Trinity

Installation and Troubleshooting Guide

PLAY®

Printed in USA

Installation And Troubleshooting Guide Table Of Contents

Chapter 1

Document Overview

This chapter covers the following topics:

Introduction

This manual provides information for the experienced technical user or engineer who wants a more in-depth look at the inner workings and configurations of the Trinity system. It also provides instructions for those Trinity users in remote locations who, due to lack of access to a dealer, are setting up their own system. For these people, the manual provides information about Trinity's minimum host PC requirements and step-by-step instructions on how to set up the system. For technical users, it contains a reference section on the Trinity cards, technical tips for maximizing Trinity's capabilities and troubleshooting problems, and detailed information on the system's specifications. These pages also include recommendations and instructions for hooking up and configuring video equipment and cameras.

Conventions

Before we get too far into the manual, let's take a moment to explain some of the conventions that appear within.

General Conventions

The following formats are used to identify special instructions or important points in this manual.

1. (numbered)	Indicates step-by-step instructions to follow.
Bold Type	Indicates words you see on the screen, such as words you should type, buttons you should click, names of menus or windows, and file path names.
Italic Type	Indicates emphasis of important points.
	This manual covers both versions 1.3 and 2.1. When a feature is only available in 2.1, this icon appears in the margin to let you know that this feature is not available in the 1.3 software. If you decide later you would like these features, your Trinity dealer can sell you the Trinity 2.1 software upgrade kit. Version 2.1 is required for Time Machine users, and it includes many new features for users without Time Machine as well. Contact your dealer for more information. The Trinity software version 1.3 is a free upgrade available on the Play web site (www.play.com) or from your Trinity dealer. The 1.3 software patch upgrades version 1.2 to 1.3. It includes many enhancements and bug fixes, and is recommended for all 1.2 users.

Mouse Conventions

Trinity is designed for use with a two-button mouse. The following table explains mouse commands used in this manual.

Click	Place the mouse pointer over an object. Press the *left* mouse button and immediately release.
Click-and-drag	Place the mouse pointer over an object. Press the *left* mouse button. While holding the button down, move the mouse around. This is used mainly to draw boxes over objects to select them.
Double-click	Place the mouse pointer over an object. Press the *left* mouse button twice quickly and immediately release.
Drag-and-drop	Place the mouse pointer over an object. Press the *left* mouse button and hold it down. Drag (move) the object anywhere on your screen. When you release the mouse button, the object is dropped where the mouse pointer is aimed.
Right-click	Place the mouse pointer over an object. Press the *right* mouse button and immediately release.

Contact Information

If you have questions about Trinity and its applications or hardware, there are a number of ways to contact Play's friendly, knowledgeable support staff.

Email	General Questions:	customerservice@play.com
	Trinity Support:	trinitysupport@play.com
Mail	Play's Intergalactic Headquarters	Play Incorporated 2890 Kilgore Road Rancho Cordova CA 95670-6133
Phone & Fax	Technical Support	916.636.2444 (7:00 AM to 6:00 PM PST, Monday-Friday)
	Corporate Office:	916.851.0800
	General Fax:	916.851.0801
	Customer Support Fax:	916.853.9831
	Sales Department Fax:	916.631.0705
Web Pages	Trinity Updates:	http://www.play.com/trinity/updates
	Main Page:	http://www.play.com
	Contact Page:	http://www.play.com/play/trinity/phone.cfm
	Knowledge Base and FAQ:	http://www.play.com/cgi-bin/rightnow
	Trinity Forum:	Go to cf.play.com/play/trinity, click on Discussion Forum in left column under User Resources.
	Trinity Q & A	cf.play.com/play/support

Chapter 2

System Requirements

This chapter covers the minimum requirements and the recommended specifications for the software and hardware of the host PC, which is a key part of your Trinity system. It includes information on the following topics:

System Requirements For The Host PC

Trinity is designed so that all real-time video processing occurs entirely inside the Trinity chassis, ensuring the highest quality video. However, there are important system requirements that need to be met in order to have a properly functioning Trinity. The Trinity software suite runs on a standard Windows NT or Windows 2000 Professional personal computer. A single high-bandwidth PCI card fits inside your PC, connecting it to Trinity at speeds of 400 MB per second at distances of up to 250 feet. Because all of the video processing occurs inside the Trinity chassis, once you meet the minimum PC requirements, the system always produces broadcast quality video in real time. The primary benefit of a more powerful PC is improved speed of non-real-time operations, such as painting and compositing operations and custom effect generation.

Minimum Requirements

The following is a list of the minimum requirements for the PC that hosts your Trinity:

- Windows NT 4.0 (Service Pack 3 or later), or Windows 2000 Professional
- Intel Pentium 200 MHz
- 64 megabytes of system memory (RAM)
- 2 gigabytes of free PC hard disk space
- CD-ROM or DVD-ROM drive
- PC graphics display capable of 1280-by-1024 resolution at 16-bit color

NOTE To successfully install the Trinity software on a Windows NT 4.0 system, you must log on to Windows NT under an account with administrative privileges (such as Administrator). This is because only an Administrator may add software drivers, such as the driver for the VideoNet card, to a Windows NT computer.

Recommended Specifications

PC Configuration for Trinity video production requires the manipulation and storage of large amounts of data. Therefore, of primary importance in a PC are the processor speed, the amount of system memory, the speed of the graphics card, and the size and speed of the hard disk drive. With that in mind, the following is a list of recommended specifications for the host PC:

- Intel Pentium III
- 100 MHz or faster PCI bus

- 128 megabytes of system memory (RAM)
- Fast SCSI hard disk drive with DMA transfer support and 4+ gigabytes free
- Fast DVD-ROM drive
- PC graphics display capable of 1280-by-1024 resolution at 24-bit color with hardware accelerated OpenGL operation

NT Compliance

Trinity is an NT-based device and must operate on a host system running Windows NT. THERE IS A DIFFERENCE IN HARDWARE REQUIREMENTS BETWEEN WINDOWS 9x AND WINDOWS NT! When it comes to the host system that is operating Trinity, the importance of this fact cannot be stressed enough. Hardware drivers are different for most components, and using the wrong drivers can cause NT to behave erratically and even crash. If you have questions about whether a piece of hardware is certified NT-compliant, check Microsoft's web site. They maintain a list of all equipment certified as NT-compliant. If the component in question is not on the list, then it is not recommended for use with Trinity.

If you know the brand names and models of the peripherals in your PC, you can check them at: http://www.microsoft.com/windows/compatible/default.asp for certification.

PC Hardware

Here is a description of how certain hardware components function with Trinity and the benefits of upgrading your hardware.

Hard Drives

As mentioned earlier, a fast PC hard drive is useful to improve the speed of non-real-time operations such as paint and animation. For optimal performance, make sure the hard drive supports Direct Memory Access (DMA) transfer and the DMA transfer is enabled in the operating system.

During live switching, a possible bottleneck is the ability to load effects off the PC hard drive into Trinity memory. Faster hard drives, such as SCSI drives, can quicken the process. For optimum performance, see if the hard drives have bus-mastering drivers available. These increase performance. Look for a decent size drive for content, such as a 9GB or larger drive.

NOTE In systems with the optional Time Machine, the Time Machine's video and audio are stored on dedicated hard drives inside of the Trinity chassis in order to ensure seamless operation.

Graphics Acceleration

OpenGL hardware acceleration is used in PersonalFX during custom effect creation. Any video source from Trinity can be routed in near real-time to the OpenGL graphics card in order to approximate the final Trinity video effect during composition on the PC display.

Processors

The speed of the processor affects the performance of Panamation and PersonalFX. However, it does not improve Air Command or Preditor performance. So, if you are creating an all-in-one system or a graphics workstation, then do not skimp on the processing power. If you are focusing on live switching or editing, then go with a cheaper processor.

NOTE With Trinity applications there is no real benefit in running a dual processor system. With dual processors, you might see a 2% increase in speed. Instead, you will experience more benefit from a 100MHz front side bus and/or DMA hard drives (see recommendations above). Product testing at Play shows that two or more PC processors do not improve performance in Trinity applications. So, more than a single PC processor is not recommended for Trinity PCs.

Motherboards

Motherboard design is constantly evolving and upgrading to take advantage of the newer, faster microprocessors available. When purchasing a host system with Trinity in mind, the main feature to look for is bus speed. While newer microprocessors operate at speeds of 500+ MHz, the bus speed of the board is slower. This limits the speed at which the microprocessor communicates with the other devices. So it is important to look for the faster bus speeds. For a Trinity host PC, look for a 100MHz front side bus. Also look for special slots for processor-intensive components, such as the AGP port for graphics cards. It is important to remember that some PCI chipsets are not fully NT compliant and may cause problems.

RAM

It is a good idea to have a maximum amount of RAM on the host PC, because increased RAM benefits Trinity applications. For example, 128MB provides plenty of capability to open multiple Trinity applications simultaneously, such as Air Command and TitleWave.

CD-ROM

As with any device on the host PC, it is important to check whether the device is NT-compliant. In the case of CD-ROM, a fast (40x) CD-ROM drive helps load new software revisions faster. Also, a CD burner is always helpful for archiving created content.

Trinity Expansion Ram

Users in certain applications, especially live shows, find additional RAM to be a valuable upgrade. The largest size SIMMs available are usually 128 MB and that is the most Trinity recognizes anyway. There is one RAM slot on each board, and Play DOES NOT recommend the use of slot expanders to try to use multiple SIMMs. The RAM should be standard 72 pin, 60 ns or better, RAM SIMMs. They can be EDO or Non-EDO, but they need to be 5 volt, not 3.3 volt. Your dealer can supply you with the correct RAM to upgrade your system.

WARNING 3.3 volt chips can cause long-term damage to the Trinity cards.

The Warp Engine RAM is also where ClipMem grabs are captured. 128 MB gives you just over 6 seconds of full-screen, uncompressed video. If you build something in Panamation using the ClipGrab video, then you can save it as a ClipMem (full screen effect) that plays from the Warp Engine. It can also be saved as an overlay, even if it uses ClipMem video. In that case, it loads into and plays from the Switcher card. There are many situations where you may want to upgrade both RAM SIMMs.

Video Card Resolution

Finding an adequate video card for the host PC is an exercise in balance. Most video cards either do 3D graphics well and 2D graphics poorly, or vice-versa. Because PersonalFX is 3D and Panamation is 2D, the host PC should be able to do both reasonably well.

For good 3D support, look for terms like “OpenGL supported.” Use a card that has 8MB or more of memory and can handle 1280-by-1024 resolution at 16 million colors (24-bit color). Most dual-monitor solutions work well with Trinity. One monitor can contain all of the application, while the other monitor has room for more bins and an extended timeline.

