

O2™ Digital Video Option Installation Guide

Document Number 007-3616-001

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Introduction

This guide describes how to install the O2 digital video option module in the O2 workstation.

The following topics are covered in this manual:

- Chapter 1, “Installing the O2 Digital Video Option Module” on page 1, explains how to remove the existing analog audio or audio-visual module and replace it with the digital video option module. It also explains where to find software installation information.
- Chapter 2, “Using the Digital Media Software” on page 19, provides information on how to get started with the digital media software.
- Chapter 3, “Technical Specifications, Product Support, and Regulatory Information” on page 27, contains cable pinout assignments, technical specifications for the O2 digital video option module, and regulatory statements. It also tells you how to contact Silicon Graphics for product support information.

Installing the O2 Digital Video Option Module

This chapter explains how to install the O2 digital video option module in an O2 workstation. It also describes how to verify the hardware installation.

The O2 digital video option is a serial digital interface board that provides four 10-bit, serial, CCIR601/SMPTE 259M channels (two in and two out). A breakout cable provides a genlock connection for locking to analog house sync, house sync loophrough, and GPI (general purpose interrupt) input and output. The digital video option module also provides an analog audio interface similar to the base O2 workstation. Digital audio is provided by the Silicon Graphics PCI digital audio option board, a separate option. For more information, see your service provider.

The O2 digital video option module does not support analog video or the O2Cam digital video camera.

The following topics are covered in this chapter:

- “O2 Digital Video Option Package” on page 2
- “Installing the Software” on page 2
- “About the O2 Digital Video Option Module” on page 3
- “Installing the O2 Digital Video Option Module” on page 5
- “Verifying the Hardware Installation” on page 12
- “Connecting an SDI Video Source to the Workstation” on page 12
- “Placing a System Upgrade Regulatory Label” on page 14
- “Exchanging Modules” on page 14

O2 Digital Video Option Package

Your package includes all of the following items. If anything is missing, contact your sales representative.

- O2 digital video option module
- breakout cable
- *O2 Digital Video Option Module Installation Guide* (this manual)
- compact disc (CD-ROM)

Installing the Software

Depending on which version of IRIX you are running, you may need to install software for the digital video option module. Read the release notes on the CD for information on which software you need to install.

The booklet that comes with the CD explains how to read release notes and how to install software.

About the O2 Digital Video Option Module

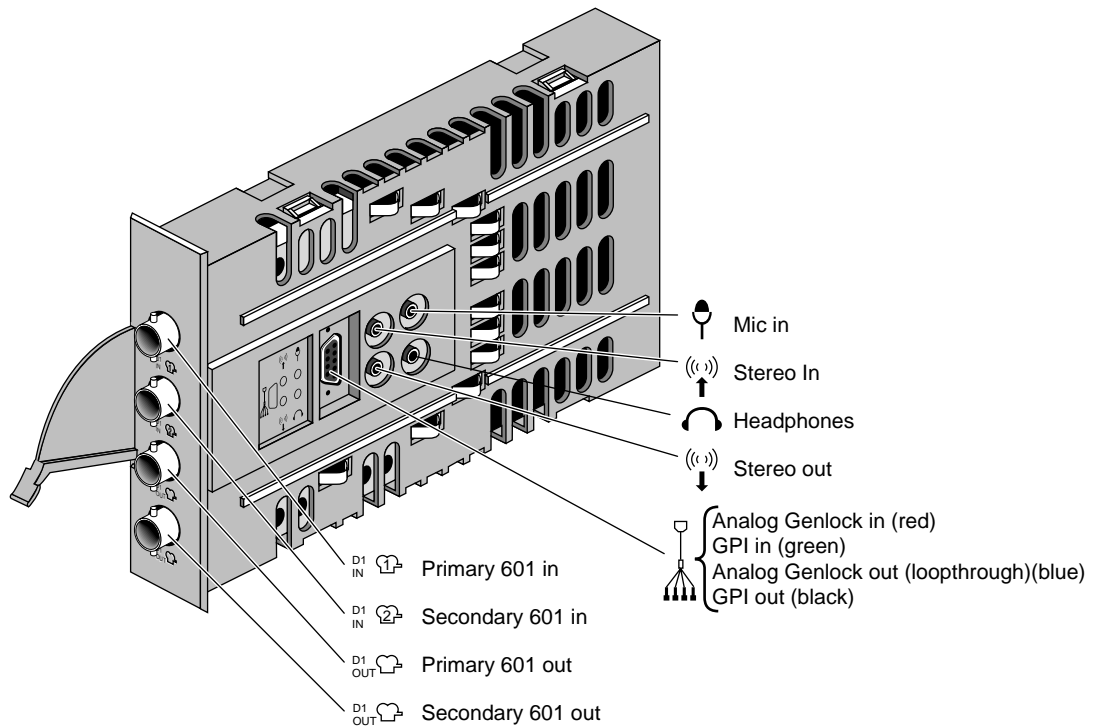


Figure 1-1 The O2 Digital Video Option Module

Note: To identify the ports on the side of the O2 digital video option module, use the icons on the module instead of those on the outer cover of the O2 workstation.

The O2 digital video option provides

- two serial, CCIR601/SMPTE 259M input channels via standard BNC connectors on the rear panel
- two serial, CCIR601/SMPTE 259M output channels via standard BNC connectors on the rear panel
- genlock input via the red connector on the breakout cable
- genlock output (loopthrough) via the blue connector on the breakout cable

- general purpose interrupt (GPI) input and output connectors via the breakout cable
- microphone in, stereo in, headphone out, and stereo out via four 3.5 mm connectors on the side panel

About the Breakout Cable

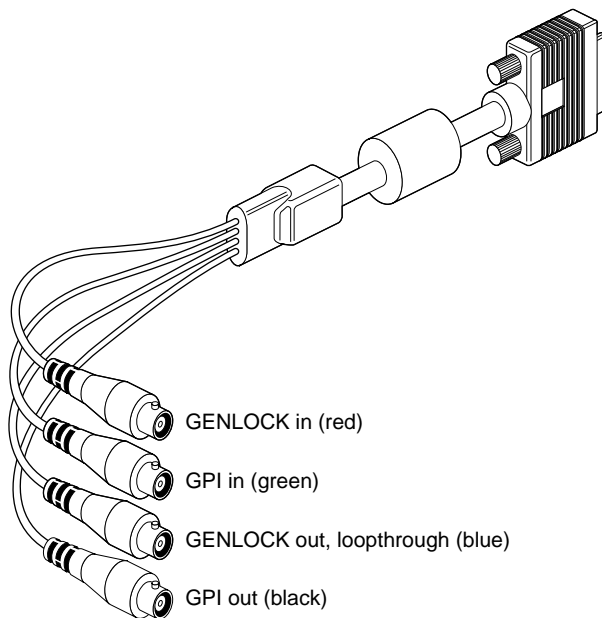


Figure 1-2 Digital Video Breakout Cable

The breakout cable provides a genlock circuit for locking to analog house sync. The sync input and output is an analog composite video signal that is used as a timing reference for the digital video outputs of the board. The board extracts the timing from the analog video input and apply it to the digital video outputs.

