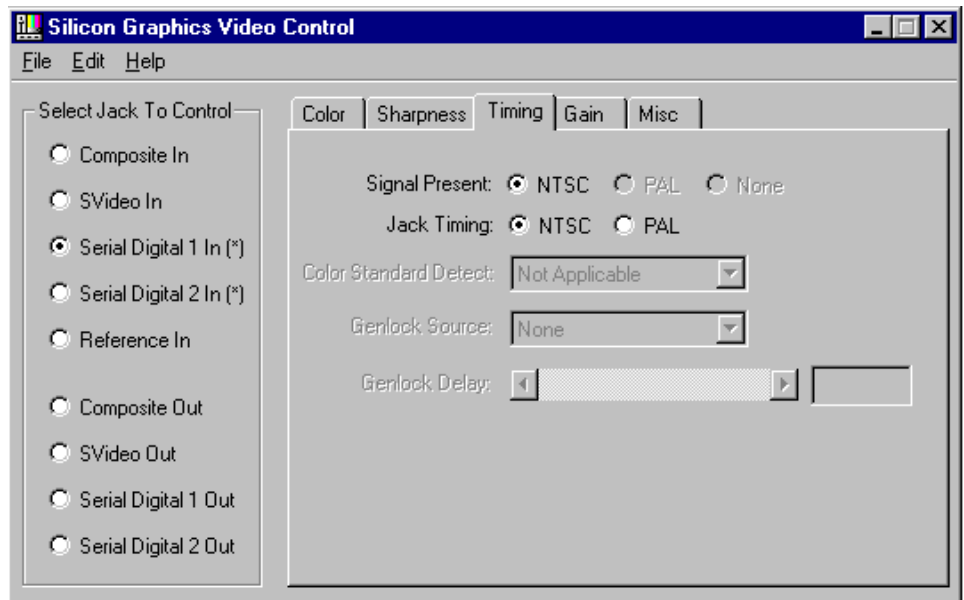


Figure 1-5 Serial Digital 1 In Timing Settings

2. Click **Serial Digital 1 Out** as the jack to control, then click the **Timing** tab.

The Serial Digital 1 Out Timing Settings window appears, as shown in the example in Figure 1-6.

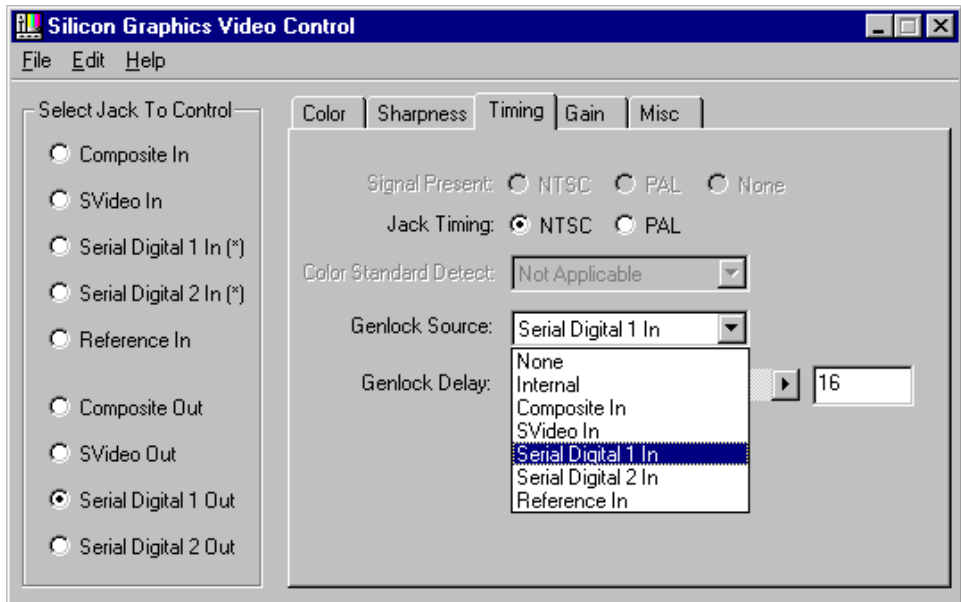


Figure 1-6 Serial Digital 1 Out Timing Settings

In this window, there are three digital video-related areas, **Jack Timing**, **Genlock Source**, and **Genlock Delay**.

For Jack Timing you can choose either **NTSC** or **PAL**.

The Genlock Source allows you to synchronize audio and video output to a common frequency source. When you choose **Genlock Source**, a drop-down menu displays the following digital video options (refer to Figure 1-6):

- Serial Digital 1 In
- Serial Digital 2 In
- Reference In

The Genlock Source drop-down menu also displays the following on-board video options (refer to Figure 1-6):

- None
- Internal
- Composite In
- SVideo In

If you choose **Internal** as the Genlock Source, the output video will free-run in your workstation instead of locking to an external video input.

The **Genlock Delay** is the delay in video (CCIR - 601) clock cycles between the genlock source and the video output from a jack that is genlocked to that source. This allows you to align the workstation so that it is precisely genlocked with other devices in an editing suite, such as an audio tape deck and other devices that plug into a mixing console.

