

# SGI™ ImageSync™ User's Guide

007-4465-001

---

## CONTRIBUTORS

Written by Ken Jones

Illustrated by Chrystie Danzer and Dan Young

Edited by Susan Wilkening

Production by Bryan Perkins

Engineering contributions by Shrijeet Mukherjee

---

## COPYRIGHT

© 2001 Silicon Graphics, Inc. All rights reserved; provided portions may be copyright in third parties, as indicated elsewhere herein. No permission is granted to copy, distribute, or create derivative works from the contents of this electronic documentation in any manner, in whole or in part, without the prior written permission of Silicon Graphics, Inc.

---

## LIMITED RIGHTS LEGEND

The License applicable to this software provides that the Licensed Software is for use only on the accompanying SGI Graphics Cluster and that it is not supported on any other systems or platforms. Accordingly, it is a violation of the License and applicable law and international treaties to distribute or run the software on non-SGI hardware.

The electronic (software) version of this document was developed at private expense; if acquired under an agreement with the USA government or any contractor thereto, it is acquired as "commercial computer software" subject to the provisions of its applicable license agreement, as specified in (a) 48 CFR 12.212 of the FAR; or, if acquired for Department of Defense units, (b) 48 CFR 227-7202 of the DoD FAR Supplement; or sections succeeding thereto. Contractor/manufacturer is Silicon Graphics, Inc., 1600 Amphitheatre Pkwy 2E, Mountain View, CA 94043-1351.

---

## TRADEMARKS AND ATTRIBUTIONS

Silicon Graphics and OpenGL are registered trademarks, and SGI, the SGI logo, SGI DataSync, SGI Graphics Cluster, SGI ImageSync, and SynaptIQ are trademarks of Silicon Graphics, Inc.

Linux is a registered trademark of Linus Torvalds. Windows NT is a registered trademark of Microsoft Corporation.

---

## Record of Revision

<b>Version</b>	<b>Description</b>
001	August 2001 Original publication.



# Contents

<b>Figures</b> . . . . .	vii
<b>About This Guide.</b> . . . . .	ix
Audience . . . . .	ix
Related Publications . . . . .	ix
Conventions . . . . .	x
Reader Comments . . . . .	x
<b>1. SGI ImageSync Overview</b> . . . . .	1
SGI Graphics Cluster System Architecture . . . . .	1
System Software . . . . .	3
What SGI ImageSync 1.0 Provides . . . . .	5
<b>2. Using SGI ImageSync</b> . . . . .	7
Configuring SGI ImageSync . . . . .	7
Windows NT Configuration . . . . .	7
Linux Configuration . . . . .	8
Starting SGI ImageSync . . . . .	9
Controlling Video Lock from the Master Node . . . . .	9
Monitoring the Status of SGI ImageSync Cards . . . . .	11
Running the Diagnostics . . . . .	11
Likely Problem Areas . . . . .	13

Troubleshooting . . . . .	.14
How to Stop and Restart SGI ImageSync . . . . .	.14
Displays Are Not in Sync. . . . .	.15
You See a Failed to lock video timing Message. . . . .	.15
Diagnostics Report Channel Node as Master . . . . .	.16
You Detect Faulty Networking . . . . .	.16

---

# Figures

<b>Figure 1-1</b>	Sample Configuration of an SGI Graphics Cluster Series 12 . . . . .	2
<b>Figure 1-2</b>	System Software Architecture. . . . .	4
<b>Figure 2-1</b>	<b>SGI ImageSync Control Window</b> . . . . .	10
<b>Figure 2-2</b>	Sample Output from a Diagnostics Run . . . . .	12



---

## About This Guide

This guide describes the SGI ImageSync component of the SGI Graphics Cluster, which provides high-end graphics for visual simulation and virtual reality applications. The SGI Graphics Cluster uses either the Linux or Windows NT operating system and incorporates proprietary hardware and software from SGI.

SGI ImageSync is a component of the SGI Graphics Cluster Series 12. The SGI ImageSync component provides the hardware and software needed to synchronize the displays of all your graphics systems in the various nodes.