Chapter 3

Setting Up Trinity

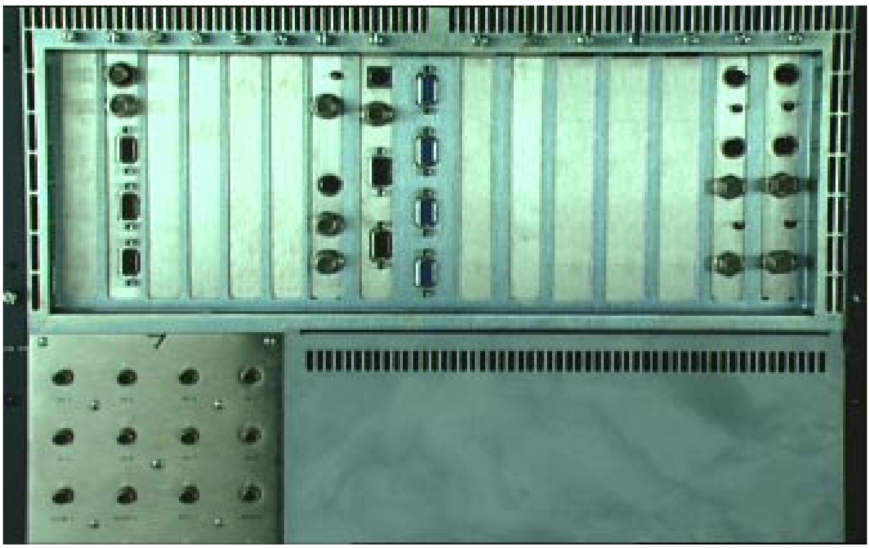
This chapter walks you through the set-up of the Trinity hardware and software. The following topics are covered:

Package Contents

Before you begin setting up the Trinity hardware and installing the Trinity software, please take a moment to check that the contents of the Trinity shipping package you received matches this list.

1. One (1) Trinity hardware unit

   This is the main hardware unit itself, to which all video inputs and outputs are connected. A typical configuration of the Trinity hardware unit is two (2) composite/S-video input cards and one (1) composite/S-video output card. The Trinity hardware unit's inputs and outputs are found at the rear of the unit, as shown in the following figure.



The Trinity Hardware Unit's Input/Output Backplate

2. One (1) VideoNet PCI card

3. Two (2) BNC VideoNet cables

   The previous two items can be found in a separate box (see following figure) within the main shipping box.

Box Containing the VideoNet Card and Cables

4. Three (3) Trinity CD-ROMs

   These CD-ROMs contain all the Trinity system software and content you need to put Trinity's creative capabilities to work. They are found in another box within the main shipping box, along with the Trinity power cable.

5. One (1) Trinity power cable

6. Trinity documentation package

If what you received is different from the contents of this list, please contact your Trinity dealer; or call the Trinity Technical Support Unit at (916) 636-2444 from 7:00AM to 6:00PM Pacific Time, Monday through Friday.

Once you verify that you received everything on this list, you are ready to install the VideoNet card in the PC that will host the Trinity software.

Electrostatic Discharge

READ THIS BEFORE YOU INSTALL ANY CARDS!

At this time, we'd like to make a point about a phenomenon known as electrostatic discharge, or ESD. Even if you are an experienced technician, you should be aware of the danger of ESD.

Almost everyone is aware of static electricity and its effect when you rub your feet on the carpet and zap someone on the earlobe. But did you know how damaging static electricity can be to computer components?

For a human being to feel a static shock, the voltage must be around 1,500 volts. Really nasty shocks can be over 30,000 volts! Electronic components can be damaged by much lower voltages, about 20-30 volts. Therefore the static electricity your body accumulates is enough to damage circuit boards by merely touching them.

Sometimes ESD damage is not readily apparent, and can cause a board to fail months after it was improperly handled. To avoid this type of failure, please take the following steps when working inside your Trinity:

1. Remove any articles of clothing that gather static electricity. Wool sweaters are especially prone to this.

2. Work on the Trinity in a reasonably ESD-free area. Don't work on the unit if it's sitting on a shag carpet, or while it's next to your laundry basket full of socks.

3. When working on the Trinity, keep it turned off and unplugged.

4. Before touching any boards inside Trinity, touch the edges of the chassis *lightly* to discharge any static buildup you may have.

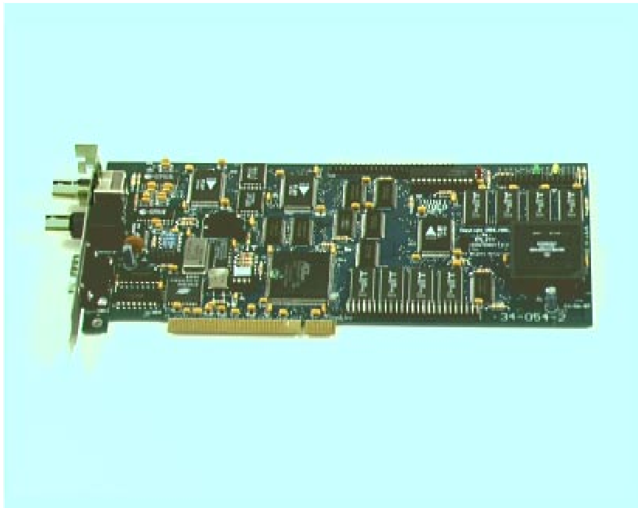
5. Handle only the boards you need to handle. Don't go poking around in the unit without a reason.

An ESD wrist strap costs $5 - $20 at any electronic supply house, and ensures that your body does not have any static charge. Having an ESD wrist strap is recommended, but not required. Attach the alligator clip of the wrist strap cord to the Trinity chassis or another common ground point.

We don't want to scare you too much about ESD, but it is a common enough problem in the computer and electronics industry that we want you to be aware of it.

Installing The VideoNet Card In The Host PC

The first step in preparing to run the Trinity for the first time is installing the VideoNet card (next figure) in the host PC.



The VideoNet Card

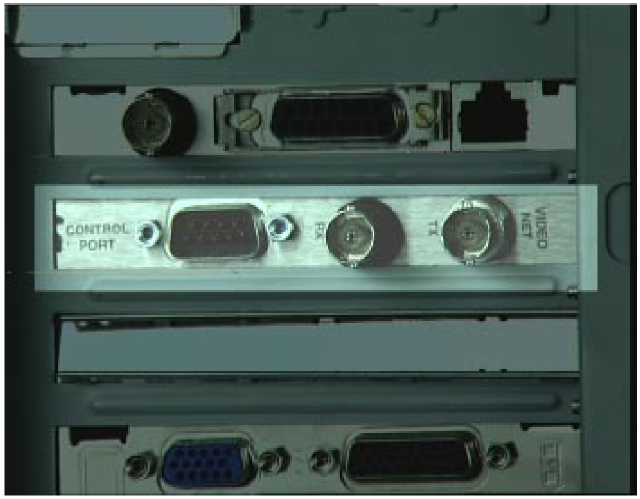
The VideoNet card is a standard PCI video card, and installs as such.

1. Make sure the PC is turned off, and install the VideoNet card into an available PCI slot. If you have a graphics card installed in the computer's AGP (accelerated graphics port), avoid putting the VideoNet card in the PCI slot closest to the AGP slot, as the two may conflict.

2. Fasten the card to the PC using the screw that previously held the slot cover in place.

3. Attach the Trinity to the PC using the two BNC cables supplied. On the VideoNet card, there are two BNC connectors, marked RX and TX (see next figure). These must be attached to the opposite connectors on the Trinity hardware. In other words, use one cable to connect the TX connector of the VideoNet card to the RX connector on the Trinity hardware unit, and the other cable to connect the RX connector of the VideoNet Card to the TX connector on the Trinity hardware unit. The Trinity hardware cannot communicate with the host PC if the connections

are reversed, or if both pairs of connectors are not properly connected, so double-check this installation.



The TX And RX Connectors On The VideoNet Card

4. Once you have properly installed the card, you can turn the PC back on so you are ready when it is time to install the Trinity software.

Powering The Trinity Hardware

This step can be completed in a flash! Use the included cable to plug the Trinity hardware (next figure) into a grounded power source.

The Power Connector On The Trinity Hardware

Turning the Trinity Hardware On and Off

Note the on/off switch next to the power connector. This is the master power switch for the Trinity hardware unit. This is a good time to note its location, and turn it on. Remember that the power should always be on *before* you try to run any of the Trinity software.

Installing The Software

Now it's time to install the Trinity software. First, let's make sure your PC has what Trinity needs.

Minimum Requirements

The following is a list of the minimum requirements for the PC that hosts your Trinity:

- Windows NT 4.0 (Service Pack 3 or later), or Windows 2000 Professional
- Intel Pentium 200 MHz
- 64 megabytes of system memory (RAM)
- 2 gigabytes of free PC hard disk space
- CD-ROM or DVD-ROM drive
- PC graphics display capable of 1280-by-1024 resolution at 16-bit color

NOTE To successfully install the Trinity software on a Windows NT 4.0 system, you must log on to Windows NT under an account with administrative privileges (such as Administrator). This is because only an Administrator may add software drivers, such as the driver for the VideoNet card, to a Windows NT computer.

Installation

To begin the software installation process:

1. Start the host PC normally, and log into Windows NT. (Remember that you must log in as an Administrator in order to install the Trinity software.)

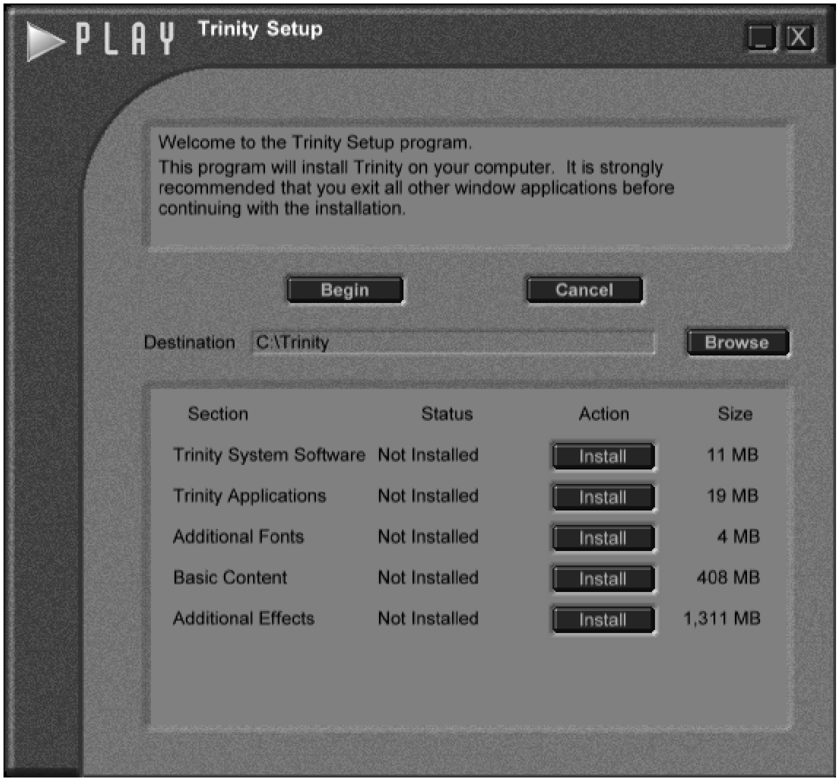
2. Insert the Trinity software CD-ROM into your CD-ROM drive. (Remember that you need 2.0 gigabytes of free hard drive space to install the Trinity software.)

3. Choose **Run** from the Windows NT Start Menu. The Run box appears on the Windows NT 4.0 desktop.

4. Type **d:\setup.exe** in the Run box, and click **OK** or press **Enter**.

   Most CD-ROM drives are labeled d:. If necessary, substitute the appropriate letter, such as e:, for the host PC's CD-ROM drive.

The Trinity Setup program appears on the Windows NT desktop (next figure).



The Trinity Installation Program

The installation program is now ready to install the Trinity software in a directory called Trinity on your boot hard drive (c:\Trinity, for example) by default.

If you wish to change this path, enter a new one in the path box, or click Browse to search for an existing directory.

NOTE Use Windows Explorer to check the free space of your hard drives before choosing a path. Install the software only on a hard drive with at least 2.0 GB of free space. If your hard drive has insufficient space available, a message informing you of that appears across the bottom of the Trinity installation window.

Below the path box, you see the list of software components to be installed. We strongly recommend that you install everything on this list. However, the Trinity applications can operate without the Additional Effects (1.3 GB), although some tutorials may depend on them.