For a full description of all the above options, refer to your *Silicon Graphics Audio/Video User's Guide for the Silicon Graphics 320 and 540 Visual Workstations*.

The Serial Digital 2 Out timing settings are identical to the Serial Digital 1 Out timing settings.

Note: If your system has a Silicon Graphics Digital Audio Card installed, refer to the information on "Clock Source" in your *Silicon Graphics DA1100 Digital Audio Card Owner's Guide*.

3. Click **Serial Digital 1 Out** as the jack to control, and then click the **Misc** tab.

The Serial Digital 1 Out Misc window appears, as shown in Figure 1-7.

In this window, there is one digital video-related area, **Jack Carries**. You can choose from two options, **Program** or **Alpha**.

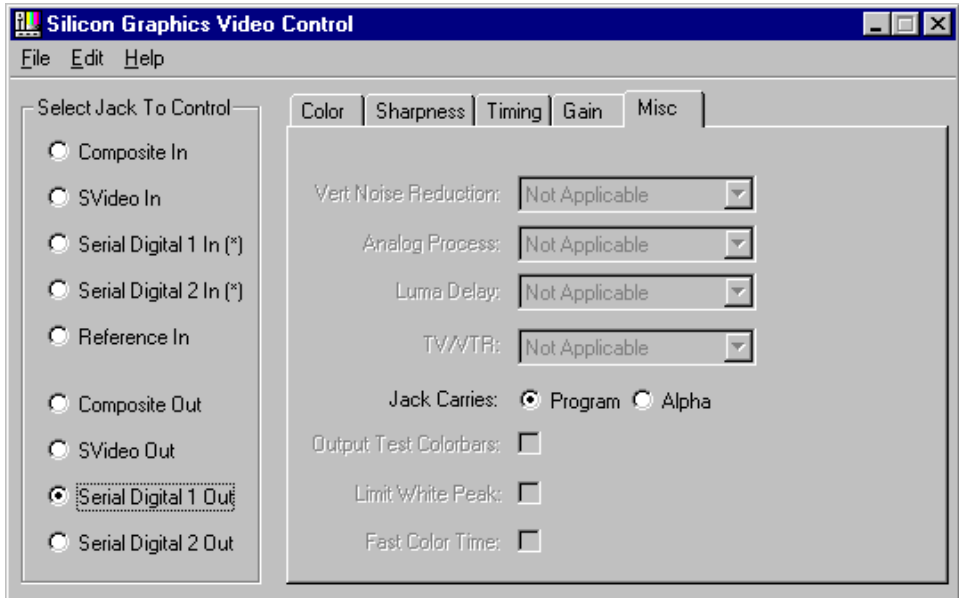


Figure 1-7 Serial Digital 1 Out Misc Settings

When video source material is generated from graphics, the graphics data may carry an Alpha component, which determines the opaqueness of a portion of the RGB graphics image. The Alpha component cannot be transmitted as part of a single digital video stream but can be sent separately. When the RGB graphics image is converted to video, the Alpha component is removed. You can preserve the Alpha component of the video signal by sending it out on a separate jack from the video signal. The Jack Carries option specifies whether the Program video (video image) or the Alpha video (opaqueness) is transmitted through the selected output jack.

If you choose **Program**, the RGB graphics image is converted to a YCrCb video image and is sent through the selected jack. If you choose **Alpha**, the stripped Alpha component is sent through the selected jack and appears in the Y component of the output video stream. To send both an Alpha and Program component, you must configure two output jacks.

The Serial Digital 2 Out Misc settings are identical to the Serial Digital 1 Out Misc settings.

Setting Up the Digital Video Card for Video for Windows (VFW)

You can capture and play back digital video using Microsoft VidCap, which is preinstalled in your Silicon Graphics 540. You can do this by following these steps:

1. Choose **Start>Run**.

The Windows NT Run dialog box appears.

2. Type **vidcap32** and click the **OK** button.

The VidCap window appears, as shown in Figure 1-8.