## Audience

This guide targets the following three audiences:

- Applications programmers
- End users
- Independent software vendors (ISVs)

## Related Publications

The following SGI documents contain additional information that may be helpful:

- *SGI DataSync Programmer's Guide*
- *SGI SynaptIQ Administrator's Guide*
- *SGI Graphics Cluster Hardware User's Guide*
- *SGI Graphics Cluster Quick Start Guide*

To obtain SGI documentation, see the SGI Technical Publications Library at <http://techpubs.sgi.com>.

## Conventions

The following conventions are used throughout this document:

Convention	Meaning
<code>command</code>	This fixed-space font denotes literal items such as commands, files, routines, path names, signals, messages, programming language structures, and URLs.
<i>variable</i>	Italic typeface denotes variable entries and words or concepts being defined.
<b>user input</b>	This fixed-space font denotes literal items that the user enters in interactive sessions. Output is shown in nonbold, fixed-space font.
<b>interface</b>	This font denotes the names of graphical user interface (GUI) elements such as windows, screens, dialog boxes, and menus. Functions are also denoted in bold with following parentheses.
<code>manpage(x)</code>	Man page section identifiers appear in parentheses after man page names.

## Reader Comments

If you have comments about the technical accuracy, content, or organization of this document, please tell us. Be sure to include the title and document number of the manual with your comments. (Online, the document number is located in the front matter of the manual. In printed manuals, the document number is located at the bottom of each page.)

You can contact us in any of the following ways:

- Send e-mail to the following address:  
`techpubs@sgi.com`
- Use the Feedback option on the Technical Publications Library World Wide Web page:  
`http://techpubs.sgi.com`

- Contact your customer service representative and ask that an incident be filed in the SGI incident tracking system.
- Send mail to the following address:  
Technical Publications  
SGI  
1600 Amphitheatre Pkwy., M/S 535  
Mountain View, California 94043-1351
- Send a fax to the attention of “Technical Publications” at +1 650 932 0801.

SGI values your comments and will respond to them promptly.



## **SGI ImageSync Overview**

This overview of SGI ImageSync 1.0 consists of the following sections:

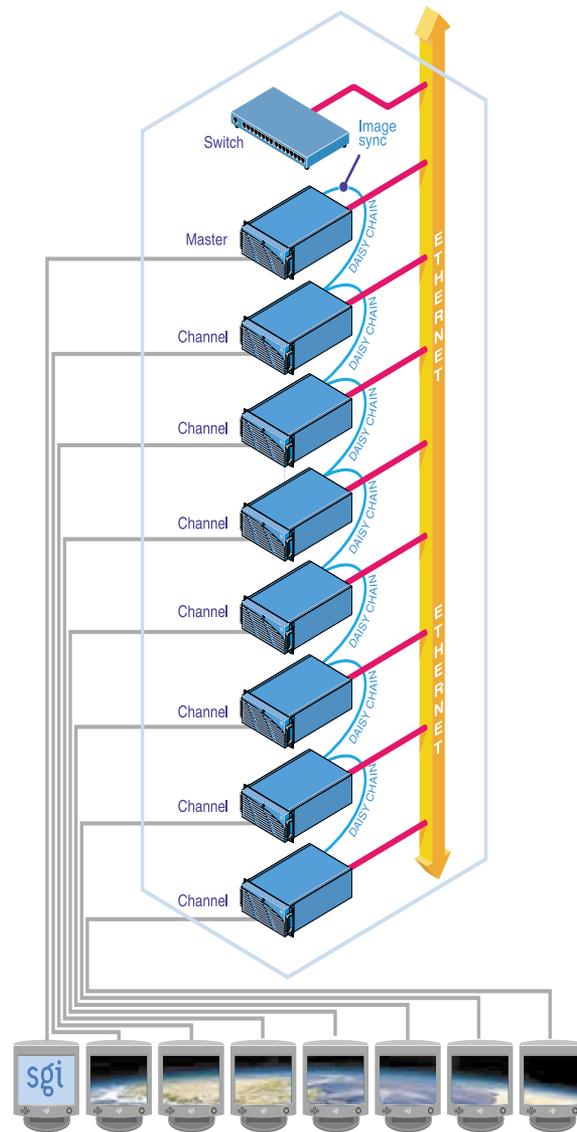
- “SGI Graphics Cluster System Architecture”
- “System Software”
- “What SGI ImageSync 1.0 Provides”