To run the installation program, do this:

1. When you are satisfied with your path, click Begin.

   The installation procedure is automatic; you need only insert CD-ROMs when prompted. When the installation is complete, you must restart the host PC before running any of the Trinity software.

2. Click the Now button to restart the Host PC.

At this point, Windows NT restarts. Once you are logged back on, let's check to make sure that everything is OK to this point, and that the Trinity hardware unit is on speaking terms with the Trinity software.

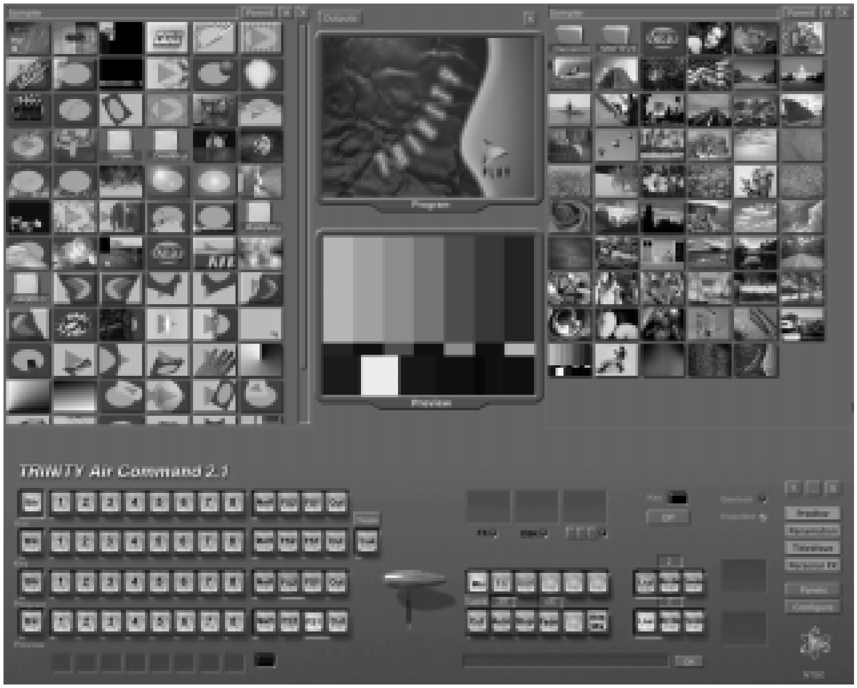
1. First, make sure that the Trinity hardware unit is plugged in and turned on.

   With that safely out of the way, let's run the Air Command.

2. From the Windows NT Start Menu, Select Programs.

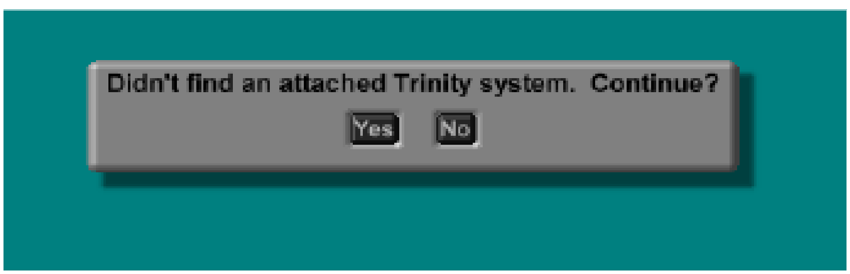
3. In the Trinity dropdown menu, select Air Command.

   If everything is working properly, you see the Trinity Air Command interface (following figure). Note that the VideoNet light in the bottom right corner of the screen is green, telling you that the host PC and Trinity are communicating.



The Trinity Air Command Interface

When the Air Command appears, you can rest assured that all your connections have been made, and everything is happy. If something is amiss – the Trinity hardware unit does not power up, or is not properly connected to the host PC via the VideoNet card – you see the following message:



'Didn't Find Attached Trinity' Message

You are given the option to continue. If you see this message at this point, do not continue. Select No to exit the Trinity software, and check the power on the Trinity hardware unit and the two cables connecting the unit to the host PC.

After you check the power and cables, run the Trinity Air Command again. If you still see the error message, please call Trinity Support Unit at (916) 636-2444 from 7:00AM to 6:00PM Pacific Time, Monday through Friday. They'll get you up and running in no time.

Card Placement In Trinity

Each card within Trinity has a specific area in the motherboard where the card belongs. It is important to understand where each card goes in order to configure your system properly. This section describes the different cards and their placement, and the next section tells you how to install cards.

Input Cards

Normal placement for input modules is in the slots labeled 1-7 on the back of the Trinity. If a card is the 8th input, it may be placed in one of slots 10-12. Keep in mind that only one input card may be placed in slots 10-12, and this card is listed on the Air Command as Input 8.

34-209 Component input card

Input formats supported are Analog YUV and RGB at adjustable levels. Factory presets are included for RGB at SMPTE levels, and YUV at Beta and MII levels. The loop-thru connectors can provide a buffered loop out or recoded loop-thru (after color correction), in which case the loop-thru can be set for RGB, YUV, Composite, or Monochrome, independent of the signal being fed into it. To configure the card, use the **Input Sources** and **Input Settings** configuration panels. See “Input/Output Settings Panels” on page 124 for information on how to use these panels.

34-059 Composite and Y/C input card

This card has connectors for both composite (BNC connector) and Y/C (S-video connector) signals. Each input also has a loop-thru connector that provides a straight loop out. Both composite and Y/C inputs can be hooked up at the same time, although only one format is available at a time. It also has a termination switch for each connector. When using the loop-thru, the termination switch should be set to the “off” position. If no loop-thru is used, the termination switch should be set to the “on” position. To see which input is active, check the **Input Sources** configuration panel. See “Input/Output Settings Panels” on page 124 for information on how to use this panel.

34-333 Composite and Y/C input card with frame sync

This card has connectors for both composite (BNC connector) and Y/C (S-video connector) signals. The card also features a synchronizer so that wild input sources (such as home camcorders and VCRs) that are not genlocked can be used with Trinity.

Each input also has a loop-thru connector that provides a buffered output. Both composite and Y/C inputs can be hooked up at the same time, although only one format is available at a time. To see which input is active, check the

Input Sources configuration panel. See "Input/Output Settings Panels" on page 124 for information on how to use this panel.

34-058 Serial digital (D1) input card

This card is compatible with SMPTE 259 specification video signals, commonly referred to as SDI or D1. The input works with 8- or 10-bit signals, with vertical blanking intervals of 9 to 21 lines for NTSC, or 25 lines for PAL. The loop-thru connectors provide reclocked, buffered pass-thru signals before color correction has been applied. The composite pass-thru connector provides either a color-corrected pass-thru signal or a straight pass-thru signal, depending on the revision of the card. Revision 4 or earlier provides a straight pass-thru. Revision 5 or later provides a color-corrected pass-thru. Check in the upper corner of the card for your version. The board number says something like 34-XXX-VV. The "VV" is the version number of the card.

Master Output Encoders

There are two types of master encoder cards. However, Trinity can have only one master encoder card in the system, so do not install more than one of these cards in a Trinity system.

The master encoder card only goes in the slot labeled 9 on the back of the Trinity, the slot next to the Air Command card inside the Trinity. If you have a downstream key card, however, put that in slot 9, and move the master encoder card up one slot. The master encoder card must be the last in the line of downstream devices.

NOTE

Although the master encoder slot is labeled 9 on the back of the Trinity box, internally (in the Air Command and configuration panels) it is referred to as input 10. This is due to an inconsistency that will be resolved soon. In the meantime, be aware that the slots labeled 8 and higher on the back of the Trinity show up as one number higher in the software.

34-208 Multi-Format Master Encoder

This card provides timing to the entire system in addition to video output. Output formats supported are YUV, RGB, Y/C (2 BNCs,) and composite. This card also has BNC connectors for Genlock In, Genlock Thru, and a configurable connector that provides either Black Burst out or Composite out. Since the Genlock loop-thru is a passive loop-thru connector, you need to place a terminator on the connector if it is not being used.

34-075 Composite and Y/C Master Encoder

This card provides video output, black burst, and signal timing for Trinity. Outputs are Composite (BNC connector) and Y/C (S-video connector). This card also has connectors for Genlock in, Genlock Thru, and a configurable BNC connector that either provides black burst output or composite video output. Since the Genlock loop-thru is a passive loop-thru connector, you need to place a terminator on the connector if it is not being used.

Slave Output Cards

Slave output cards can be placed in any of the slots on the back of the Trinity, except slot number 8, which is the Air Command Preview Slot. These cards work in conjunction with a master output encoder to provide additional simultaneous outputs to a single Trinity. The timing on each slave output card can be adjusted relative to the master encoder, allowing signals with different phasing to be output simultaneously. Also, the fade to black function in the Air Command can be individually selected on each output, so only selected outputs fade to black.

34-233 Analog Slave Output Card

This card provides four BNC connectors and an S-video connector, and can be configured via software in a number of different modes. All of the connectors output either Program output or Alpha output. The bottom BNC connector always outputs composite video. The other three BNCs can be configured in Trinity's software interface for RGB, YUV component, or composite (middle BNC) and Y/C (first and third BNCs) video. When the card is in the last mode (Composite Y/C), the S-video connector is also active, providing a Y/C signal source.

34-210 Serial Digital Slave Output Card

This card provides four outputs that conform to the SMPTE 259 specification for digital video, also called Serial Digital Interface (SDI) or D1. All four outputs provide either Program output or Alpha (key) output, which can be selected via the Trinity software interface. All four outputs switch together, meaning that if you want to have both Program output and Alpha output, two cards are required.

34-040 Preview Card

This card, if installed, must be placed in the slot labeled 8 on the back of the Trinity (although it shows up as output 9 on the software), behind and in line with the Air Command. It provides the switcher preview output to an external monitor, as well as connections for GPI triggers and tally lights.

Video Processing Cards

34-099 Warp Engine Card

This card resides in any of the internal slots labeled Channel 1-8 on the motherboard. It provides an additional channel of warped video.

34-076 Framestore Card

This card resides in any of the internal slots labeled Channel 1-8 on the motherboard. It provides an additional channel of video (live or still).

34-105 ClipGrab Card

This card resides in any of the internal slots labeled Channel 1-8 on the motherboard. It displays video on up to four live monitors within the Trinity interface.

Installing cards

Follow these steps to install or remove Trinity cards:

1. Turn off the power to the Trinity.

2. Unscrew the three thumbscrews along the edge of the top cover.

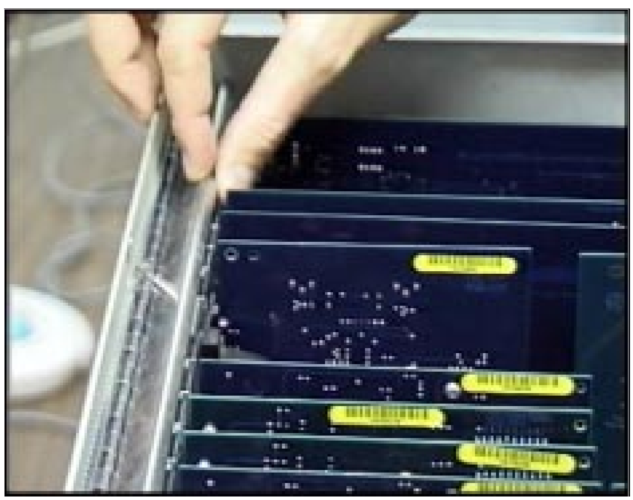
3. Slide the top cover about 1 inch toward the back, and lift off.