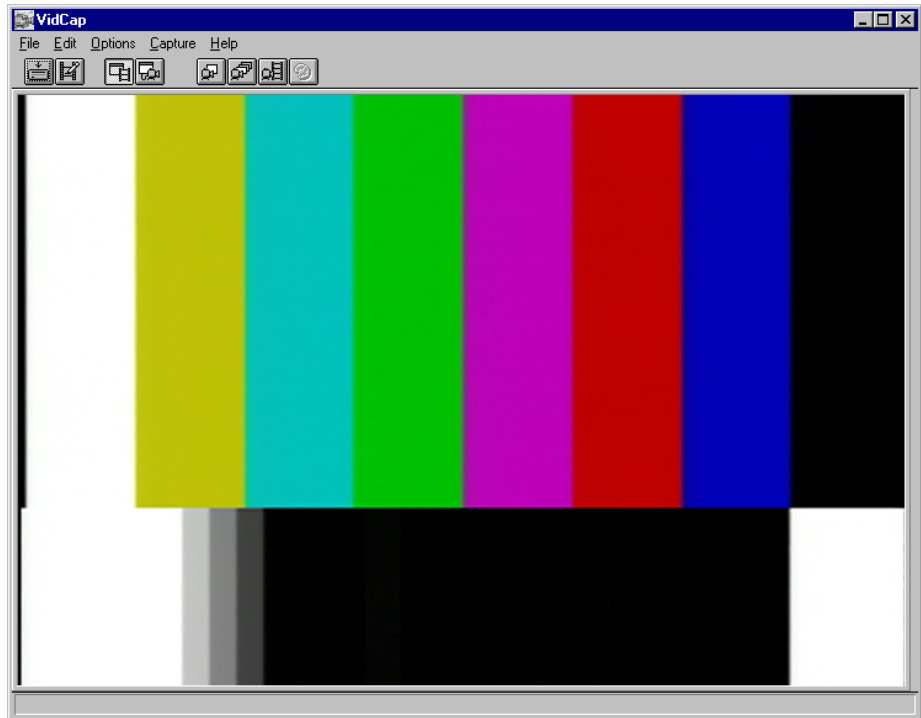


Figure 1-8 Microsoft VidCap Window

3. Choose **Video Format** in the **Options** menu.

The Silicon Graphics VFW Capture Settings window appears, as shown in the example in Figure 1-9 with **Serial Digital 1** selected as the **Source Jack** and **Uncompressed 16 bit BGR** selected as the **Image Format**. If you choose another option for the Image Format, the **Dither Images** option under **Other Settings** is deactivated (grayed out).

In this window you can choose the desired jack to use for your video capture under the **Source Jack** settings. If you choose **Serial Digital 1 In** or **Serial Digital 2 In**, you can choose **NTSC** or **PAL** for the Source Timing and you can choose the desired **Captured AVI File Settings**. The analog settings are deactivated when you choose one of the digital jacks to capture video.

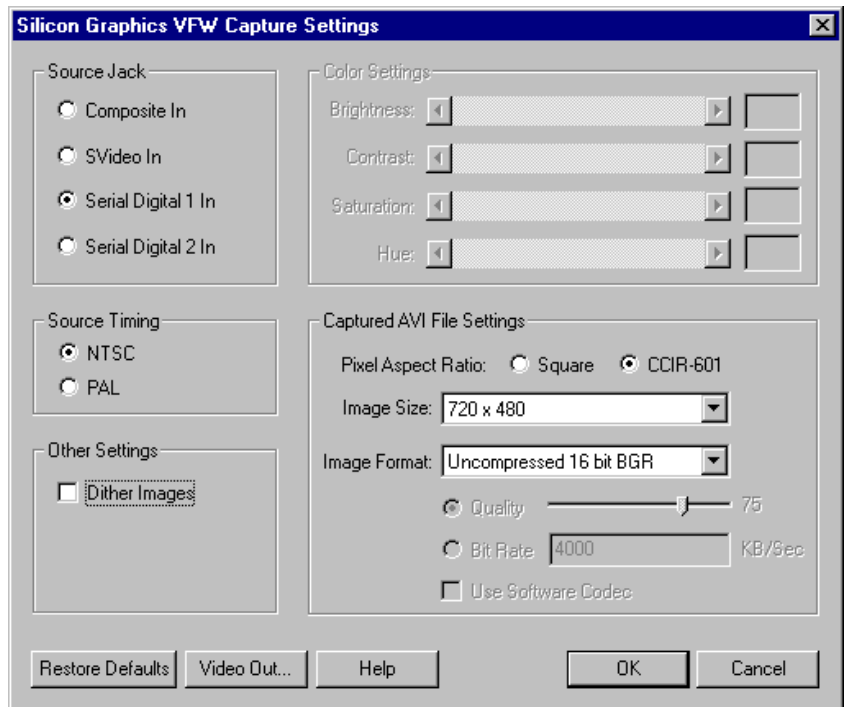


Figure 1-9 Silicon Graphics VFW Capture Settings

4. Click the **Video Out** button at the bottom of the Silicon Graphics VFW Capture Settings window.

The Silicon Graphics VFW Output Settings window appears, as shown in the example in Figure 1-10 with **Serial Digital 1 Out** selected as the **Output Jack**. In this window, you can choose an output jack to use for your video output. You can also enter the **Output Timing**, **Square To Nonsquare Conversion**, and **Enable Video Display on Computer Screen** parameters.

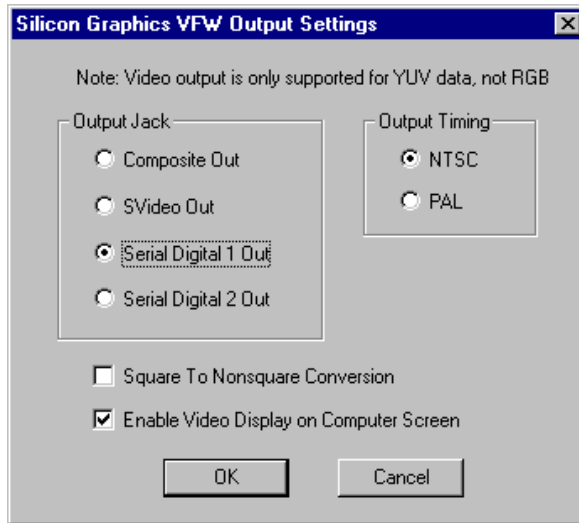


Figure 1-10 Silicon Graphics VFW Output Settings Window

Setting Up the Digital Video Card for QuickTime

You can choose an input jack for digital video capture within any QuickTime-based video capture program (for example, Adobe Premiere), as shown in the example in Figure 1-11 with **SDI 1** selected as the input jack. In this example, SDI 1 and SDI 2 represent Serial Digital Interface jacks 1 and 2, and you can also enter the **Digitizer** parameters (SGI Square Pixel or SGI Non-Square Pixel). Typically, you can access these options through an application's QuickTime video settings.