### **SGI Graphics Cluster System Architecture**

The SGI Graphics Cluster uses either the Linux or Windows NT operating system and incorporates proprietary hardware and software from SGI. The hardware consists of the following:

- A single master node
- Multiple visual channel nodes (each with a commercial graphics card)
- An Ethernet backbone, including a network switch
- An optional SGI ImageSync network

Figure 1-1 illustrates the hardware architecture.



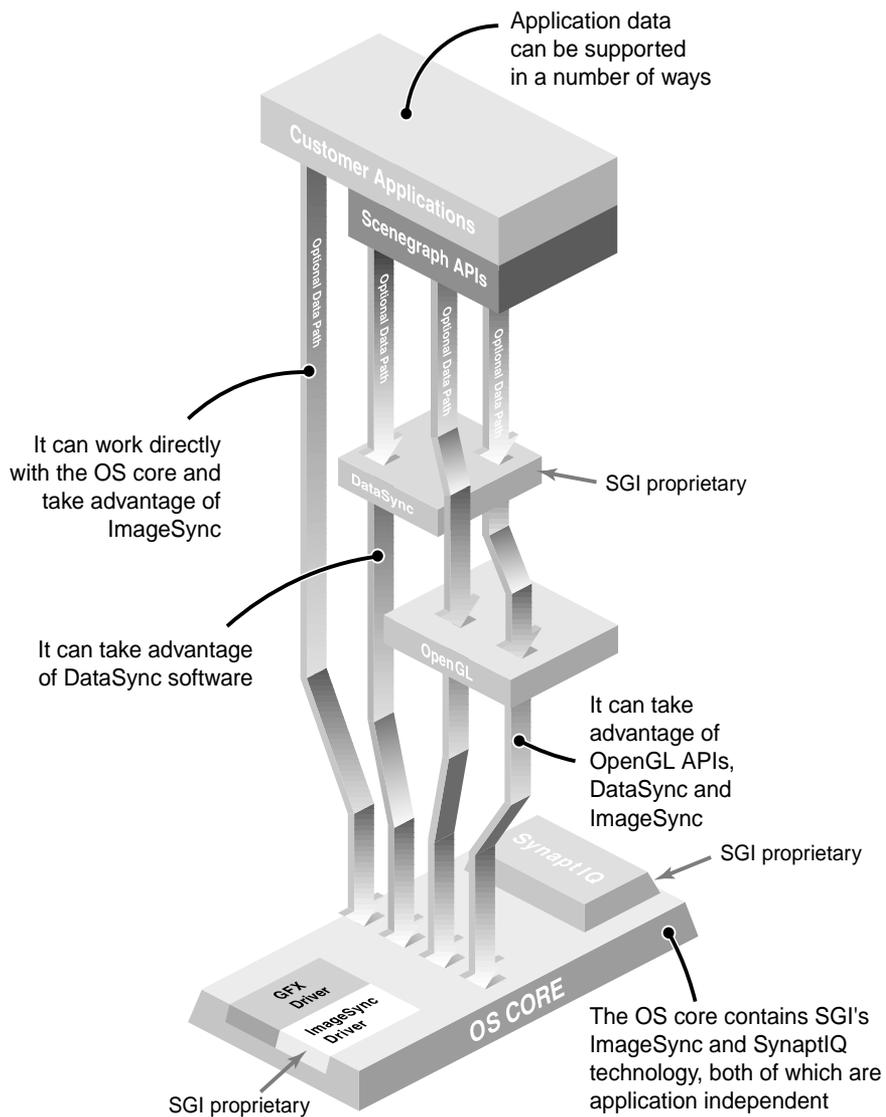
**Figure 1-1** Sample Configuration of an SGI Graphics Cluster Series 12