The analog genlock input can be a composite video signal or a composite video blackburst signal. The loopthrough connection allows you to daisy-chain the house sync signal to other video devices that can be genlocked.

Note: The house sync signal must be terminated with a 75 ohm BNC terminator. If you are using a video input only and not looping through to another device, you need to terminate the unused video out connector with a 75 ohm BNC terminator.

The GPI in and out are for synchronizing the O2 workstation with external devices.

Installing the O2 Digital Video Option Module

To install the O2 digital video option module, follow the steps below.

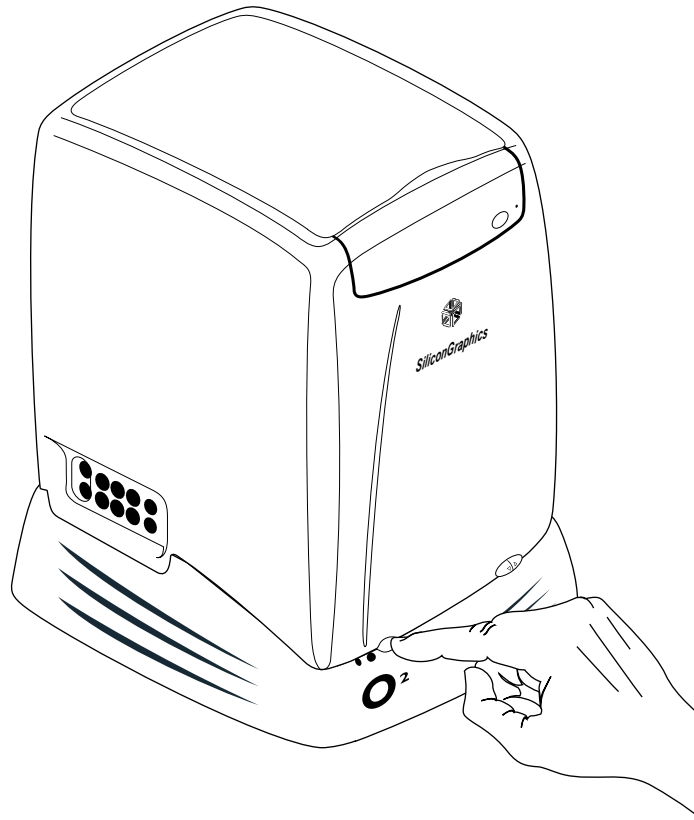


Figure 1-3 Turning Off the Workstation

1. Turn off the workstation.

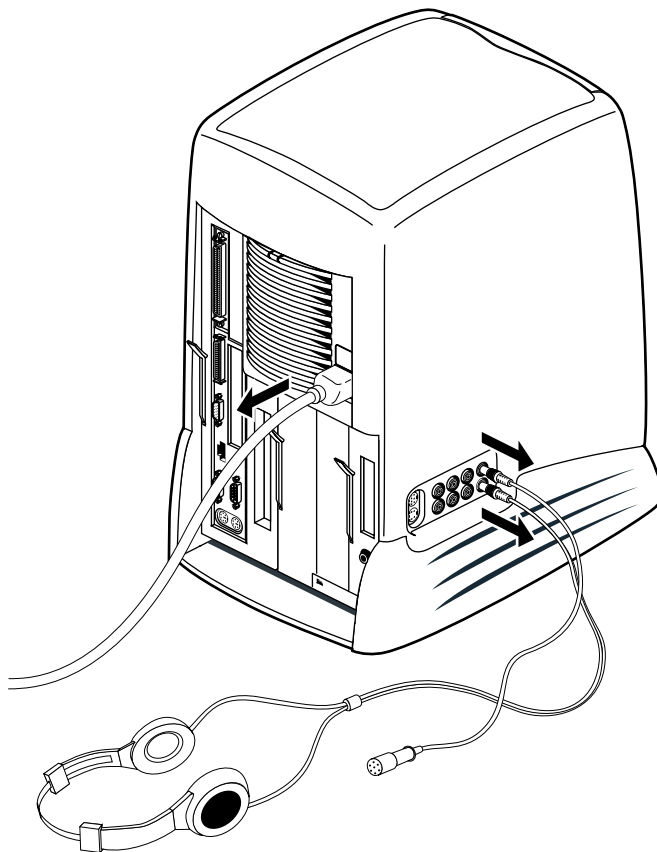


Figure 1-4 Removing the Cables

2. Remove the power cable from the rear of the chassis, and any other cables from the side of the existing analog audio or audio-visual module. The audio-visual module is on the extreme right as you face the rear of the workstation. You don't have to remove the cables connected to the system module on the left.