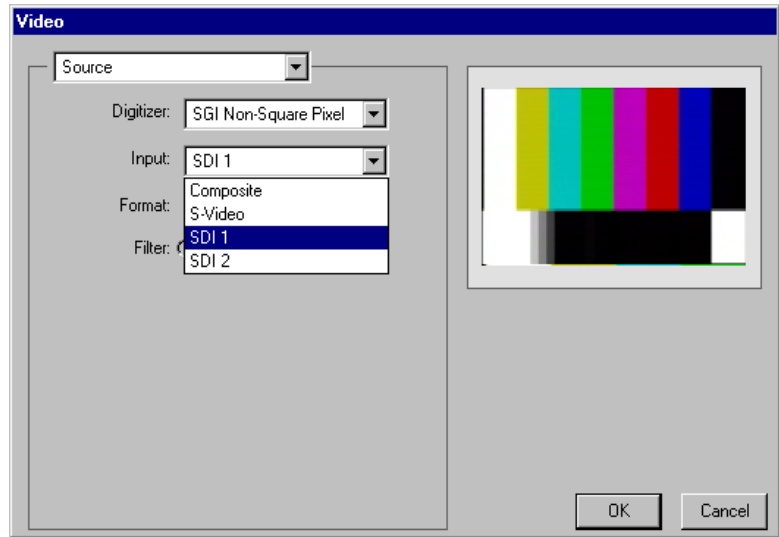


Figure 1-11 QuickTime-Based Video Capture Window

You can choose an output jack for QuickTime video playback using the Silicon Graphics QuickTime Output Settings panel, which is preinstalled in your Silicon Graphics 540. You can also enable or disable square to non-square pixel conversion. You can do this by following these steps:

1. In the taskbar, choose **Start>Run**.

The Windows NT Run dialog box appears.

2. Type **sgiqtvout** and click the **OK** button.

The Silicon Graphics Quicktime Output Settings panel appears, as shown in the example in Figure 1-12 with **Serial Digital 1** selected as the output jack. In this window you can select the desired jack to use for your QuickTime movie playback.

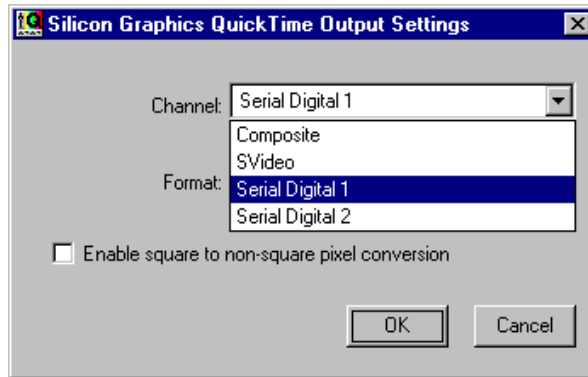


Figure 1-12 Silicon Graphics QuickTime Output Settings Panel

Chapter 2

Configuring the Digital Video Card

This chapter shows you how to set up your Digital Video Card in an example studio configuration.

Synchronizing the Digital Video Card with Two Digital Audio Cards

This example shows you how to configure your Silicon Graphics 540 for digital audio/video production. You can set up this configuration by following the step-by-step procedures below.

Setting Up the Configuration

In this example, you configure your workstation with the Silicon Graphics Digital Video Card for serial digital video (SDI) input and output with the video output genlocked to the reference video signal, and two Digital Audio Cards set up for multichannel digital audio input and output.

1. Connect two digital VTRs to SDI input/outputs 1 and 2, respectively, on the Digital Video Card.

This allows the capture and playback of 2-channel digital audio, which can be synchronized to either the on-board analog audio or to the Digital Video Card's input/output channels.

2. Connect the AES digital audio inputs and outputs for the audio channels 1 and 2 on two VTRs to AES inputs and outputs on the two Digital Audio Cards.

This allows the capture and playback of 2-channel digital audio, which is synchronized with the Digital Video Card.

3. Connect the optical connectors on Digital Audio Card #1 to a consumer DAT machine to transfer 2-channel S/PDIF digital audio data to/from the DAT machine.
4. Connect the optical connectors on Digital Audio Card #2 to a small format digital mixing console to transfer 8-channel digital audio to/from the mixing console.
5. Connect each of the VTRs to a digital reference signal from the sync generator.
6. Connect the mixing console to a word clock.
7. Connect a digital reference signal to the video reference input on the Digital Video Card.