## System Software

The software for the SGI Graphics Cluster Series 12 consists of the following:

- Operating system (Windows NT 4.0 or SGI Linux kernel with XFS support (2.4.2-5SGI-137 or greater))
- SGI ImageSync device drivers
- SGI SynaptIQ (Linux systems only)
- SGI DataSync (Linux systems only)

Figure 1-2 illustrates the software architecture.



**Figure 1-2** System Software Architecture

## What SGI ImageSync 1.0 Provides

The SGI ImageSync component provides the hardware and software needed to synchronize the displays of all your graphics systems in the various nodes. SGI ImageSync 1.0 provides the *frame lock* feature, line-locked video through a daisy-chained system of SGI ImageSync cards. It guarantees pixel-locked video streams with a phase difference of less than 50 pixels.

As illustrated in Figure 1-2, SGI ImageSync 1.0 supports two of four possible data paths for your applications. Each path uses a subset or the full set of features provided by the SGI Graphics Cluster system. Table 1-1 describes the four data paths.

**Table 1-1** SGI ImageSync 1.0 Features

<b>Data Path</b>	<b>Features Used</b>	<b>OS Support</b>
Application to OS directly	Frame lock	Windows NT and Linux
Application to SGI DataSync to OS	Frame lock	Linux
Application to OpenGL to OS		Windows NT and Linux
Application to SGI DataSync to OpenGL to OS		Linux



## Using SGI ImageSync

This chapter describes how to use SGI ImageSync 1.0. The following sections describe the pertinent tasks:

- “Configuring SGI ImageSync”
- “Starting SGI ImageSync”
- “Controlling Video Lock from the Master Node”
- “Monitoring the Status of SGI ImageSync Cards”
- “Troubleshooting”

---

**Note:** You can only use SGI ImageSync from the master node of the cluster.

---

### Configuring SGI ImageSync

You must register all cluster nodes for the cluster. There are separate registration procedures for Windows NT and Linux, as described in the following subsections.

#### Windows NT Configuration

On Windows NT, you must configure SGI ImageSync on both the master and the channel nodes.

##### Master Node

On the master node, you must add the IP addresses of each channel node to the registry. You add these values to the parameter **DiagTest1**, which is found under the registry key **HKEY\_LOCAL\_MANAGER**. Use the following path to access **DiagTest1**:

**HKEY\_LOCAL\_MANAGER** —> **System** —> **CurrentControlSet** —> **Services** —> **ImageSync** —> **Parameters**.

The first string of **DiagTest1** is `res`. Do not alter it. Make the second string the IP address of the first channel node, make the third string the IP address of the second channel node, and so on.

## Channel Nodes

On each channel node, you must add the IP address of the master node to the registry. You add this value to the parameter **MASTER\_ADDR**, which is found under the registry key **HKEY\_LOCAL\_MANAGER**. Use the following path to access **MASTER\_ADDR**:

**HKEY\_LOCAL\_MANAGER** —> **System** —> **CurrentControlSet** —> **Services** —> **ImageSync** —> **Parameters**.

## Linux Configuration

On Linux systems, you need to add an SGI ImageSync configuration file to the master node with the name `/etc/channel_list`. Make this file a simple text file with the following format and contents:

```
number-of-channels  
channel0-address  
channel1-address  
channel2-address  
:  
:  
:  
channeln-address
```

The variables represent the following:

<i>number-of-channels</i>	Number of channel nodes in the cluster
<i>channeli-address</i>	IP address or host name of channel <i>i</i>

## Starting SGI ImageSync

On Linux systems, you enter the following to start the control application:

```
# /usr/share/ImageSync/bin/imagesync
```