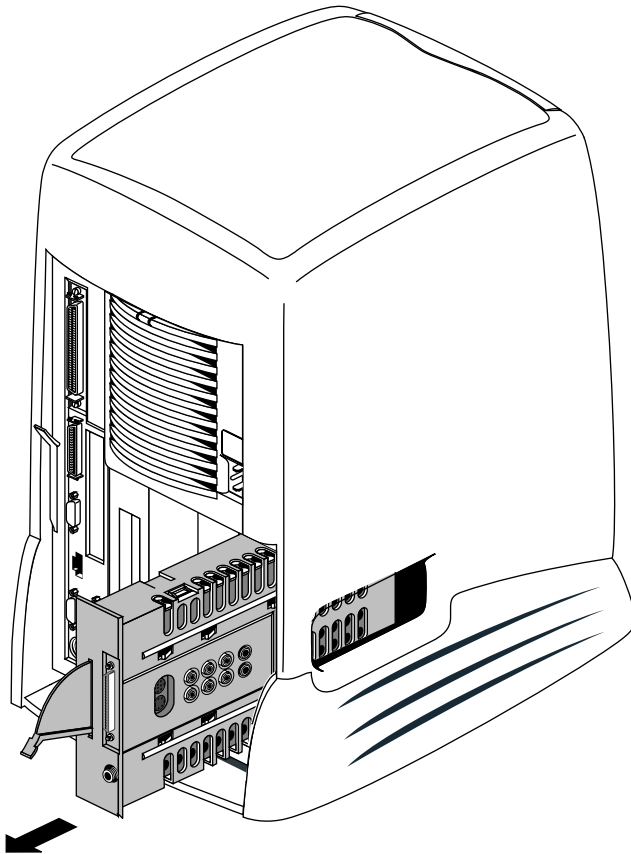


Figure 1-5 Removing the Analog Audio-Visual Module

3. Remove the existing analog audio or audio-visual module by pulling down the lever and sliding it out of the chassis.

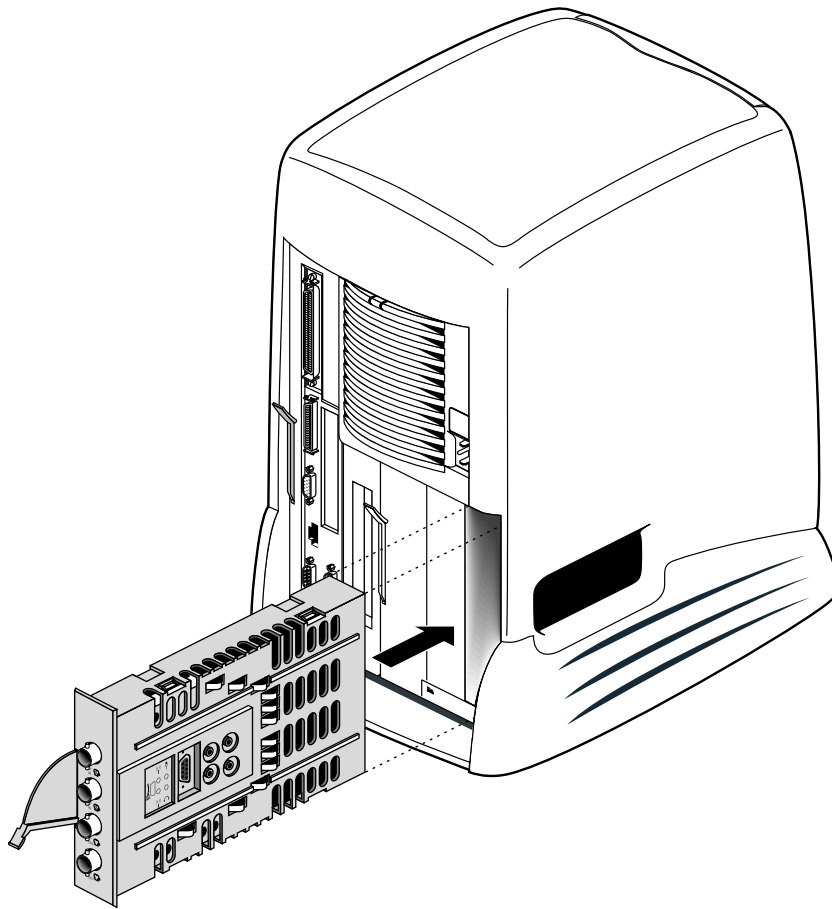


Figure 1-6 Installing the O2 Digital Video Module

4. Slide the new digital video option module into the opening on the right of the chassis.

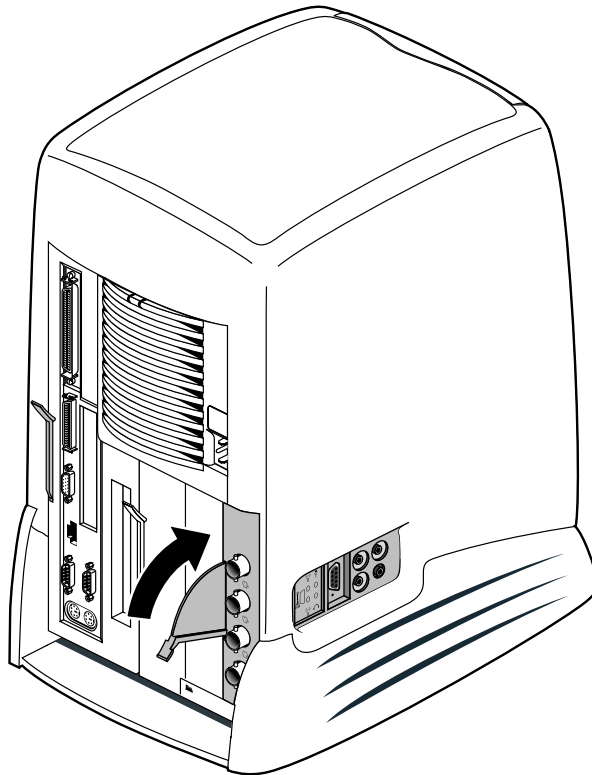


Figure 1-7 Locking the Digital Video Option Module in Place

5. Push the lever all the way up to lock the module in place.

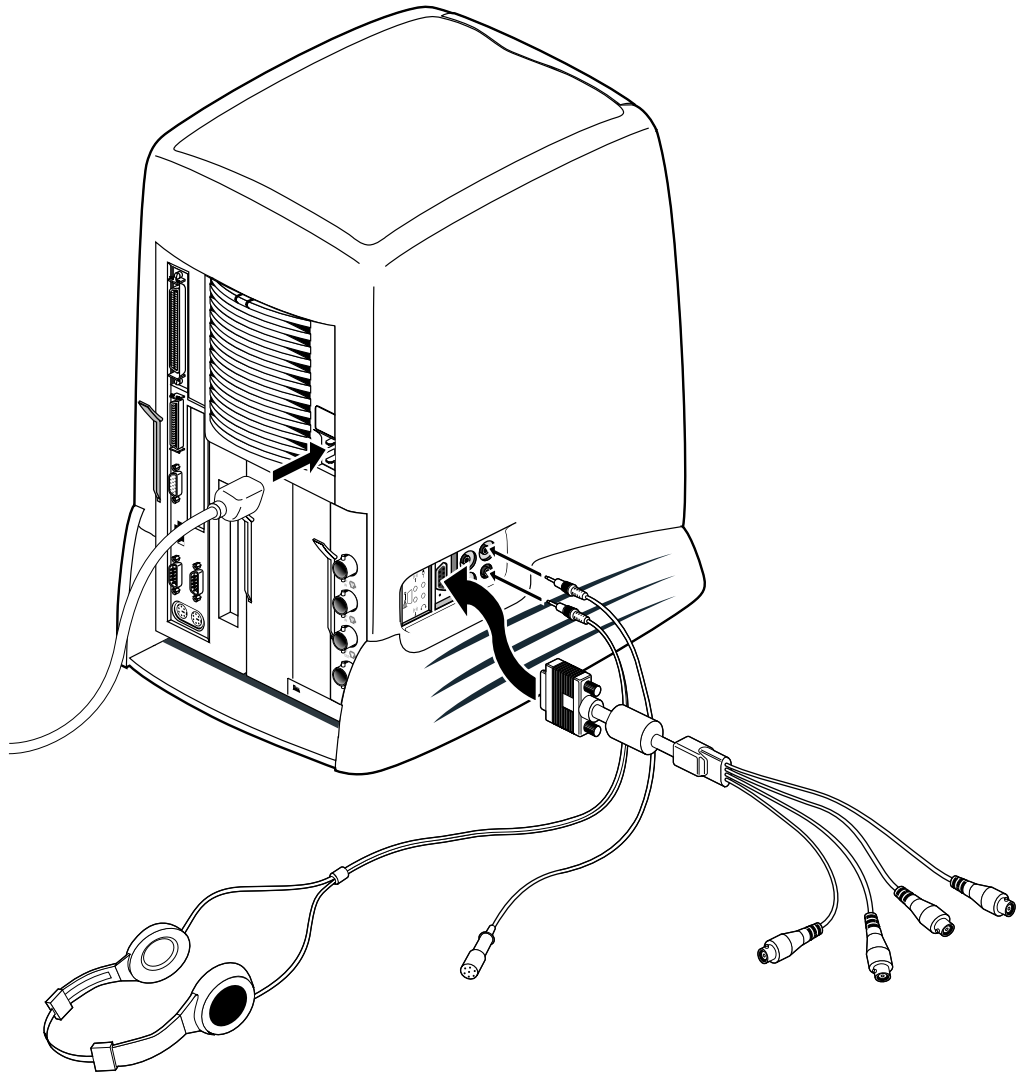


Figure 1-8 Reconnecting the Power Cable

6. Reconnect the power cable.
7. Connect the digital video breakout cable and any other cables.

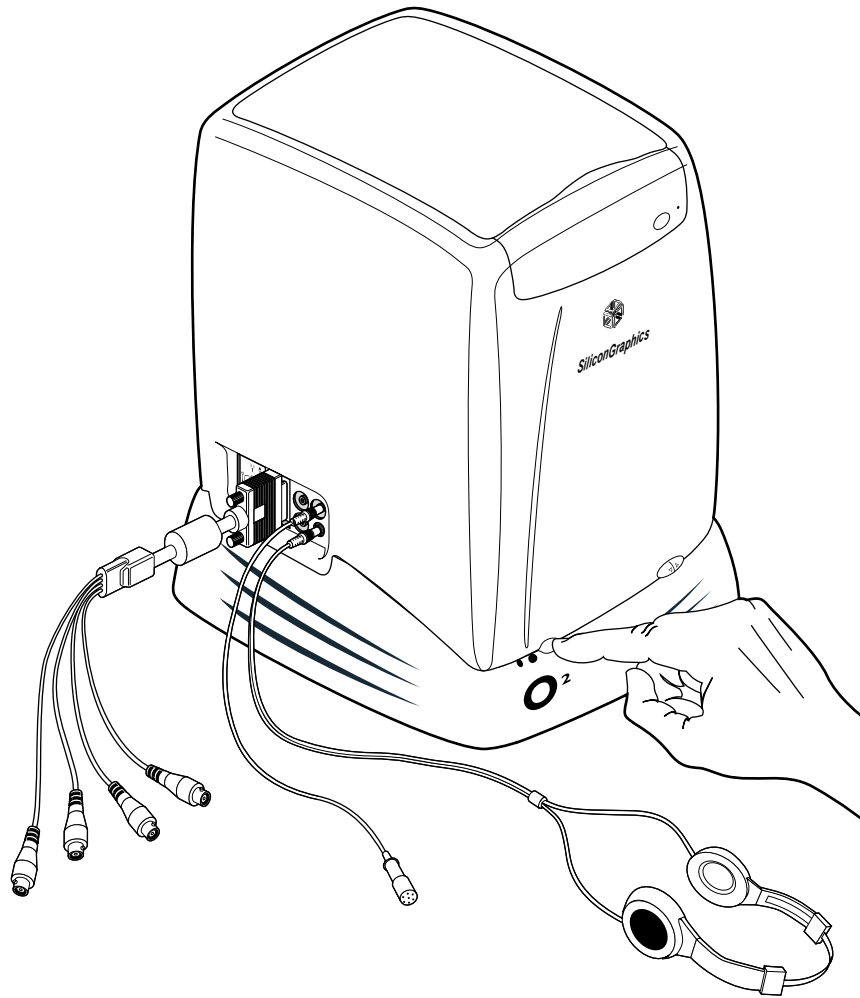


Figure 1-9 Turning On the Workstation

8. Turn on the workstation.

Verifying the Hardware Installation

Once you have installed the software and the digital video option module, verify that the system recognizes the new hardware:

Open a UNIX shell. At the prompt type

```
hinv
```

Look for a line similar to this:

```
AV: AV2 Card version xxxx
```

Note: You only see this listing if you have the video software installed. Read the release notes on the CD for information about which software to install.

Troubleshooting the Installation

If you do not see the `hinv` listing for the digital video option module:

1. Check that you have installed the correct software from the CD. Read the release notes on the CD for information about which software to install. The booklet that comes with the CD describes how to read release notes.