This provides the master clock for the audio and video devices inside the workstation.

All the studio devices are now synchronized to a house sync generator.

Each Digital Audio Card is synchronized with the Digital Video Card's video sync input using your workstation's onboard internal video sync capture circuitry, as shown in the illustration in Figure 2-1.

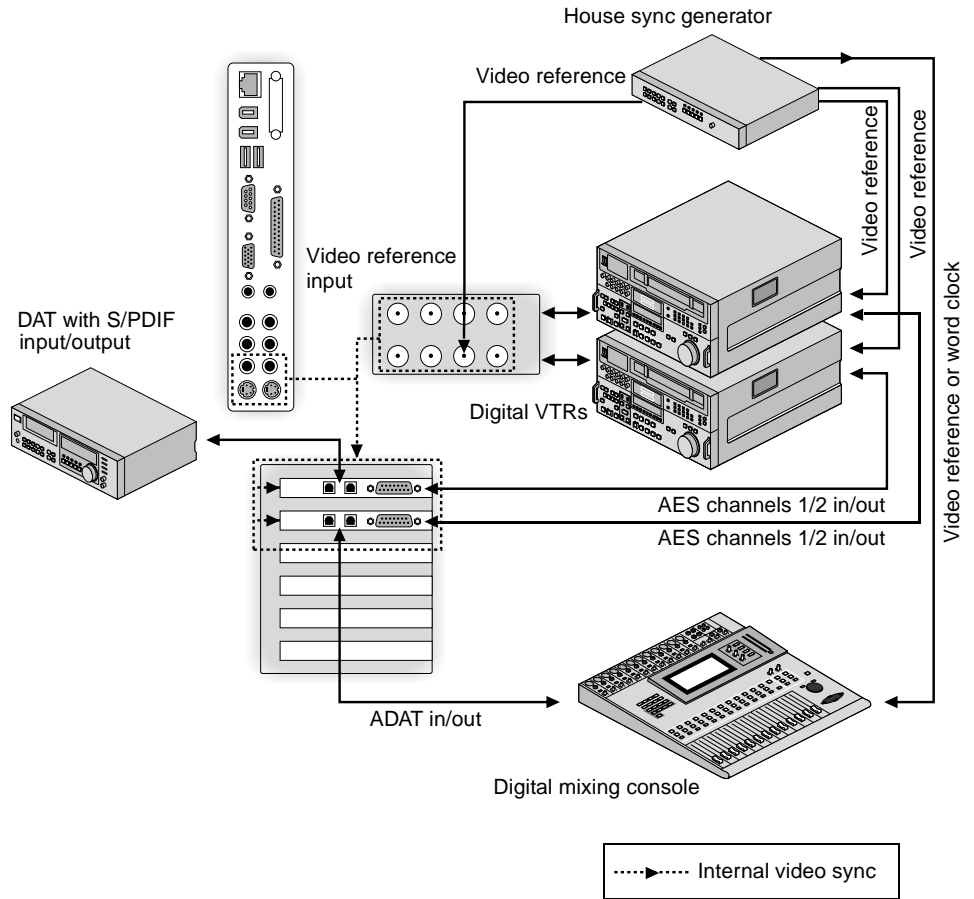


Figure 2-1 Two Digital Audio Cards/Digital Video Card Sync

8. Click the Silicon Graphics icon in the System Tray on the taskbar (near the clock).

The Silicon Graphics Control Panels menu appears, as shown in Figure 2-2.

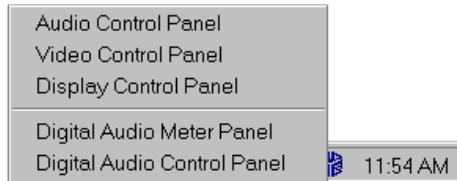


Figure 2-2 Silicon Graphics Control Panels Menu

9. Choose **Video Control Panel**.

The Silicon Graphics Video Control panel appears, as shown in Figure 2-3. In this example, **Serial Digital 1** is selected as the jack to control.

You can also use the taskbar to display this control panel by choosing **Start > Settings > Control Panel > SGI Video**.