4. Unscrew the thumbscrew on the retaining bars running across the Trinity (next figure).

Removal of Retaining Bar

5. Remove the retaining bars.

6. Locate the lock-down panel that holds the backs of the cards in place (next figure). It is on the inside of the back of the unit. It is hinged in place and held down with three thumbscrews.



The Rear Lock-Down Panel

7. Unscrew the three thumbscrews on the rear lockdown panel.

8. Lift and rotate the lockdown panel out of the way.

9. Remove the backplate from the hole in the back of the slot.

10. Line up the new card in the socket. For cards that fit into more than one socket, make sure the card is lined up in all the sockets it plugs into.

NOTE THESE HIGH-SPEED SOCKETS ARE MUCH MORE FRAGILE THAN STANDARD PC SOCKETS. EXTREME CARE MUST BE TAKEN TO MAKE SURE THE MOTHERBOARD IS NOT DAMAGED DURING INSTALLATION.

11. Push down lightly on the card BUT DO NOT PUSH THE CARD IN YET! Double-check a second time to make sure the card is properly aligned and not binding within the socket.

12. Using equal pressure, push the card into the sockets. Make sure the card is in the slots evenly.

13. Rotate the rear lockdown panel back into place, and tighten the thumbscrews.

14. Replace the retaining bars and tighten the thumbscrews on each.

15. Replace the top cover. Make sure the bottom edges of the top cover fit into the slots in the bottom cover.

16. Tighten the three thumbscrews on the top cover.

Now that the card is installed, we'll fire up the Trinity and test the configuration of the cards.

1. Turn Trinity and the PC on.

2. Run the Air Command application from the host PC.

3. To make sure the Trinity recognizes the new card, click on the **Configure** button and select **Installed Cards** from the pop-up menu. The Installed Cards panel appears, and the card you just installed should be listed there.

Troubleshooting

If for any reason you need to remove or re-seat a card, always TURN OFF THE POWER to your Trinity before removing or re-seating any card. Failure to do so will damage your Trinity system and void the warranty.

Following are some common problems and how to remedy them:

I get an error saying "I couldn't find attached Trinity System."

- First, check the VideoNet cables between the PC and the Trinity. The cables run from the TX connector on the PC to the RX connector on the Trinity, and the RX connector on the PC runs to the TX connector on Trinity.
- If the Coordinator card in the Trinity was removed for any reason, it might not be properly seated in the sockets. Turn off the power, pull the card, and re-seat it.

I get an error saying "Failure during creation of VEMain Bus…"

- The card may not be properly seated in the slot. Turn off the power, pull the card, and reseat it, making sure the card is fully inserted in the slot.
- Check to make sure no other cards have popped loose from their sockets.
- Make sure you have the latest Trinity software installed in the host PC. Older versions of the software do not have the proper drivers to support the component boards.
- Newer versions of input/output modules may require a special driver disk, included in the box with the module. If your module does not initialize properly, ask your Trinity dealer whether there is a required driver disk for the module.
- Make sure you have only one master encoder card and that the card is located in the slot labeled 9 on the back of the Trinity. Having more than one master encoder card generates conflicting timing signals, confusing your Trinity.

When I turn on the power for my Trinity, it doesn't do anything. The fans don't start and the light doesn't even turn on.

- A card is improperly seated in the sockets on the motherboard. Immediately turn the power off, and re-seat the card. Make sure the card is inserted into all appropriate sockets and is pushed down evenly in the unit.
- If the unit still won't start, turn off the power, pull the installed card, and inspect the sockets on the motherboard for damage. There is a slim

possibility that the motherboard sockets have been damaged. Look for any pins in the socket that are bent or out of shape. If you find some, contact tech support immediately.

- If there is an audio module installed, check that the ribbon cable which connects to the Trinity motherboard to the audio module is connected correctly. If you have questions, contact Tech Support at 916.636.2444 (7:00 AM to 6:00 PM PST, Monday-Friday)

Chapter 4

Setting Up Time Machine

2.1 only

This chapter walks you through setting up the Time Machine hardware and software. The following topics are covered:

Package Contents

Before you begin setting up your Time Machine, please take a moment to check that the contents of the Time Machine shipping package you received matches the list below.

- One (1) 34-403 Time Machine card
- One (1) 34-367 TDM Audio Router card
- One (1) 34-389 BAS TDM Expander card
- One (1) Hard Drive Bay Unit
- Two (2) 24-pin ribbon cables
- Three (3) 14-pin ribbon cables
- One (1) 34-437 Internal Pass Through card
- Two (2) power cable splitter/extenders
- Hard Drive Bay Unit cover
- One (1) Coordinator Card SRAM module (a 1 MB ram stick which is installed on the 34-003 Coordinator card)
- One (1) R26 mod kit for the 34-155 and 34-153 audio modules

Time Machine Requirements

Your host PC must have Windows NT 4.0, service pack 3 or higher (service pack 5 is recommended), and Trinity 2.0 software installed for Trinity to operate properly. Your Trinity also must be equipped with the following options for Time Machine to operate correctly:

- A ClipGrab card (not required, but recommended)
- 128MB of RAM in the Switcher card (not required, but recommended)
- 128MB of RAM in the Warp Engine card (not required, but recommended)
- One input card in addition to the Internal Pass Through card (component, SD1, or DV I/O recommended).
- One Coordinator card SRAM module, included.
- Two SCSI ribbon cables (see “Time Machine SCSI Cable Specifications” on page 38 for more information about SCSI ribbon cable requirements).
- Three hard drives (see “Hard Drive Requirements” on page 40 for more information about hard drive requirements).

Time Machine SCSI Cable Specifications

Connecting Time Machine takes a little bit of love and two very specific SCSI cables. You are more than welcome to make your own cables using the following specifications, or you may use the “off the shelf” model:

- Adaptec Inc. part number ACKW2W-5IT or

Two cables that meet these requirements:

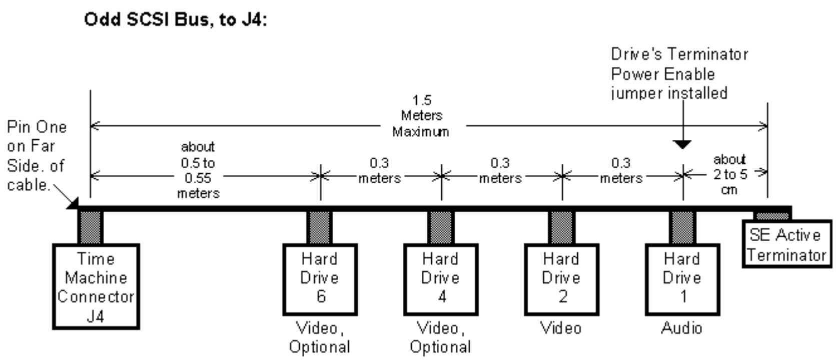
- 68-conductor SCSI internal flat ribbon cable for Ultra SCSI (Fast 20).
- Single-ended wide application with 68-pin male connectors.
- Active SE Terminator at end of each cable. (SE means single ended, very important. Do not use differential termination!)

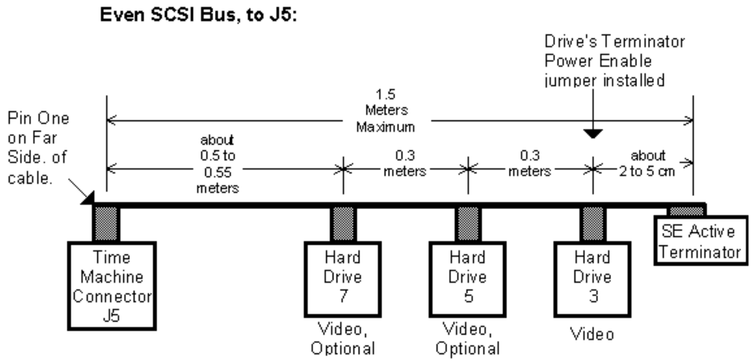
NOTE Proper termination at the end of the SCSI cables is required. The recommended hard drive type is LVD. These drives do not have internal terminators. External terminators are at the end of the SCSI cables instead.

- Maximum cable length of each cable is 1.5 meters.

- Distance between controller connector and first device should be about 0.5 meters or 20 inches.
- Distance between devices should be about 0.3 meters, or 12 inches. (The Adaptec cable has one of these distances as low as 9 inches and it works fine.)
- Distance between last device and terminator should be about 3 cm, or 1.5 inches.
- Four devices or five connectors total on one of the two SCSI cables. This cable attaches the J4 connector on the Time Machine with an audio and video drive.
- At least three devices or four connectors total on the other SCSI cable. This cable attaches the J5 connector on the Time Machine with a video drive.
- The cables must be assembled so that when viewing the side of the cable, as shown in the following figure, with the connector pins pointing down and the controller or Time Machine on the left, the pin one (the end marked red) side of the cable is on the far side of the cable from the observer. This allows the cable to feed in the proper directions.

See the SCSI-2 Specification Manuals (not included) for more detail.





Technical Notes

- The 0.5-meter distance between the Time Machine (controller) and the first drive is sufficient for the first few Trinity processor slot positions, farthest left positions as viewed from the front. Time Machine is installed in these slots to minimize the cable lengths.
- The same cable (specified for the "Odd") can be used for the "Even" bus with the extra connector ignored.

Hard Drive Requirements

Basic requirements for hard drives:

- High-performance Fast20 (Ultra) Wide SCSI hard drives or Ultra2 LVD SCSI drives, 10K RPM, 68-pin connector.

Examples:

- IBM UltraStar 9LZX model DRVS-09V, part number 08L8261, 9 GB
- Seagate Cheetah model ST39102LW, part number 9J8005-001, 9 GB
- Variations may include larger cache sizes.

NOTE In the future, more than three internal hard drives will be supported. A power supply upgrade (available from Play) will be required. The current power supply can safely power three hard drives using 2.75 amps peak at spin up or seek per drive.

Electrostatic Discharge Reminder

Please Read This Before You Start!

We'd like to make a point about a phenomenon known as electrostatic discharge, or ESD. Even if you are an experienced technician, you should be aware of the danger of ESD (See "Electrostatic Discharge" on page 20 for more information on ESD procedure). Please remember to be aware of all ESD hazards when installing hardware in your Trinity. *It's good Karma.*

Preparing The Hard Drives

Before we dive into installing the Time Machine card in Trinity, let's take some time to set up the three required hard drives (not included).

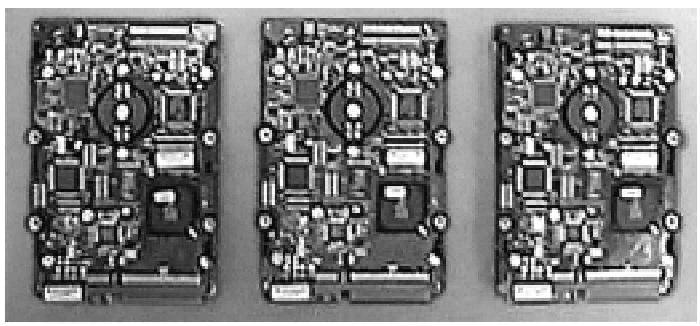
There are three phases to preparing the three hard drives. They are:

- Lining up the hard drives
- Setting hard drive power termination
- Setting hard drive SCSI IDs

Lining Up The Hard Drives

Before we do anything to our hard drives, we need to line them up in the order we'll be working on them. In your work area, line them up in a row with their boards facing up (following figure). The left hard drive will be the Video 2 drive, the middle drive will be the Audio drive, and the right drive will be the Video 1 drive. Keeping the hard drives in this order makes it easier to remember each hard drive's function and the order in which they will be installed in Trinity.