2. If the correct software is installed, turn off the workstation, remove the power cable, and go over each step of the hardware installation instructions again. Make sure the digital video option module is pushed back all the way into the chassis and that the lever is up. The module should be flush with the other modules.

Connecting an SDI Video Source to the Workstation

Follow these steps and refer to Figure 1-10 to connect the digital video source to the O2 workstation.

To record video input, you need a few additional items that are not included in your O2 Digital Video Option package.

- A professional-quality SDI (serial digital interface) video source.
- One or two cables with BNC connectors on each end.

- One or two analog audio cables with 3.5 mm stereo jack connectors on each end.

Note: Digital audio is provided by the Silicon Graphics PCI digital audio option board, a separate option. For more information, see your service provider. Or go to the following location on the Web:

<http://www.sgi.com/Products/hardware/desktop/products/digital.html>

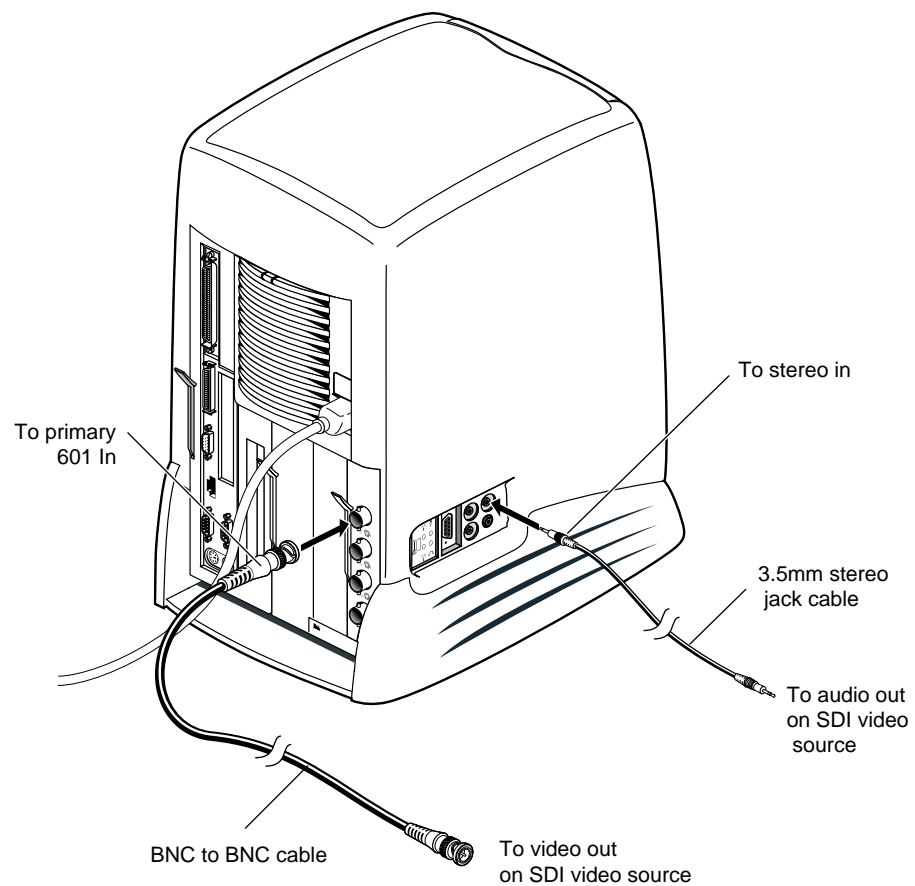


Figure 1-10 Connecting an SDI Video Source

1. Attach one end of the BNC cable to the D1 In 601 (primary) or D1 In 601 (secondary) connector on the rear of the digital video option module.
2. Attach the other end of the BNC cable to the Video Out connector on the SDI video source.
3. Attach one end of the 3.5 stereo jack cable to the Stereo In connector on the side panel of the digital video option module.
4. Attach the other end of the 3.5 mm stereo jack cable to the analog Audio Out connector on the SDI video source.