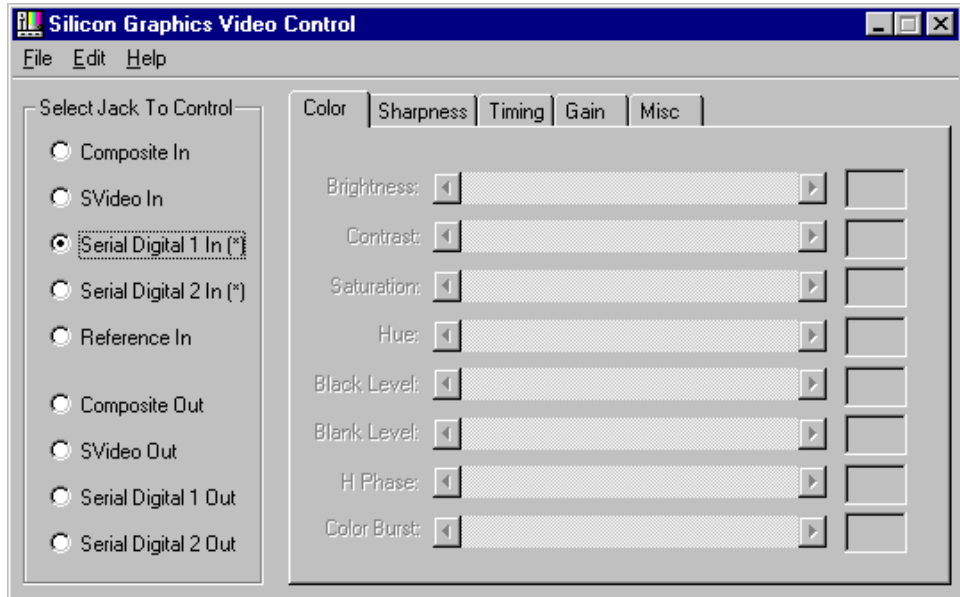


Figure 2-3 Silicon Graphics Video Control Panel

10. Configure your SDI video inputs and outputs (see Chapter 1), and choose **Reference In** as the **Genlock Source** in the Timing Settings window, as shown in Figure 2-4. In this example, Serial Digital 1 Out is selected as the jack to control.

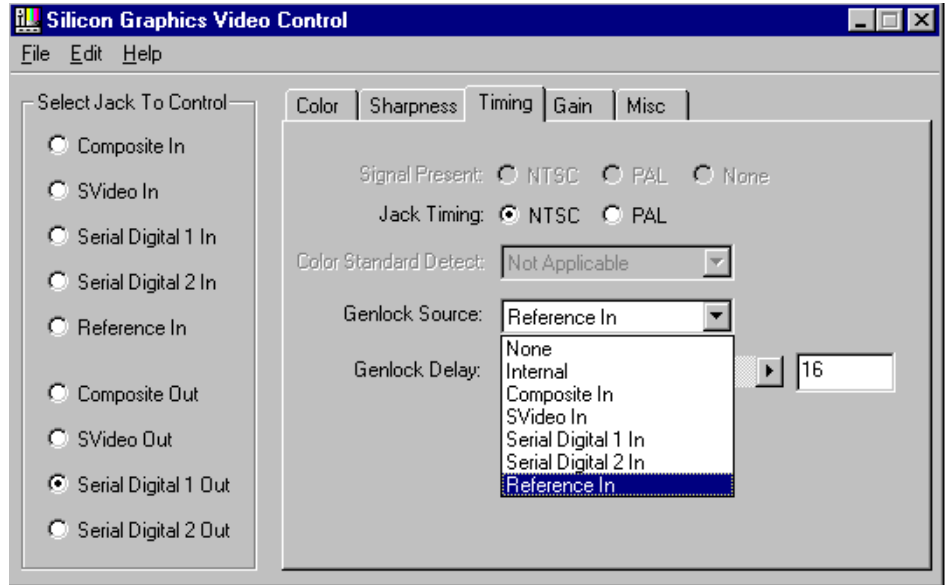


Figure 2-4 Timing Settings Window

11. In the Silicon Graphics Control Panels menu, click **Digital Audio Control Panel**.

The Silicon Graphics Digital Audio Control panel appears.

12. Set up the Digital Audio Control panel as shown in the examples in Figures 2-5 through 2-8.

Note: For a complete description of the Digital Audio Card and its related software, refer to the *DA1100 Digital Audio Card Owner's Guide*.

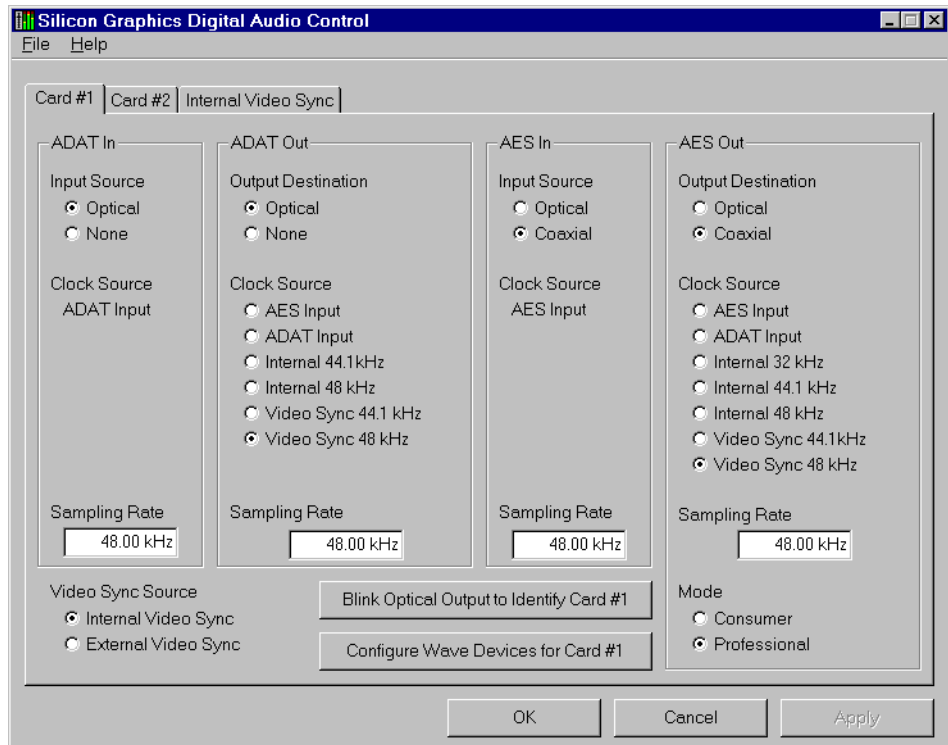


Figure 2-5 Two Digital Audio Cards/Digital Video Card Sync - Card #1 Control Panel Settings for AES/EBU Transfers to/from VTR