Video 2 Video 1 Audio



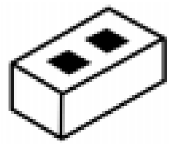
The Three Hard Drives Lined Up

Setting Hard Drive Power Termination

First, we must set the hard drive power termination on the two hard drives that will be closest to the active terminators when connected to the SCSI ribbon cables. These drives are the Video 2 (left) and Audio (right) drives.

Power is provided to the terminators by installing jumpers on pins on the hard drives.

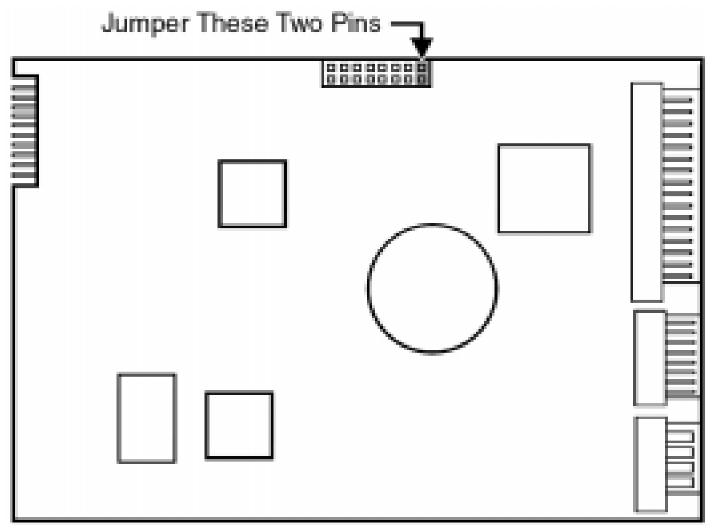
NOTE Pins are jumpered by pushing a small jumper plug (included with the hard drives) over the two pins. A jumper plug (following figure) is a metal bridge that closes an electrical circuit.



A Typical Jumper Plug

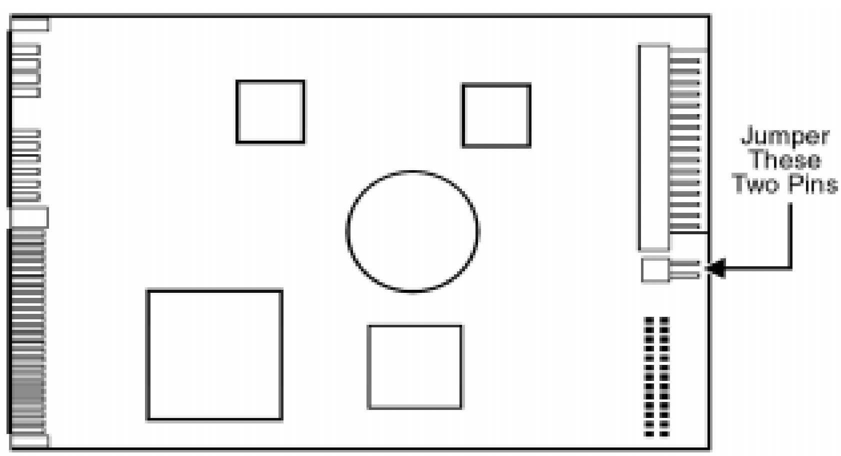
To enable the power termination, jumper the pins as illustrated in the following figures, or refer to your hard drive documentation for further information.

To set power termination on the Seagate Cheetah hard drive, jumper the pins as shown in the following diagram:



Power Termination for the Seagate Cheetah Hard Drive

To set power termination on the IBM UltraStar hard drive, jumper the pins as shown in the following diagram:



Power Termination for the IBM UltraStar Hard Drive

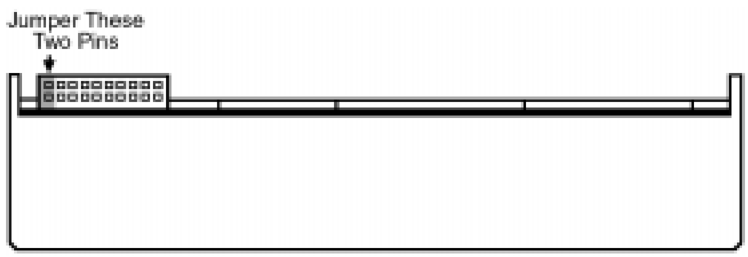
Setting Hard Drive SCSI IDs

The three hard drives must be jumpered with unique SCSI IDs for identification purposes. SCSI ID is set by installing jumpers on pins on the hard drives.

The Video 2 (left) and Audio (right) drives should have their SCSI IDs set to 0. Since this is the default setting for new drives, we don't need to jumper pins on either of these drives.

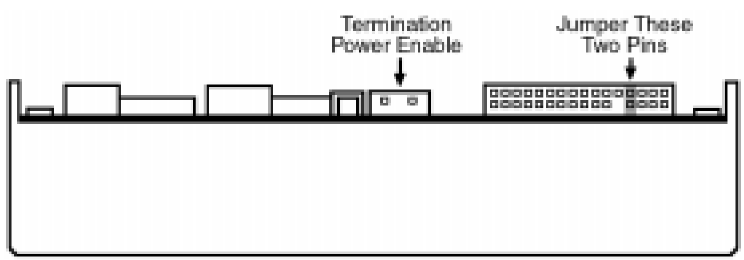
The Video 1 (middle) drive should have its SCSI ID set to 1. To set the SCSI ID to 1, jumper the pins illustrated in the following figures, or refer to your hard drive documentation for further information.

To set the SCSI ID on the Seagate Cheetah hard drive, jumper the pins as shown in the following diagram:



Jumper These Pins to Set SCSI ID to 1 for the Seagate Cheetah Hard Drive

To set the SCSI ID on the IBM UltraStar hard drive, jumper the pins as shown in the following diagram:



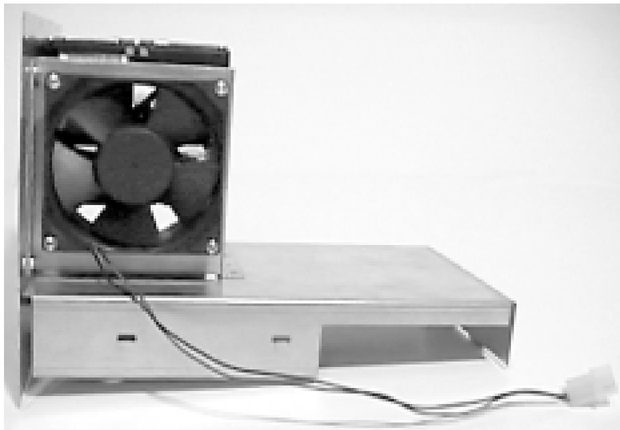
Jumper These Pins to Set SCSI ID to 1 for the IBM UltraStar Hard Drive

NOTE Be sure any other hard drive jumper options that may hamper performance are not installed. Refer to your hard drive manual.

That's all there is to setting up the three hard drives. Now it's time to move on to the next step.

Installing Hard Drives Into The Hard Drive Bay Unit

Now that we've prepared Time Machine's three hard drives, it's time to install them into the Hard Drive Bay Unit (following figure).



The Hard Drive Bay Unit

TIP Solicit the help of a friend. An extra set of hands may be necessary.

Remember the order that we have the three hard drives laid out in our workspace: on the left is Video 2, in the right is Audio, and on the middle is Video 1. When we install these drives into the Hard Drive Bay Unit, the Video 2 drive will be the top drive, the Audio drive will be the middle drive, and the Video 1 drive will be the bottom drive.

NOTE The drives are installed so that the end *opposite* the SCSI and power connectors is facing the fan in the Hard Drive Bay Unit. Also, the hard drive's boards should face down.

Follow these steps to install the three hard drives into the Hard Drive Bay Unit:

1. Using two of the screws included with your hard drives, attach the Audio drive to the lower set of holes in the Hard Drive Bay Unit.

2. Using two of the screws included with your hard drives, attach the Video 1 drive to the middle set of holes in the Hard Drive Bay Unit.

3. Using two of the screws included with your hard drives, attach the Video 2 drive to the top set of holes in the Hard Drive Bay Unit.

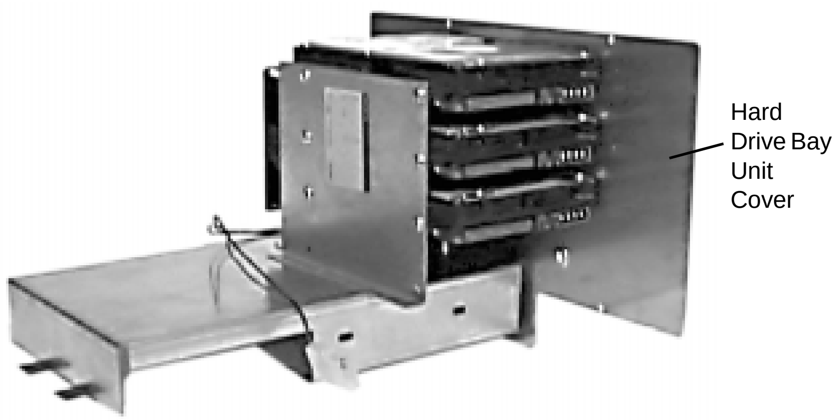
4. Locate the Hard Drive Bay Unit cover (included) and remove the plastic protective coating from it.

5. Attach the Hard Drive Bay Unit cover to the front of the Hard Drive Bay Unit.

   The indentions of the indented holes should face the hard drive. This is where the cover attaches to the three hard drives.

   The two holes to the right of the rows of indented holes line up with the two holes on the plate holding the fan on the Hard Drive Bay unit. This is where the metal plate is secured to the Hard Drive Bay Unit.

With the drives and cover installed in the Hard Drive Bay Unit, it should look like the following figure.



The Hard Drive Bay Unit with Hard Drives Installed

The Hard Drive Bay Unit is ready to be installed in the Trinity chassis. But first we must remove the cover from Trinity.

Removing Trinity's Cover

Now that the hard drive bay unit is ready, let's remove Trinity's covers so we can begin installing Time Machine's components. If you're continuing after installing other cards, the top cover is already off and you can skip ahead to step 4.

TIP Solicit the help of a friend. An extra set of hands may be necessary.

Follow these steps to remove Trinity's cover:

1. Turn off the power to the Trinity and unplug it.

2. At the back of the Trinity, unscrew the three thumbscrews along the edge of the top cover.

3. Slide the top cover about 4 inches toward the back, and lift off.

4. At the back of the Trinity, unscrew the three thumbscrews along the edge of the bottom cover.

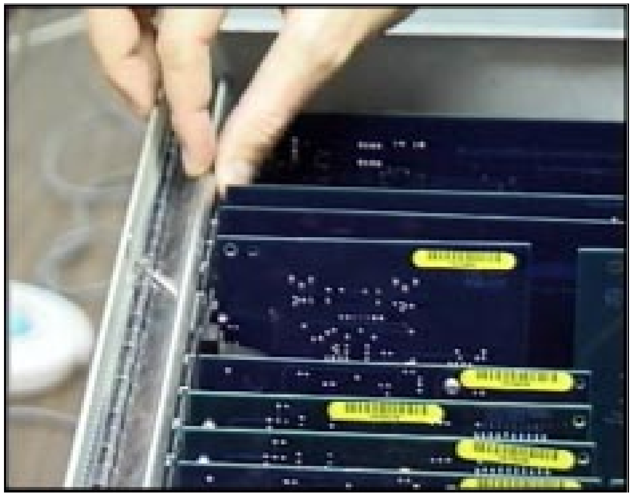
5. Tilt the Trinity on its front corner, and slide the bottom cover back and out of the way (following figure).