Placing a System Upgrade Regulatory Label

If you received a system upgrade label, tilt the O2 carefully and place it underneath the chassis. Do not cover the original label. For regulatory statements, see “Manufacturer’s Regulatory Declarations” on page 30.

Exchanging Modules

The O2 digital video option module and the analog audio-visual module are interchangeable. The system recognizes either module, however, you may need to remove or rename your `~/videopanelrc` file. See “Switching Between Analog Video and Digital Video” on page 25. To remove and replace the O2 digital video option module, follow these steps:

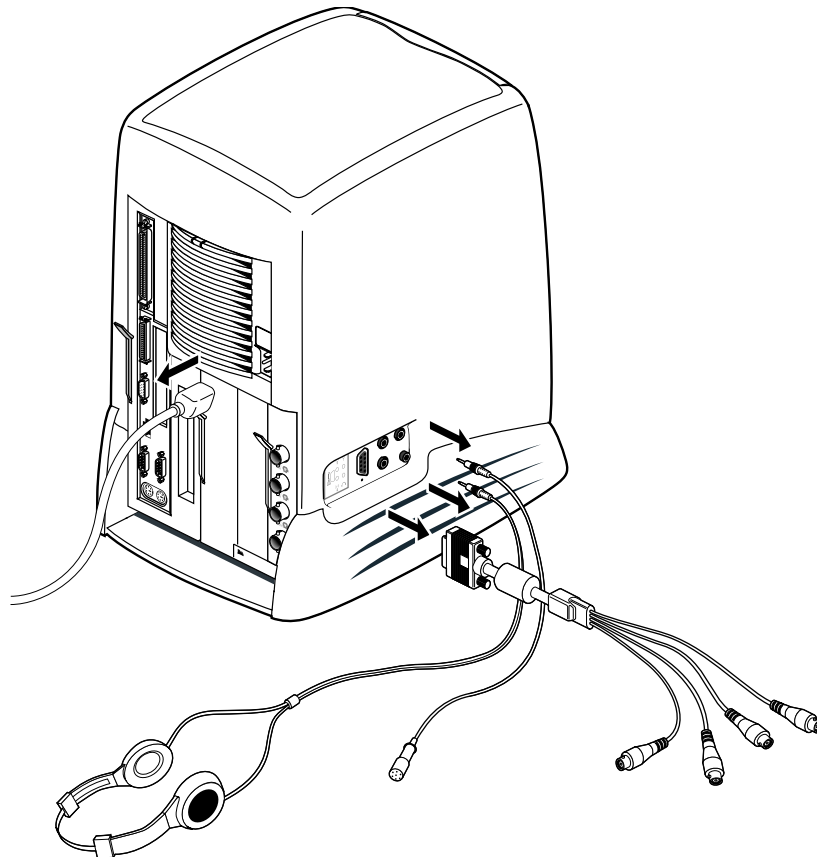


Figure 1-11 Disconnecting the Cables

1. Disconnect the power cable from the rear of the O2 workstation, and disconnect any cables attached to the side or rear of the digital video option module.