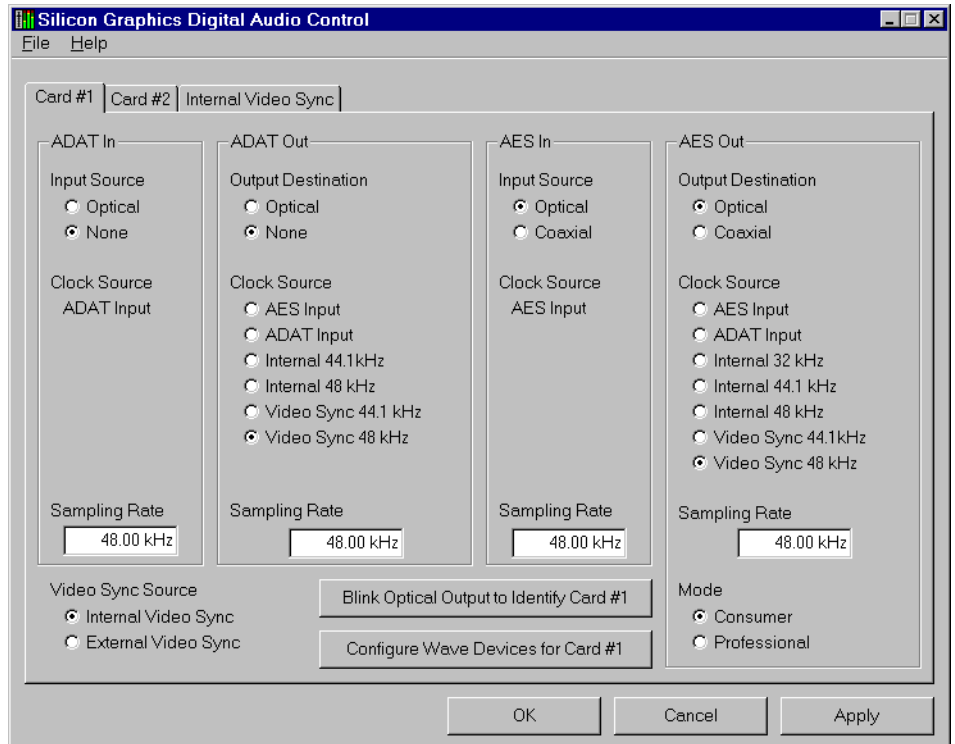


Figure 2-6 Two Digital Audio Cards/Digital Video Card Sync - Card #1 Control Panel Settings for S/PDIF Transfers to/from DAT Recorder

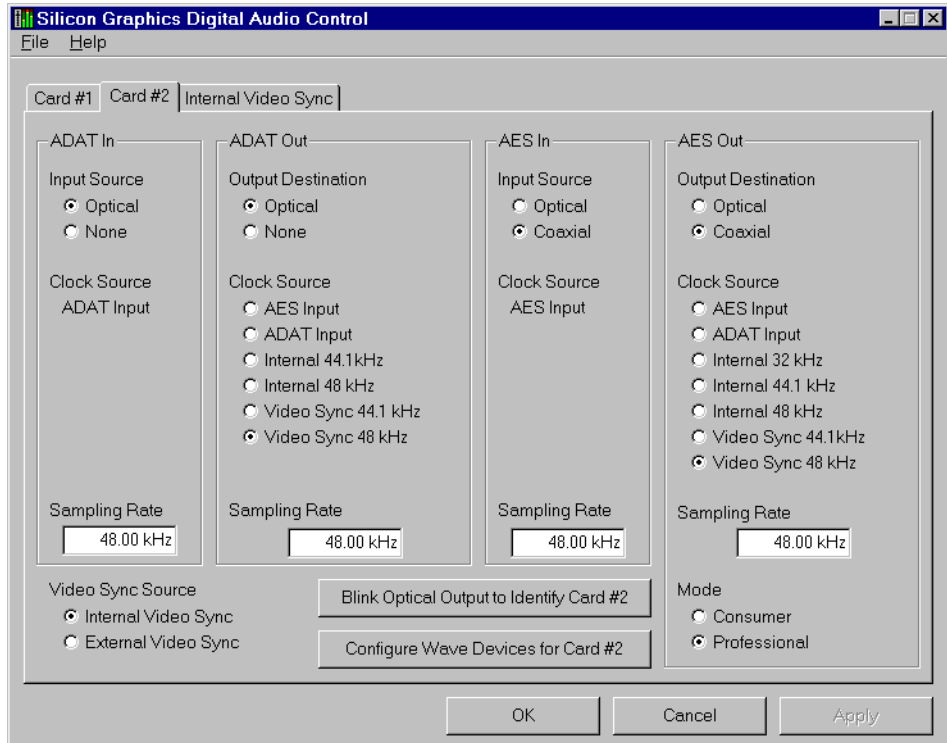


Figure 2-7 Two Digital Audio Cards/Digital Video Card Sync - Card #2 Control Panel Settings for AES/EBU Transfers to/from VTR