Removing the Bottom Cover of Trinity

6. Back at the top of the Trinity, unscrew the thumbscrew on the retaining bars running across the Trinity (following figure).

Removal of Retaining Bar

7. Locate the lock-down panel that holds the backs of the cards in place (following figure). It is on the inside of the back of the unit. It is hinged in place and held down with three thumbscrews.



The Rear Lock-Down Panel

8. Unscrew the three thumbscrews on the rear lockdown panel.

9. Lift and rotate the lockdown panel out of the way.

With Trinity's covers removed, it's now time to move on to the next step.

Installing The Hard Drive Bay Unit In Trinity

Now we're ready to install the Hard Drive Bay Unit in Trinity!

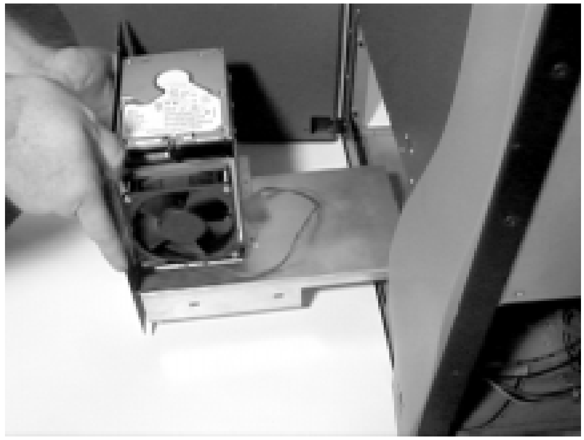
Follow these steps to install the Hard Drive Bay Unit:

1. At the front of Trinity, open the faceplate of the Trinity unit and remove the metal plate (following figure). This allows you to insert the Hard Drive Bay Unit. (Now you know why there is a door).

   Set the screws for the metal plate aside. You will need them later when we install the Hard Drive Bay Unit.

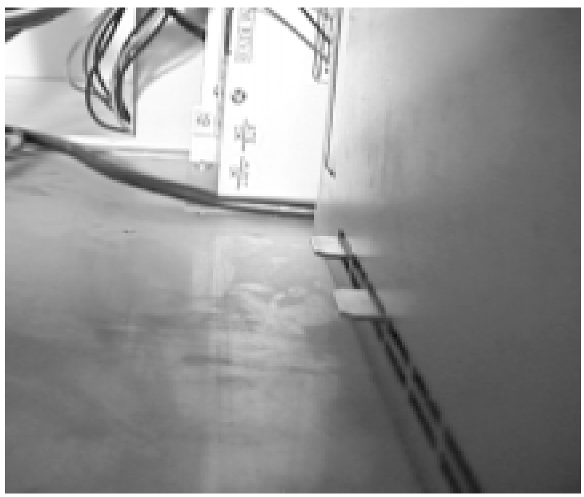
Removing the Metal Plate from Behind the Door

1. Slide Hard Drive Bay Unit into the Trinity chassis (following figure).



Placement of the Hard Drive Bay Unit

NOTE The two metal tabs on the Hard Drive Bay Unit fit securely into the slots in the Trinity chassis (following figure).



Behind the Hard Drive Bay Unit

2. On the front of the Trinity, replace the screws that hold the new Hard Drive Bay Unit cover in place and close the Trinity door.

Now that the Hard Drive Bay Unit is in place, we're ready to move to the next step.

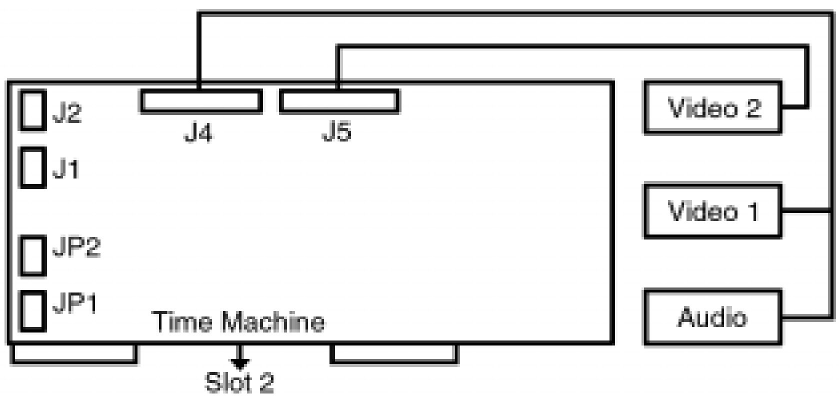
Connecting SCSI Ribbon Cables To The Hard Drives

Now we'll connect the SCSI cables to Time Machine's hard drives.

Remember the order the hard drives are arranged in the Hard Drive Bay Unit: the top drive is the Video 2 drive, the middle is the Video 1 drive, and the bottom is the Audio drive.

CAUTION In case of sharp edges inside the Trinity, take extra care to prevent injury to yourself and damage to the SCSI cables. SCSI cables are fragile and can be easily damaged by minor scrapes, nicks, or abrasions. We suggest covering sharp edges with gaffer's tape or packing tape to protect cables.

The following diagram shows how these drives will be connected to the Time Machine card when we are finished.

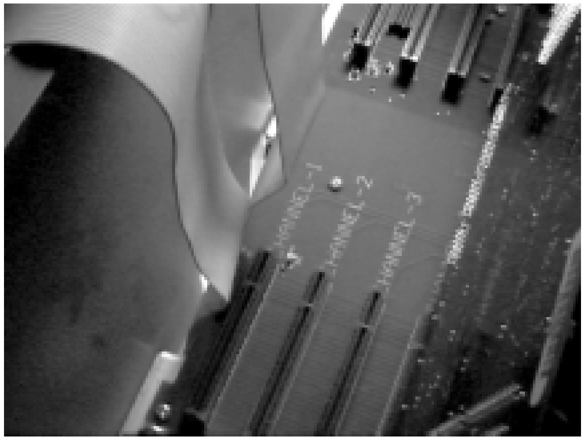


Connecting SCSI Cables to Hard Drives

Follow these steps to connect the SCSI ribbon cables to Time Machine's hard drives:

1. Route one of the SCSI ribbon cables (if you constructed your own ribbon cable, it is the one with five connectors) from the Hard Drive Bay Unit up through the narrow hole between the chassis wall and slot 1 in the Trinity (following figure). Be sure to feed the cables from the bottom. Only one connector (the one at the end without the active terminator) should go through the hole in the chassis.

This cable connects the Audio and Video 1 drive to the Time Machine card.



Routing of the SCSI Ribbon Cables

2. With a felt tip pen, write J4 on the end of the ribbon you just fed through the chassis hole. This will help you identify the cable when connecting it to the Time Machine card.

3. In the Hard Drive Bay Unit, connect the SCSI ribbon cable to the Audio (bottom) drive. The connector on the SCSI ribbon cable nearest the active terminator connects to this drive.

4. Connect the next connector on the SCSI ribbon cable to the Video 1 (middle) drive.

5. Route the other SCSI ribbon cable (if you constructed your own ribbon cable, it is the one with four connectors) from the Hard Drive Bay Unit up through the narrow hole between the chassis wall and slot 1 in the Trinity (following figure). Be sure to feed the cables from the bottom. Only one connector (the one at the end without the active terminator) should go through the hole in the chassis.

   This cable connects the Video 2 drive to the Time Machine card.

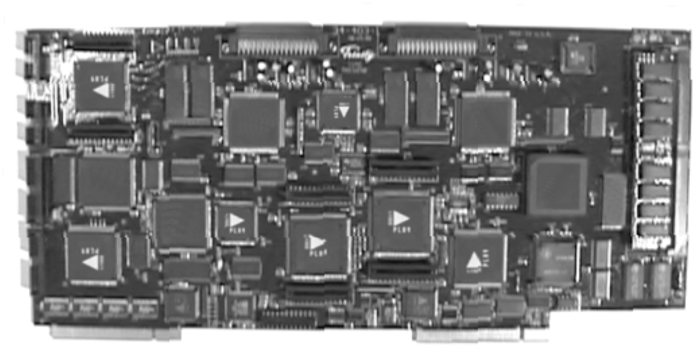
6. With a felt tip pen, write J5 on the end of the ribbon cable you just fed through the chassis hole. This will help identify the cable when connecting it to the Time Machine card.

7. In the Hard Drive Bay Unit, connect the SCSI ribbon cable to the Video 2 (top) drive. The connector on the SCSI ribbon cable nearest the active terminator connects to this drive.

The power cables still need to be connected to the three hard drives and fan, but we'll get to that step later. While we have the SCSI ribbon cables ready to connect to the Time Machine card, lets install the card.

Installing The Time Machine Card

Now let's install the Time Machine card (following figure).



The Time Machine Card

Follow these steps to install this card:

1. Line up the Time Machine card in the slots marked Channel 2. Make sure the card is lined up in all the sockets it plugs into.

   The Time Machine Card installs into a channel of upstream processing slots. It can fit into either slot 1 or slot 2, but for the best positioning to accommodate the SCSI cables, Play engineers recommend placing the Time Machine card in slot 2, leaving slot 1 open to make room for the SCSI cables.

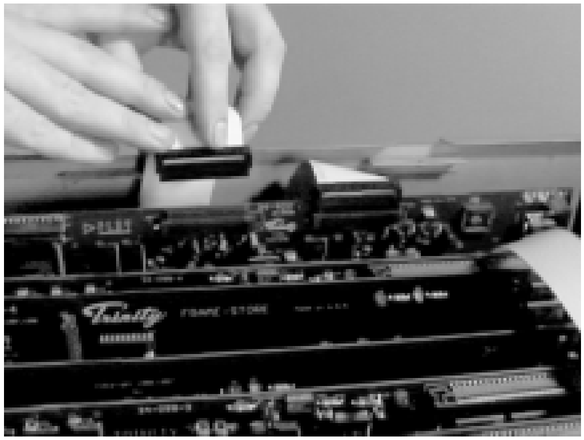
NOTE THESE HIGH-SPEED SOCKETS ARE MUCH MORE FRAGILE THAN STANDARD PC SOCKETS. EXTREME CARE MUST BE TAKEN TO MAKE SURE THE MOTHERBOARD IS NOT DAMAGED DURING INSTALLATION.

2. Push down lightly on the card BUT DO NOT PUSH THE CARD IN YET! Double-check a second time to make sure the card is properly aligned and not binding within the socket.

3. Using equal pressure along the length of the card, push the card into the sockets. Make sure the card is in the slots evenly.

4. Locate the J5 connector on the Time Machine Card and connect the cable we marked J5 to it (following figure). This connector has a keyed slot.

5. Locate the J4 connector on the Time Machine Card and connect the cable we marked J4 to it (following figure). This connector has a keyed slot.



Connecting the Cables to J4 and J5 on the Time Machine Card

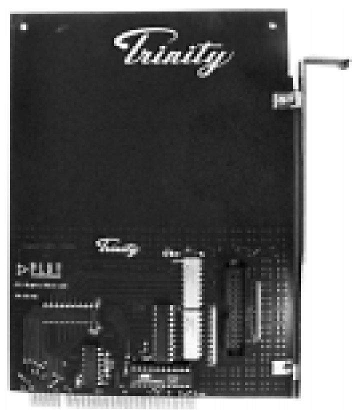
Now that the Time Machine card is installed, let's connect our input modules to it.

Connecting Input Modules To Time Machine

Time Machine requires two input cards, including one internal pass through card (included).