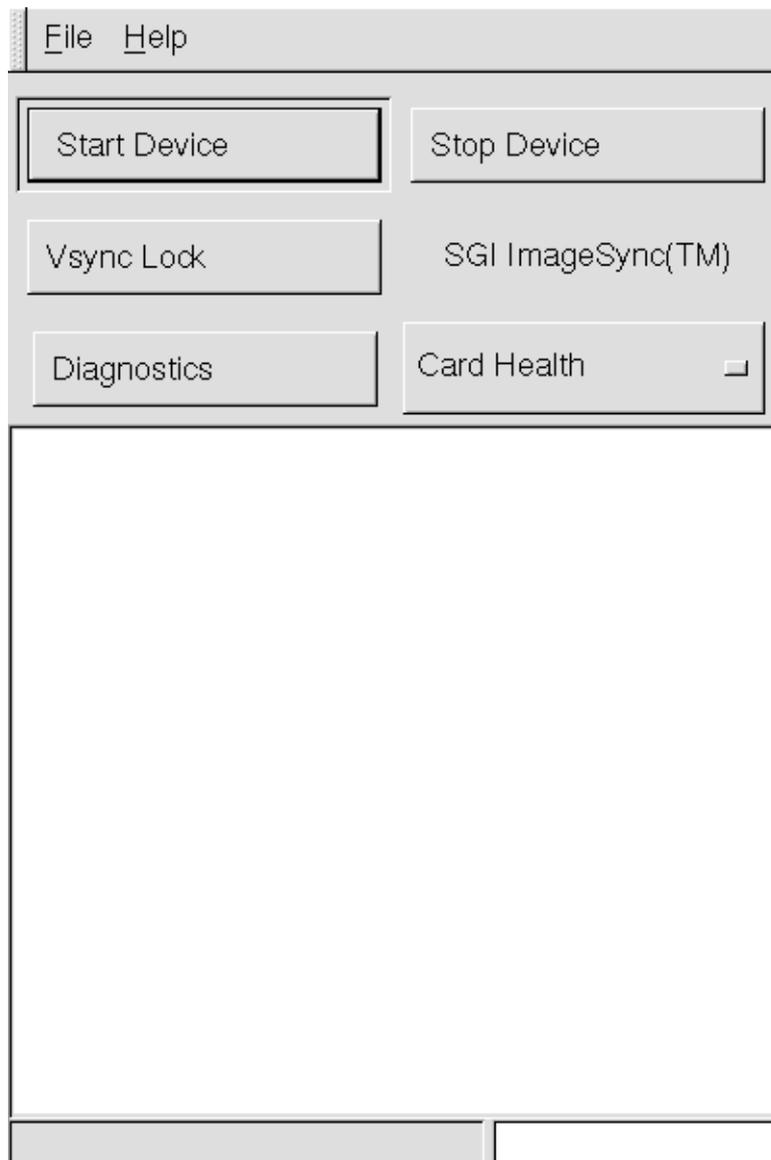
On Windows NT systems, you can use one of the following two methods:

- Use the following menu path **Start** —> **Program** interface.
- Execute the following file:

```
C:\System32\ImageSync\ImageSync.exe
```

## Controlling Video Lock from the Master Node

When your system is configured and started, you should have an **SGI ImageSync Control Window** on the monitor of the master node, as shown in Figure 2-1.



**Figure 2-1** SGI ImageSync Control Window

To enable video lock (also called *frame lock*), click the **Vsync Lock** button from this panel. The text panel will show a message indicating that the video locking was initiated. After a second or so, take a look at the status bar in the bottom left corner of the window. The status bar will indicate the status of the program. Upon success, you should see the following message in the status bar:

```
Video timing locked
```

---

**Note:** On Linux systems, the `imagesync` command has a `-v` command-line option, which you can use in a script to start the application and lock video.

---

## Monitoring the Status of SGI ImageSync Cards

This section describes how you run diagnostics on the SGI ImageSync cards and then describes the types of problems the diagnostics are likely to identify.