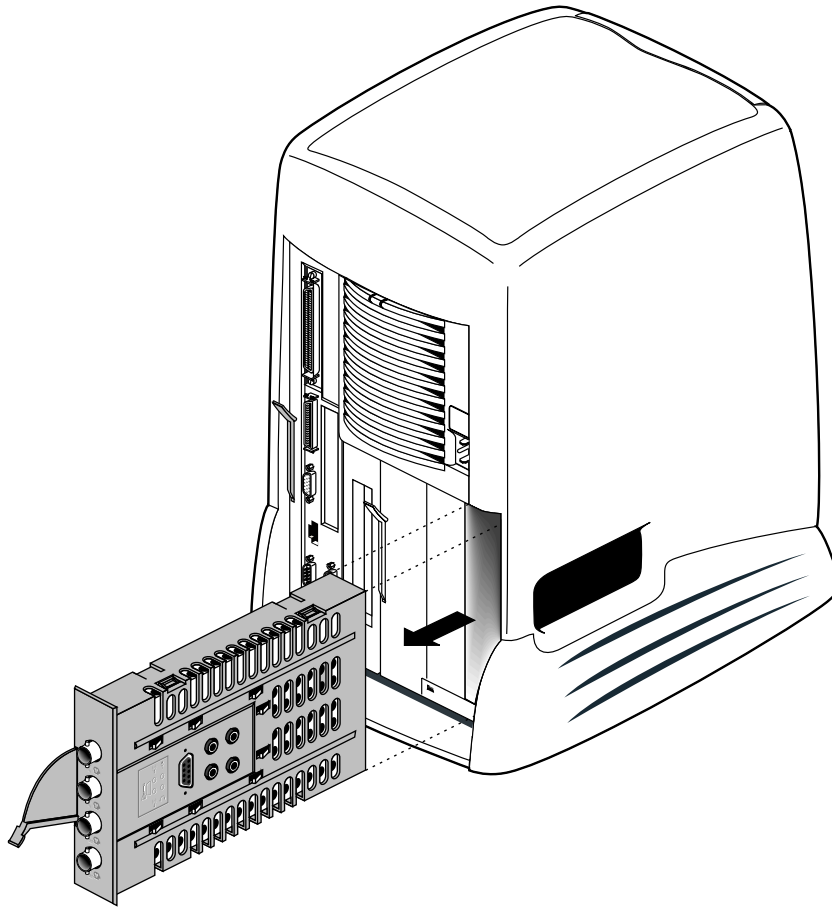


Figure 1-12 Removing the Digital Video Option Module

2. Pull down the lever on the digital video module and slide the module out of the chassis.

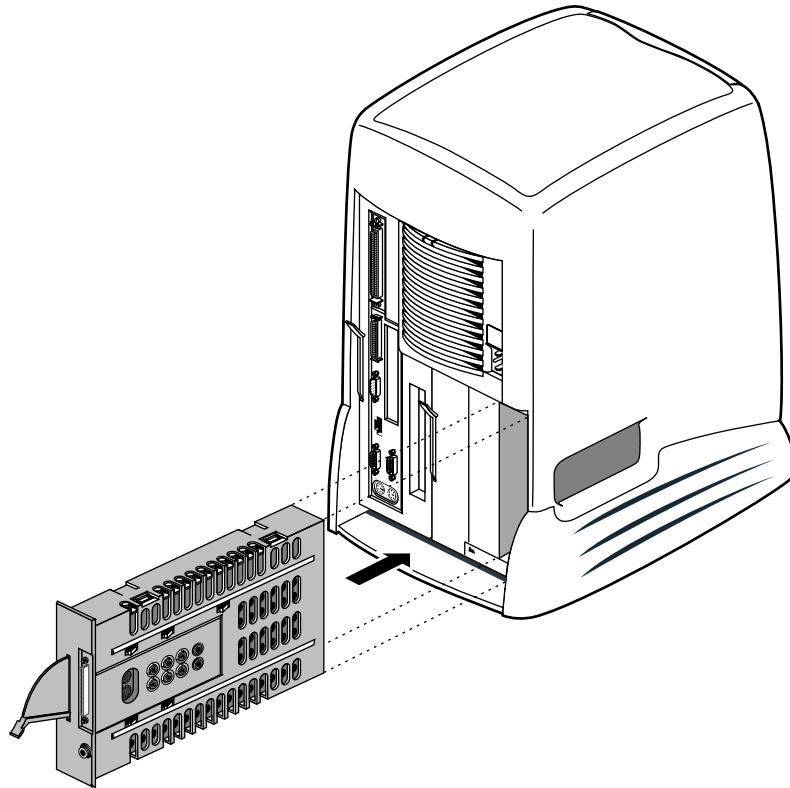


Figure 1-13 Installing the Analog Audio-Visual Module

3. Install the analog audio-visual module by sliding it into the chassis.

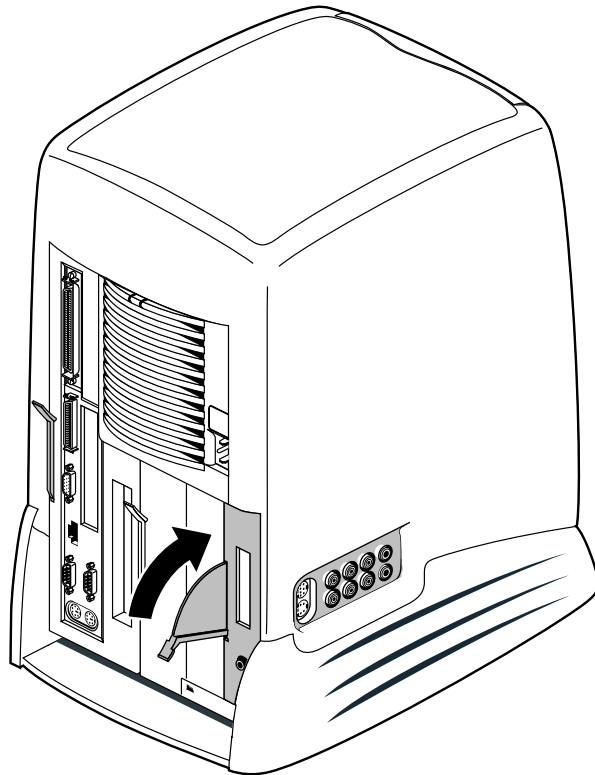


Figure 1-14 Locking the Analog Audio-Visual Module in Place

4. Push the lever all the way up to lock the module in place.
5. Reconnect any exterior cables.
6. Turn on the workstation.

Using the Digital Media Software

This chapter provides information on how to adjust Video Panel settings. For additional information, use the Help menus on the Video Panel and digital media tools, or the O2 video man pages. If you are creating high quality digital movies, you might consider using a third party application such as Adobe Premiere.

If you haven't already installed the O2 digital video option software and hardware, refer to Chapter 1, "Installing the O2 Digital Video Option Module."

The following topics are covered in this chapter:

- "Locating Additional Software Information" on page 20
- "Adjusting Video Parameters" on page 20
- "Locking Audio With Video" on page 22
- "Synchronizing to House Sync" on page 24
- "Using Video Commands From a UNIX Shell" on page 24
- "Switching Between Analog Video and Digital Video" on page 25

Locating Additional Software Information

The instructions in this section are based on current operating system software. If you have upgraded to a subsequent operating system, some of the instructions may no longer be valid. If this is the case, check the latest information by using the online documentation and the Help menus on the Video Panel and digital media tools.

- For more technical information on the O2 digital video option, refer to the O2 Video man pages. In a shell window, enter
`man 7 O2Video`
- For the latest information, read the release notes on the CD.
- For detailed information on using the digital media tools such as MediaRecorder, MediaConvert, and MovieMaker, see the online *Digital Media Tools Guide*. (From the Toolchest choose Help > Online Books > SGI_End User > Digital Media Tools Guide.)
- Use the online Help for digital media applications such as Media Recorder, MediaConvert, MovieMaker, and so on.
- Browse the Silicon Graphics Technical Publications Library. Enter the following in your Web Browser location window:
`http://techpubs.sgi.com/library/`

Adjusting Video Parameters

You can use the Video Panel to adjust video parameters such as input and output timing, default input source, and output genlock source and content.

There are several ways to start the Video Panel:

- From the Toolchest, choose Find > Control Panels and double-click the videopanel icon.
- Type `videopanel` in a shell window.
- From the Options menu of MediaRecorder, choose `Video Panel`.

The video panel for the O2 digital video option is shown in Figure 2-1.

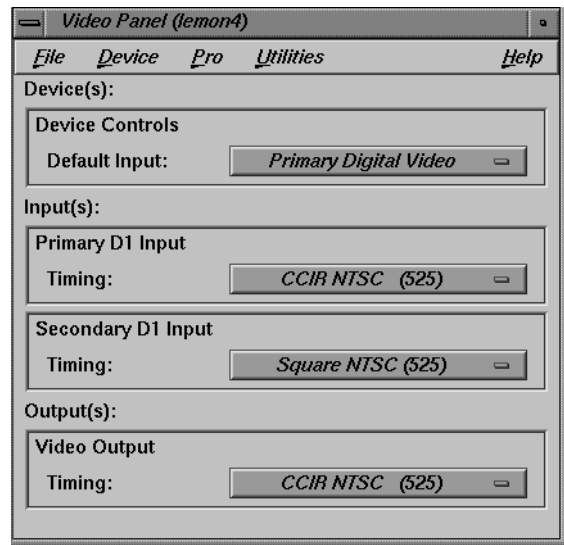


Figure 2-1 Video Control Panel For the O2 Digital Video Option

For details on adjusting settings in the Video Panel for the O2 digital video option, use the O2 Video man pages. In a shell window, type

```
man 7 O2Video
```

Note: There is an incorrect reference in the current O2Video man pages which will be corrected in future releases. In the section on Output Enable, when it refers to Analog Output, this corresponds to the Primary Video Channel (channel 1). When it refers to Digital Output, this corresponds to the Secondary Video Channel (channel 2).