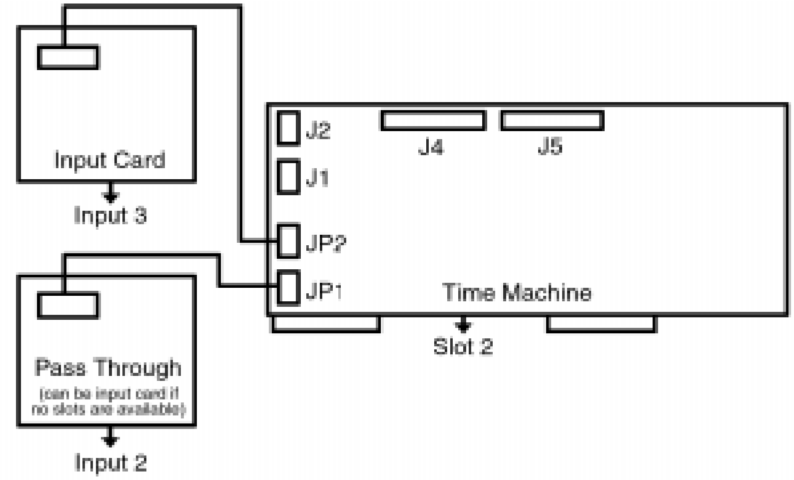
NOTE We recommend using D1, component, or DV I/O modules for connection to Time Machine. Time Machine uses these modules for playback of clips. By routing the clips through an input module, you can take advantage of the real-time color correction on the module. Composite/YC input modules are constructed differently than other inputs, and some color correction features are disabled if used for Time Machine playback. This does not affect or limit digitizing clips. Clips are digitized from any input in Trinity, and full color correction is applied during digitizing. This only affects color correction of digitized clips.

Now, let's install the internal pass through card (following figure) by connecting it and an input module to the Time Machine card.



The Internal Pass Through Card

The following diagram shows how these cards connect to the Time Machine card.



Connecting Input Cards to Time Machine.

Follow these steps to install the pass through card and connect it and an input card to Time Machine:

1. Line up the pass through card in the slot for input 2. This pass through card must be installed in the input slot that is in line with the position of the Time Machine card.

   If there is already an input card in the slot for input 2, move it to another slot. If no slots are available, an input module can be used instead of the pass through card.

2. Push down lightly on the pass through card BUT DO NOT PUSH THE CARD IN YET! Double-check a second time to make sure the card is properly aligned and not binding within the socket.

3. Using equal pressure along the length of the card, push the card into the socket. Make sure the card is in the slots evenly.

4. Use one of the two 24-pin ribbon cables to connect JP1 on the Time Machine card to the pass through card or input card in the slot for input 2. There is only one connector on the internal pass through card that this ribbon cable can connect to. On input modules, the ribbon cable connects to the pins in the upper corner of the card closest to the front of the

Trinity. On input modules that are not keyed, the red stripe goes toward the front of the Trinity.

5. Connect the other 24-pin ribbon cable from connector JP2 on the Time Machine card to the input module in the slot for input 3. On input modules, the ribbon cable connects to the pins in the upper corner of the card closest to the front of the Trinity.

Now that we've connected our input modules to the Time Machine card, we're ready to install the included SRAM on the Coordinator card.

Installing SRAM On The Coordinator Card

Trinity's Time Machine requires the addition of SRAM to the Coordinator card. SRAM, or static RAM, provides faster access to data and is a bit more expensive than DRAM. We want to emphasize this difference and point out the fact that adding anything other than the specified SRAM will result in the destruction of the Coordinator card.

CAUTION Adding DRAM will actually blow up the card, and since we have not registered Trinity as a Class B explosive, we strongly recommend you do not use it for this purpose.

To install SRAM on the Coordinator card, follow these simple steps:

1. Disconnect the two VideoNet Cables connected to the inputs at the back of the Coordinator card.

2. Remove the Coordinator card from its slot.

3. On the back of the Coordinator card locate the SIMM socket (marked "Static Ram Only").

4. Using the included SRAM module, line up the notch in the center of the SRAM module with the center of the SIMM socket (SRAM is keyed so it can be installed only in one direction).

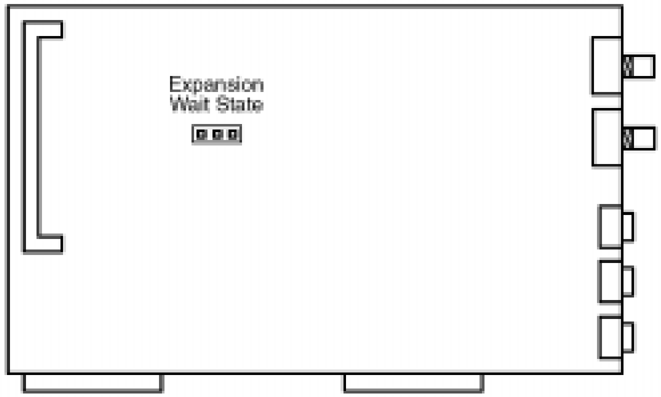
5. Place the SRAM module into the socket at a 45-degree angle.

6. Making sure the module is lined up, push it down until a click is heard and it lies flat on the Coordinator card.

7. Verify that the posts on each end of the SIMM socket pass through the allocated holes on SRAM module.

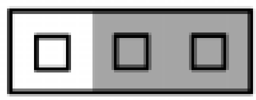
8. Verify that the SRAM module is locked into place with the metal clips.

9. Locate the pins labeled Expansion Wait State on the Coordinator card (following diagram).



Locating the Pins Labeled Expansion Wait State

10. Make sure the jumper is set to 1 (following diagram).



Expansion Wait State's Pins Jumpered to 1.

Now that your SRAM is installed, let's reinstall the Coordinator card:

1. Place the Coordinator card back into its slot.

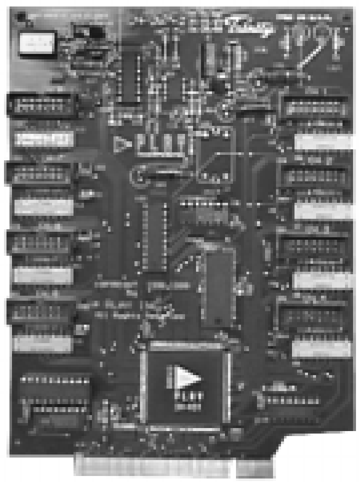
2. Reconnect the two VideoNet Cables to the card's output connectors.

3. Verify that all connections are secure.

Now that we've finished installing the SRAM on the Coordinator card, let's install the TDM Audio Router card.

Installing The TDM Audio Router Card

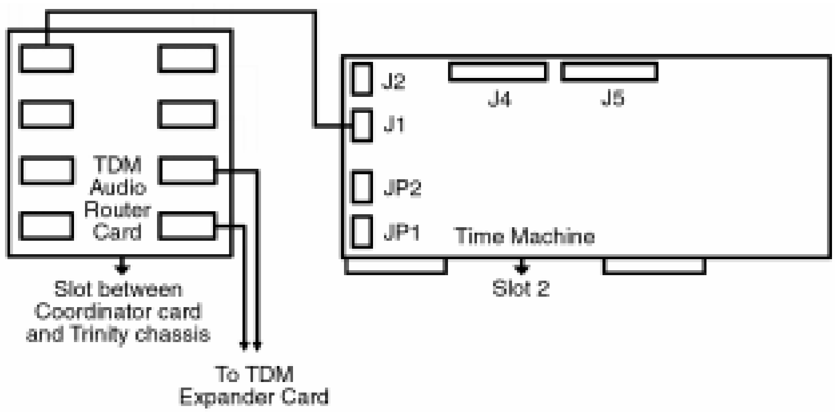
The TDM Audio Router card (following figure) is a new card designed to handle 128 channels of digital audio. It works to route audio from external devices to internal storage (Time Machine).



The TDM Audio Router Card

The TDM Audio Router card installs in one of the slots directly on either side of the Coordinator card.

The following diagram details cable connection.



Connecting the TDM Router Card to Time Machine.

Follow these steps to install your TDM Audio Router card:

1. First, connect the three small 14-pin ribbon cables (included) to any of the connectors on the TDM Audio Router card.

   The red stripe on the ribbon cables must be toward the center of the card.

2. Connect any one of the 14-pin ribbon cables to the J1 connector on the Time Machine card.

3. Route the remaining two 14-pin ribbon cables down through the narrow hole between the chassis wall and the Coordinator card. These cables will connect the TDM Audio Router card to the TDM Expander card when we get to the section on installing the TDM Expander card.

4. Line up the TDM Audio Router card in the slot in between the Coordinator card and the Trinity chassis.

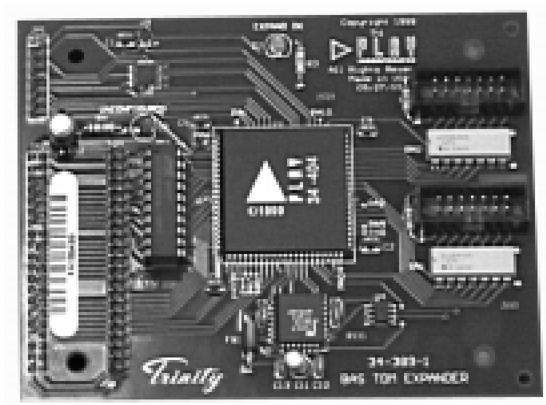
5. Push down lightly on the TDM Audio Router card BUT DO NOT PUSH THE CARD IN YET! Double-check a second time to make sure the card is properly aligned and not binding within the socket.

6. Using equal pressure, push the card into the socket. Make sure the card is in the slots evenly.

Now that we've completed the installation of the TDM Audio Router card, we can move ahead to installing the TDM Expander Card.

Installing The TDM Expander Card

The TDM Expander card (following figure) only needs to be installed on original Graham-Patten audio cards. It fits on the back of the Graham-Patten audio mixer module and communicates with the new TDM Audio Router Card. This combination manages sound in and out of your Time Machine.



The TDM Expander Card

NOTE An audio mixer module is not necessary for Time Machine to function. However, the following steps *must* be followed for audio to be recorded with Time Machine.

Here are the phases to installing the TDM Expander card into the Trinity:

- Removing the audio mixer module
- Upgrading the audio mixer module resistor (if necessary).
- Attaching the TDM Expander card to the mixer module
- Reinstalling the audio mixer module

Removing The Audio Mixer Module

Before we can connect the TDM Expander Card, we must first remove the audio mixer module (following figure) from Trinity.

The Audio Mixer Module

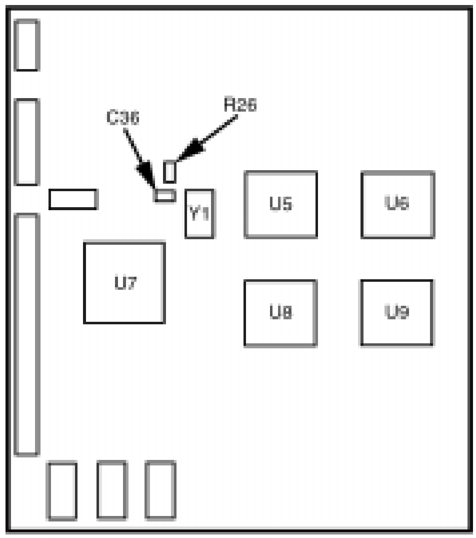
Follow these steps to remove the audio mixer:

1. Locate the the audio mixer module at the rear left corner of your Trinity.
2. Remove the four screws holding the audio mixer module.
3. Note the polarity (order of the colored stripes) of the ribbon cables connecting your audio mixer module.
4. Remove the ribbon cable from the upper left corner of the audio mixer module.
5. Locate and remove the power cable from the audio mixer module.
6. Remove the audio mixer module from Trinity.