### Running the Diagnostics

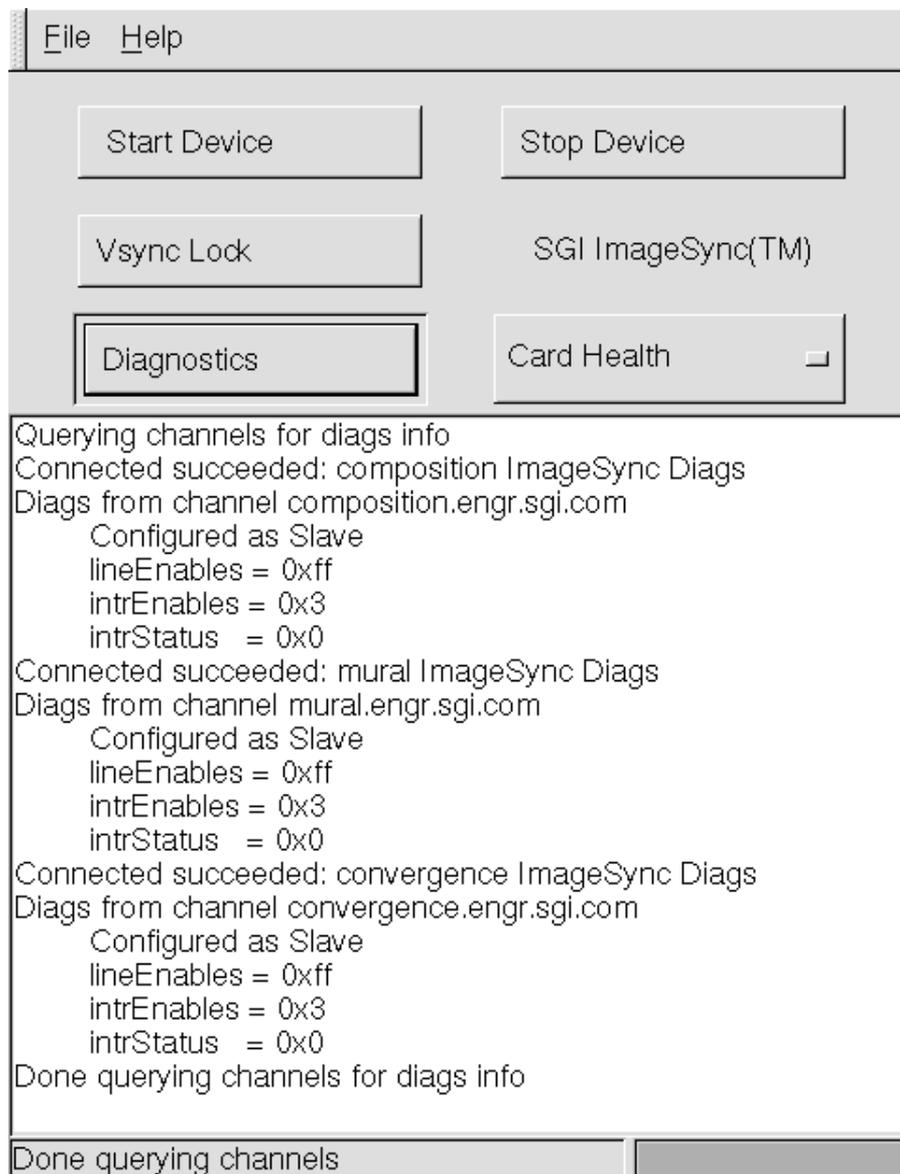
To run the diagnostics, do the following:

1. Ensure that SGI ImageSync is configured and started as described earlier in this chapter.
2. In the **SGI ImageSync Control Window**, ensure that the **Card Health** option is selected for **Diagnostics**.
3. Click the **Diagnostics** button.

In the text panel, the system will print the results of the following tests for component channels:

- Success/failure to connect
- SGI ImageSync card status
- Cable connectivity

Figure 2-2 shows sample output from a diagnostics run.