Pro Menu Settings

Table 2-1 explains the settings in the Output Enable control panel of the Video Output-Signal window in the Pro menu.

Note: Since the input and output timings and genlocks require an active input or output, it's best to adjust the controls while an application performing video input or output is running. The easiest way to do this is to use `videoin` or `videoout` in the Utilities menu of the Video Panel.

Table 2-1 Output Enable Control Panel Settings

Output Enable Settings	Channel 1 Primary 601 Output	Channel 2 Secondary 601 Output
Pixels/Pixels	4:2:2 YCrCb	4:2:2 YCrCb
Pixels/Alpha	4:2:2 YCrCb	4:0:0 A
Alpha/Pixels	4:0:0 A	4:2:2 YCrCb
Alpha/Alpha	4:0:0 A	4:0:0 A
Passthru/Passthru	Sends input from input source to both outputs without traversing memory.	Sends input from input source to both outputs without traversing memory.

Locking Audio With Video

To lock the PCI digital audio option board with the digital video option board, you must apply house sync to both boards, as shown in Figure 2-2.

For information on using analog audio with the digital video option board, see the online *Digital Media Tools Guide*. (From the Toolchest choose Help > Online Books > SGI_End User > Digital Media Tools Guide.) Or, use the online help for the Audio Panel and digital media applications.

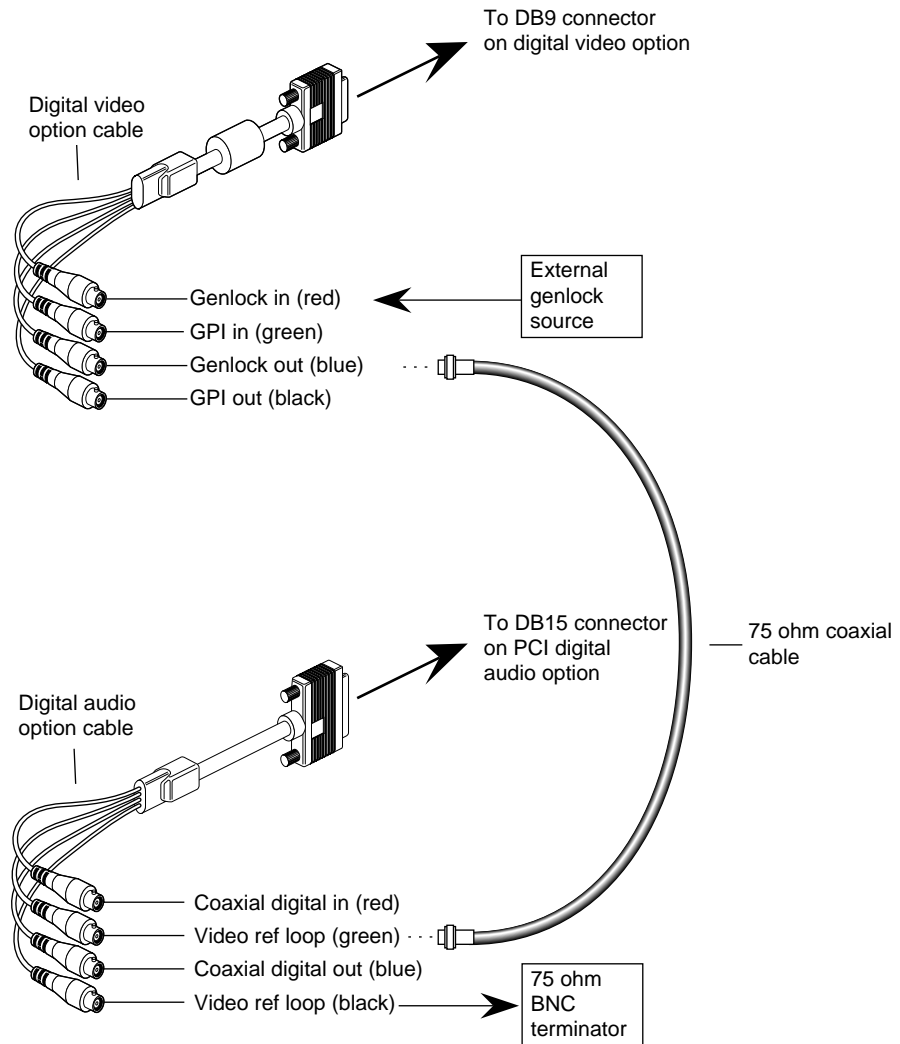


Figure 2-2 Locking Digital Audio With Digital Video

Synchronizing to House Sync

House sync is a timing signal generated to synchronize video equipment in a studio environment. The O2 Digital Video Option can be synchronized to a house sync source as follows.

1. Connect the house sync signal to the red Genlock In connector on the breakout cable.
2. In a shell window, enter `videopanel` to open the Video Panel.
3. From the Pro menu, choose Video Output > Signal Controls.
4. For Output Sync choose Genlock.
5. For Genlock Source choose External.

Note: With current software, genlock can only be selected for Output Sync if an application performing video output from memory is running. (This will be corrected in future releases.)

For more information on adjusting parameters in the Video Panel, refer to its online Help, or to the O2 video man pages. (Type `man 7 o2video` in a shell window.)

Using Video Commands From a UNIX Shell

From a UNIX shell, you can use the video tools listed below. Each of these tools has man pages.

<i>videoin</i>	Displays video input in a window on the graphics screen
<i>videout</i>	Sends graphics from a portion of the screen or the full screen to a video output port
<i>vintovout</i>	Receives video input and sends it to a device attached to the output port
<i>vidtomem</i>	Saves single frames from video input to memory
<i>mentovid</i>	Sends single frames from memory to an output port

Use the tools with the `-v` flag and a number to select inputs. To obtain the number, enter `vinfo` in a shell window. For example, to display input from Primary 601 In and output it to digital, use the command

```
vintovout -v 1
```

The default input is selected in the Device Controls Default Input panel in the Video Panel. All outputs are active on the O2 digital video option.

Switching Between Analog Video and Digital Video

The O2 digital video option module and the analog audio-visual module are interchangeable. The system recognizes either module, however, you should remove or rename your `~/videopanelrc` settings file. (In future operating system releases, you won't have to do this.) If you plan to make this switch frequently, you may want to save the above commands in a script file to save time.

Note: The settings file is saved in your \$HOME directory (denoted by the `~` in the examples below). You should make the change in all home directories for any user (including root) who starts up the Video Panel.

Follow these steps:

1. If the analog audio-visual module is currently installed and you saved the video panel settings, rename the `~/videopanelrc` file as follows:

In a shell window, enter

```
mv ~/.videopanelrc ~/.videopanelrc.analog
```

Or, if the digital video module is currently installed and you saved the video panel settings, rename the `~/videopanelrc` file as follows:

```
mv ~/.videopanelrc ~/.videopanelrc.digital
```

2. To switch between the two modules, link to the appropriate `~/videopanelrc` as follows.

- To switch to the digital video module, enter

```
rm -f ~/.videopanelrc
ln -s ~/.videopanelrc.digital ~/.videopanelrc
```
- To switch to the analog video module, enter

```
rm -f ~/.videopanelrc
ln -s ~/.videopanelrc.analog ~/.videopanelrc
```

Technical Specifications, Product Support, and Regulatory Information

This chapter contains the following topics:

- “Technical Specifications” on page 27
- “Manufacturer’s Regulatory Declarations” on page 30
- “Product Support” on page 33

Technical Specifications

Table 3-1 shows the pinout assignments for the DB9 Connector on the O2 digital video option board. Table 3-2 through Table 3-5 provide Serial CCIR601/SMPTE 259M, Genlock, and GPI specifications.