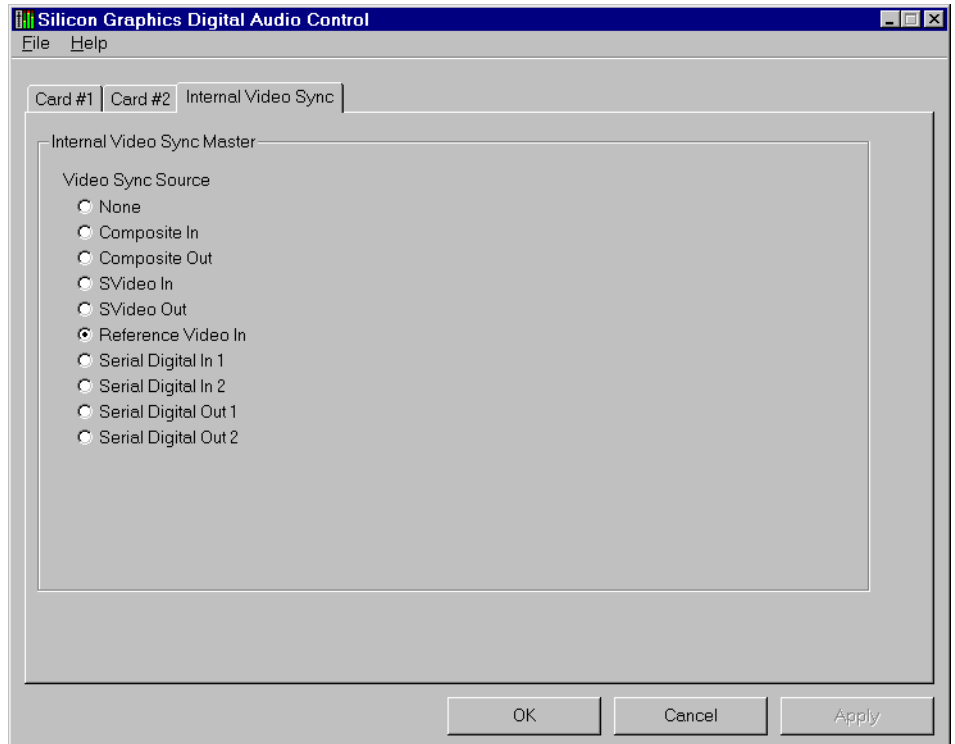


Figure 2-8 Two Digital Audio Cards/Digital Video Card Sync - Internal Video Sync Setting Using Sync Input on Digital Video Card

13. Click the **OK** button in the Silicon Graphics Digital Audio Control panel.

Appendix A

Digital Video Card Specifications

The Silicon Graphics SD1100 Serial Digital Video Interface Card occupies the proprietary AV (Advanced Visualization) slot on the Silicon Graphics 540 motherboard.

Table A-1 General Specifications

Video Standard	CCIR 601 525 (NTSC), CCIR 601 625 (PAL), SMPTE 259M
Video Input	2 x 10-bit SDI (BNC)
*Video Output	2 x 10-bit SDI (BNC)
Reference Video	Analog black burst (BNC) In and Loop Thru
Trigger	GPI (BNC) In and Out
Video Capture Rate	29.97 fps for 601-525 timing, 25 fps for 601-625 timing
Capture Area	Arbitrary clipping including 720 x 486 (525) and 720 x 576 (625)
Output Placement	Arbitrary Placement, including 720 x 486 (525) and 720 x 576 (625)
SDTI Support	SMPTE 305M, 856 x 525 for 601-525 timing, 862 x 625 for 601-625 timing (all horizontal pixels except for pixels 720-721, the first two pixels in a 601 video line)
Square-Non-Square Conversion on Input and Output	Hardware Mitchell Filter including 640 x 486 (525) and 768 x 576 (625)

Table A-1 General Specifications (continued)

Downscaling on Input	Arbitrary Scaling Ratio
YCrCb Support	8-bit and 10-bit per component in CCIR 601 nominal range
RGB A Support	8-bit per component or 16-bit per pixel (5551) using hardware color space conversion

*You can combine two digital outputs to produce a 4:2:2:4 signal.

Note: The Digital Video Card has no direct audio connection but the card can utilize the workstation's on-board analog audio I/O capabilities. If you require professional digital audio, you can install a Silicon Graphics DA1100 Digital Audio Card in your workstation. Both audio systems provide video clock synchronization. The DA1100 also supports the SGI proprietary high-resolution K-Sync synchronization system.

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