**Figure 2-2** Sample Output from a Diagnostics Run

The output printed into the text panel has the following six lines for each channel node if the system is healthy:

- a. A `Connected` message
- b. `Diags from channel channel-name`
- c. A `clkSource` value (Configured as Slave/Master)
- d. A hex `lineEnables` value
- e. A hex `intrEnables` value
- f. A hex `intrStatus` value

If the system fails to get a response from all the channel nodes defined by you during SGI ImageSync configuration, then it reports the following message:

```
Error on one or more channels
```

## Likely Problem Areas

The diagnostics are likely to identify problems in the following three areas:

- Networking
- SGI ImageSync driver functionality and PCI interface
- SGI ImageSync card and connectivity

### Networking

The diagnostics program uses a special service to gather information about all the SGI ImageSync cards in the cluster. Therefore the first thing tested is network connectivity, which will be reported by either a `Connected succeeded` message or an OS-dependent system failure code that indicates a network layer connect failure.

### SGI ImageSync Driver Functionality and PCI Interface

The diagnostics program queries the PCI registers of the SGI ImageSync cards. The message `Diags from channel channel-name` indicates that the drivers are active and the cards have working PCI interfaces.

## SGI ImageSync Card and Connectivity

The diagnostics application reports the cable connectivity status of all the channels in the system. If a cable is disconnected or misconnected in the system, then the diagnostics show the channel connected downstream to be “configured as a master”. In this event, check the cable of the channel node incorrectly reported as the “master”.

## Troubleshooting

This section describes how to stop and restart SGI ImageSync as well as miscellaneous problems you might encounter and what to do to solve them.

- “How to Stop and Restart SGI ImageSync”
- “Displays Are Not in Sync”
- “You See a Failed to lock video timing Message”
- “Diagnostics Report Channel Node as Master”
- “You Detect Faulty Networking”

## How to Stop and Restart SGI ImageSync

You can start and stop SGI ImageSync from the master node or from one of the channel nodes.

- On the master node, use the **Start** and **Stop** buttons on the control panel.
- To stop SGI ImageSync from a channel node, do the following:

(on Windows NT systems)

Using the **Services** interface, stop the SGI ImageSync service.

(on Linux systems)

Enter the following:

```
# pconsole.sh channel0 channel1 ... channeln /sbin/rmmod imagesync  
# pconsole.sh channel0 channel1 ... channeln /sbin/rmmod windrvr
```

- To start SGI ImageSync from a channel node, enter the following:  
(on Windows NT systems)

Using the **Services** interface, start the SGI ImageSync service.

(on Linux systems)

Enter the following:

```
# pconsole.sh channel0 channel1 ... channeln /sbin/insmod windrvr
# pconsole.sh channel0 channel1 ... channeln /sbin/insmod imagesync
```

## Displays Are Not in Sync

One scenario that might cause displays not to be in sync is for an application to change its operating monitor resolution. Video synchronization will not be maintained if an application tries to change its operating monitor resolution while an application using SGI ImageSync is still running. After any change in resolution in the master or any of the channel nodes, perform a complete restart of SGI ImageSync (including the video lock operation).

In general, if you get this symptom, ensure that video lock is enabled by following the procedure described earlier in “Controlling Video Lock from the Master Node”.

## You See a Failed to lock video timing Message

If you get the message Failed to lock video timing when you try to enable video lock, do the following:

1. Ensure that you have SGI ImageSync configured correctly.  
See the section “Configuring SGI ImageSync”.
2. Retry the video lock procedure.  
See the section “Controlling Video Lock from the Master Node”.
3. If video lock is still disabled, run diagnostics by clicking the **Diagnostics** button from the **SGI ImageSync Control Window**.

In the case of a cable error, it is possible to get a false positive on the video locking procedure. If you are not sure, run the diagnostics program and it will tell you which node has the problem.

## **Diagnostics Report Channel Node as Master**

If a diagnostics run incorrectly reports a channel node as the master, do the following:

1. Check the cable coming into the channel node reported incorrectly as a master.
2. Reseat the boards.

## **You Detect Faulty Networking**

If you detect faulty networking, recable the network.