Table 3-1 DB9 Connector Pinout Assignments

Pin	Assignment
1	Analog Video Genlock In
2	Analog Video Genlock Gnd
3	GPI In
4	GPI In Gnd
5	NC
6	Analog Video Genlock loopthrough
7	Analog Video Genlock Gnd
8	GPI Out
9	GPI Out Gnd

Table 3-2 Serial CCIR601/SMPTE 259M Output Performance

Parameter	Specification
Signal amplitude	800 mV +/- 10%
Rise time	400 to 1500 ps
Fall time	400 to 1500 ps
Comparison rise and fall time	Within 500 ps
Overshoot rise	No more than 10% of amplitude, 77mV
Overshoot fall	No more than 10% of amplitude, 77mV
Jitter	Less than 20% of UI, 741 ps
Unit interval	3.704 ns
Cable length on transmit	300 meters for output
Output configuration	Two 8- or 10-bit serial CCIR601/SMPTE 259M digital video channels, one 4:2:2 program, and one 4:0:0 alpha. You can configure the channel type. The same signal can be mirrored on both outputs. For example, you can assign the 4:2:2 source to both outputs simultaneously. Or you can assign the 4:0:0 source to both outputs simultaneously.

Table 3-3 Serial CCIR601/SMPTE 259M Input Performance

Parameter	Specification
Signal amplitude	800 mV +/- 10%
Rise Time	400 to 1500 ps
Fall time	400 to 1500 ps
Comparison rise and fall time	Within 500 ps
Overshoot rise	No more than 10% of amplitude, 77mV

Table 3-3 (continued) Serial CCIR601/SMPTE 259M Input Performance

Parameter	Specification
Overshoot fall	No more than 10% of amplitude, 77mV
Unit interval	3.704 ns
Cable length on transmit	300 meters
Input configuration	Two independent 10-bit serial CCIR601/SMPTE 259M digital video inputs

Table 3-4 Genlock Performance

Parameter	Specification
Input signal	NTSC/PAL composite video, black-burst, or composite sync signal, or either of the two serial digital video inputs.
Jitter performance	Less than 741 ps on the serial digital video output stream when genlocked to the analog video source. The jitter is somewhat less when genlocking to either of the two digital video inputs.

Table 3-5 GPI Input/Output

Parameter	Specification
Output	Open collector, optically isolated, active low.
Input	Active low, optically isolated.

Manufacturer’s Regulatory Declarations

Caution: This device has several governmental and third-party approvals, licenses, and permits. Do not modify this product in any way that is not expressly approved by Silicon Graphics. If you do, you may lose these approvals and your governmental agency authority to operate this device.

The device conforms to several national and international specifications and European Directives listed on the Manufacturer’s Declaration of Conformity. The CE insignia displayed on each device is an indication of conformity to the European requirements.

Class A

Table 3-6 Class A FCC Declaration of Conformance

Trade Name	Silicon Graphics, Inc.
Product	O2 Digital Video Option Module
Model Number	CMNB014A
Date of Conformance	September 1997
Responsible Party	Silicon Graphics, Inc.
Address	2011 North Shoreline Boulevard, Mountain View, California 94043-1389
Telephone	(650) 933-1071

This equipment complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a

particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Caution: The user is cautioned that changes or modifications to the equipment not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Electromagnetic Emissions

The following information applies to the system base configuration. Refer to the Manufacturer's Declaration of Conformity for your system's specific classification.

This device complies with the Class A limits of Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- This device may not cause harmful interference.
- This device must accept any interference received, including interference that may cause undesired operation.

This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe B respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

This device complies with Class A electromagnetic emissions limits of C.I.S.P.R. Publication 22, Limits and Methods of Measurement of Radio Interference Characteristics of Information Technology Equipment; Class A limits for Information Technology Equipment; and Japan's VCCI Class A limits.

この装置は、情報処理装置等電波障害自主規制協議会 (VCCI) の基準に基づくクラス A 情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。

Figure 3-1 Japan's VCCI Class A Statement

Radio and Television Interference

The equipment described in this guide generates and uses radio frequency energy. If it is not installed and used in accordance with the instructions in this guide, it can cause radio and television interference.

This equipment has been tested and complies with the limits for a Class A computing device in accordance with the specifications in Part 15 of FCC rules. These specifications are designed to provide reasonable protection against such interference in an industrial or office installation. However, there is no guarantee that the interference will not occur in a particular installation. This system is not certified for home use.

You can determine whether your system is causing interference by turning it off. If the interference stops, it was probably caused by the workstation or one of the peripherals. To tell if the interference is caused by one of the peripherals, try disconnecting one peripheral at a time to see if the interference stops. If it does, that peripheral is the cause of the interference.

If your workstation does cause interference to radio or television reception, try to correct the interference by using one or more of the following suggestions:

- Turn the television or radio antenna until the interference stops.
- Move the workstation to one side or the other of the radio or television.
- Move the workstation farther away from the radio or television.
- Plug the workstation into an outlet that is on a different circuit from the radio or television. (That is, make certain the workstation and the radio or television are on circuits controlled by different circuit breakers or fuses.)
- For additional information, check the FCC web site at <http://www.fcc.gov/Bureaus/Compliance/WWW/tribook.html>

Shielded Cables

The device is FCC-compliant under test conditions that include the use of shielded cables between the workstation and its peripherals. Your workstation and any peripherals you purchase from Silicon Graphics have shielded cables. Shielded cables reduce the possibility of interference with radio, television, and other devices. If you use any cables that are not from Silicon Graphics, make sure they are shielded. Telephone cables do not need to be shielded.

Electrostatic Discharge

Silicon Graphics designs and tests its products to be immune to the effects of electrostatic discharge (ESD). ESD is a source of electromagnetic interference and can cause problems ranging from data errors and lockups to permanent component damage.

It is important that while you are operating your workstation you keep all the covers and doors, including the plastics, in place. The shielded cables that came with the workstation and its peripherals should be installed correctly, with all thumbscrews fastened securely.

An ESD wrist strap is included with some products, such as memory and graphics upgrades. The wrist strap is used when installing these upgrades to prevent the flow of static electricity, and it should protect your system from ESD damage.

Product Support

Silicon Graphics provides a comprehensive range of product support for its products. If you are in North America and would like support for your Silicon Graphics supported products, contact the Technical Assistance Center at 1-800-800-4SGI or your authorized service provider. If you are outside North America, contact the Silicon Graphics subsidiary or authorized distributor in your country.

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