Upgrading The Audio Mixer Module Resistor

If you have an original Graham-Patten audio mixer module, you must upgrade a resistor on the module for the TDM Expander Card to work properly. This upgrade must be made to all Graham-Patten audio mixer modules. If you have any question as to whether or not your audio mixer module needs the resistor upgrade, contact Play's technical support at 916.636.2444 from 7:00 AM to 6:00 PM PST, Monday-Friday.

For a visual test, locate R26 and C36 on the Audio Mixer Module and see if there is a resistor that bridges them. If there is not a resistor bridging R26 and C36, then you must make the upgrade before using the TDM Expander Card.



Locating R26 and C36 on the Audio Mixer Module

CAUTION This upgrade should not be attempted by the non-technical user. If you are unsure whether you should attempt this upgrade, contact Play technical support, your dealer, or a qualified technician.

To upgrade the the audio mixer module resistor, follow these steps:

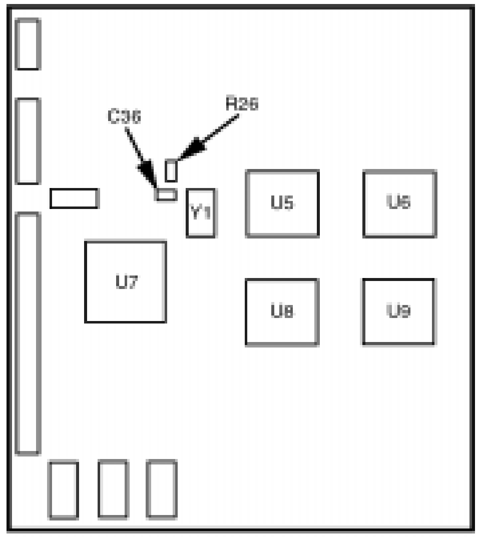
1. Acquire a resistor that has these characteristics

   - Minimum of 1/10W
   - Value between 22 and 47 ohms (33 ohms is recommended)
   - Surface mount or through hole

2. With wirecutters, trim the length of the resistor's wires.

When the resistor is soldered to the audio mixer module, its height should not exceed 1/4 inch, in order to make room for the TDM expander card when it is attached.

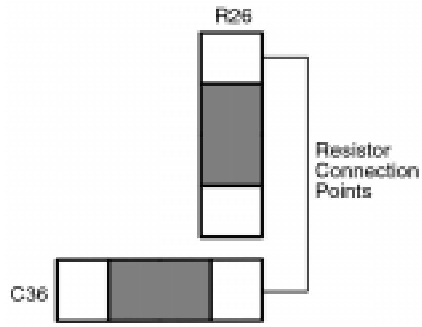
3. Locate R26 and C36 on the audio mixer module (following figure).



Locating R26 and C36 on the Audio Mixer Module

4. Bridge R26 and C36 by soldering the resistor in place.

   One end of the resistor should connect to the top connection at R26. The other end should connect to the right connection at C36 (following figure). If a surface mount resistor is used, it may be installed so that it simply bridges across R26.



Resistor Connection Points

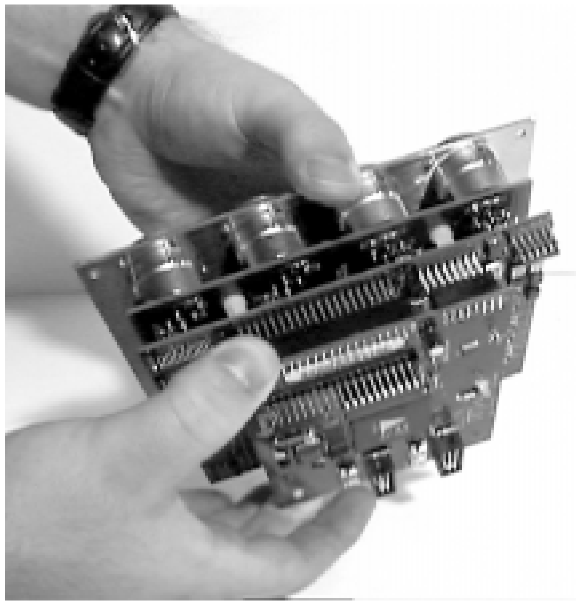
NOTE Please observe all precautions while soldering the new resistor in place.

Attaching The TDM Expander Card

Now that we've removed the audio mixer card, it's time to attach the TDM Expander card to it.

Follow these steps to attach the TDM Expander card:

1. Align the TDM Expander card so the connectors match the pins on the audio mixer card (following figure).



Connecting the TDM Expander Card and the Audio Mixer Module Together

2. Double-check to make sure all of the pins are aligned.

3. Once the pins are aligned, gently press the cards together.

Reinstalling The Audio Mixer module.

Now that we've connected the TDM Expander card to the audio mixer, it's time to reinstall the audio mixer module back into your Trinity.

Follow these steps to reinstall the audio mixer:

1. Reconnect the audio power cable to the audio mixer.

2. Connect the multicolored ribbon cable to the connector on the expander board. Be sure the polarity is as it was on the audio mixer before it was removed.

CAUTION

IT IS EASY TO PLUG IN THIS CABLE SO THAT IT IS SHIFTED OVER ONE SET OF PINS TO THE RIGHT OR LEFT. DOING SO CAUSES THE CABLE TO MELT, SMOKE AND POSSIBLY CATCH FIRE. MAKE ABSOLUTELY SURE THAT THE CABLE IS CONNECTED TO ALL 40 PINS ON THE MOTHERBOARD AND AUDIO MODULE.

3. Connect the two 14-pin ribbon cables from the TDM Audio Router card to the two 14-pin heads on the expander board. Pin one (red stripe) should be toward the center of the board. It doesn't matter which order the ribbon cables attach to the 14-pin heads, they can be interchanged.

4. Carefully place the audio mixer into the Trinity chassis and secure it with the four retaining screws.

Now that we've installed the TDM Expander card, let's move on to the next set of steps.

Connecting Power Cables To The Hard Drives

Now let's go back to the Hard Drive Bay Unit and connect the power cables to Time Machine's three hard drives.

To connect these cables, follow these steps:

1. Locate the round plastic grommet from the hole above and behind the power supply.
2. Remove the grommet by pushing the back of it (in HDBU).
3. Carefully route two power cables from the Trinity power supply through the plastic grommet.
4. Route power cables through the hole, and replace the grommet.
5. Connect splitters/extenders (included) to power cables.
6. Connect one power connector to the fan.
7. Connect the remaining three power connectors to the three hard drives.

Now that we've connected the power cables, it's time to put the cover back on Trinity.

Putting The Cover Back On

Now that all of Time Machine's components are installed, it's time to put the cover back on.

Follow these steps to put the cover back on.

1. Rotate the rear lockdown panel back into place, and tighten the thumbscrews.
2. Replace the retaining bars and tighten the thumbscrews on each.
3. Tilt the Trinity on its front corner, and slide the bottom cover back into place.
4. At the back of the Trinity, tighten the three thumbscrews along the edge of the back cover.
5. Replace the top cover. Make sure the bottom edges of the top cover fit into the slots in the bottom cover.
6. Tighten the three thumbscrews on the top cover.

Checking Installed Cards

Now that the cards are installed, we'll fire up the Trinity and test the configuration of the cards.

Follow these steps to check the installed cards:

1. Plug the Trinity in and turn it and the PC on.

2. Run the **Air Command** application from the host PC.

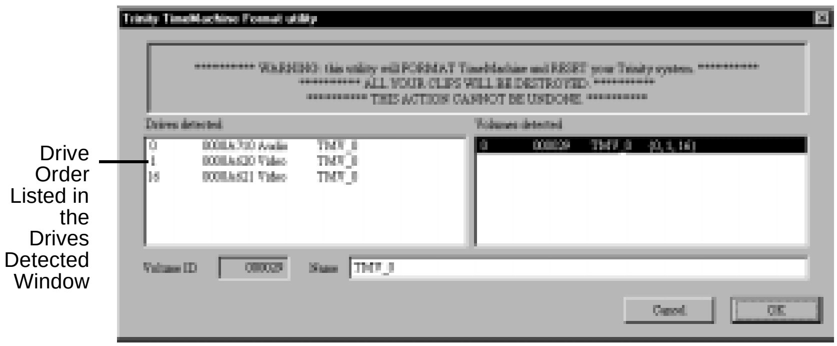
To make sure the Trinity recognizes the new cards, click on the **Configure** button in the lower right corner of the screen and select **Installed Cards** from the pop-up menu. The **Installed Cards** panel appears, and the cards you just installed should be listed there, except the internal pass through card, which does not show up in this panel.

Trouble-shooting

If you don't see the Time Machine, TDM Audio Router, or Audio Mixer in the **Installed Cards** panel, the card was not recognized by Trinity when the system powered up. The card(s) may not be plugged in properly. Please turn everything off, open the unit and check the connections. If this doesn't work, please contact your dealer or Trinity Technical Support.

Formatting The Hard Drives

After installing Time Machine's components, you must format the hard drives before you can use them. To do this, open the Trinity 2.0 program directory from the programs menu and launch the **Time Machine Format** program (following figure). This program is self-explanatory and takes only a brief moment to perform, as it is very efficient. It's so brief that you'll wonder whether it did anything!



The Time Machine Format Program

NOTE In the **Drives detected** window, the drives should be listed in this order: 0, 1, 16. If they are not, it is possible that the SCSI ribbon cables connected to J4 and J5 on the Time Machine card have been swapped. If this is the case, try disconnecting the SCSI ribbon cables from the J4 and J5 connectors and swapping them.

After you have formatted your hard drives, it is necessary to restart your software.

Once your software starts up, you're ready to begin digitizing clips! Refer to the manuals for the individual applications or the Trinity updates on Play's web site for more information on digitizing clips with Time Machine.

Chapter 5

Connecting Video Equipment

Once the Trinity hardware, software, and host PC are up and running, you can get down to the process of connecting the appropriate video equipment. This chapter tells you how to do that and covers the following topics:

Synchronizing Video Equipment

Video timing is called a number of different things. Some of the terms used are genlock, house sync, sync, timing, and reference. Each term refers to slightly different information, but the general function of each is the same.

Video is made up of 60 fields, or still pictures, per second for NTSC (or 50 fields per second for PAL). These images are drawn on a television one line at a time, starting from the top of the screen and working down.

When dealing with multiple video devices that are mixed together, they all must start drawing each field of video at the same time. Otherwise, weird artifacts show up in the video. The most common artifact is a pointer crossing. This is a horizontal tear in the video signal. In a scene with a lot of horizontal motion, such as a person walking from left to right, the top half of the image becomes separated from the bottom half. In some video signals, this tear may not be visible because the tear is located in the vertical blanking interval. Usually it becomes visible over time, or when a warping video effect is applied to the video signal. The other giveaway is a flash at the beginning of a digital video effects transition. This flash is caused by the router switching before one of the video signals has been buffered into the Warp Engine.

The way to combat this is to designate one video device as a sync generator that all other devices link to for synchronization. Usually, this device is a camera or a stand-alone device called a sync generator or black burst generator. By hooking up the sync generator output to the genlock input or reference input of each device, you ensure that all devices draw their fields at the same time, and the picture remains cohesive.

Since Trinity is designed to eliminate the hassles of buying a bunch of small stand-alone devices, we have conveniently built a black burst generator into every master output encoder card. See the documentation that came with your output card for more information.

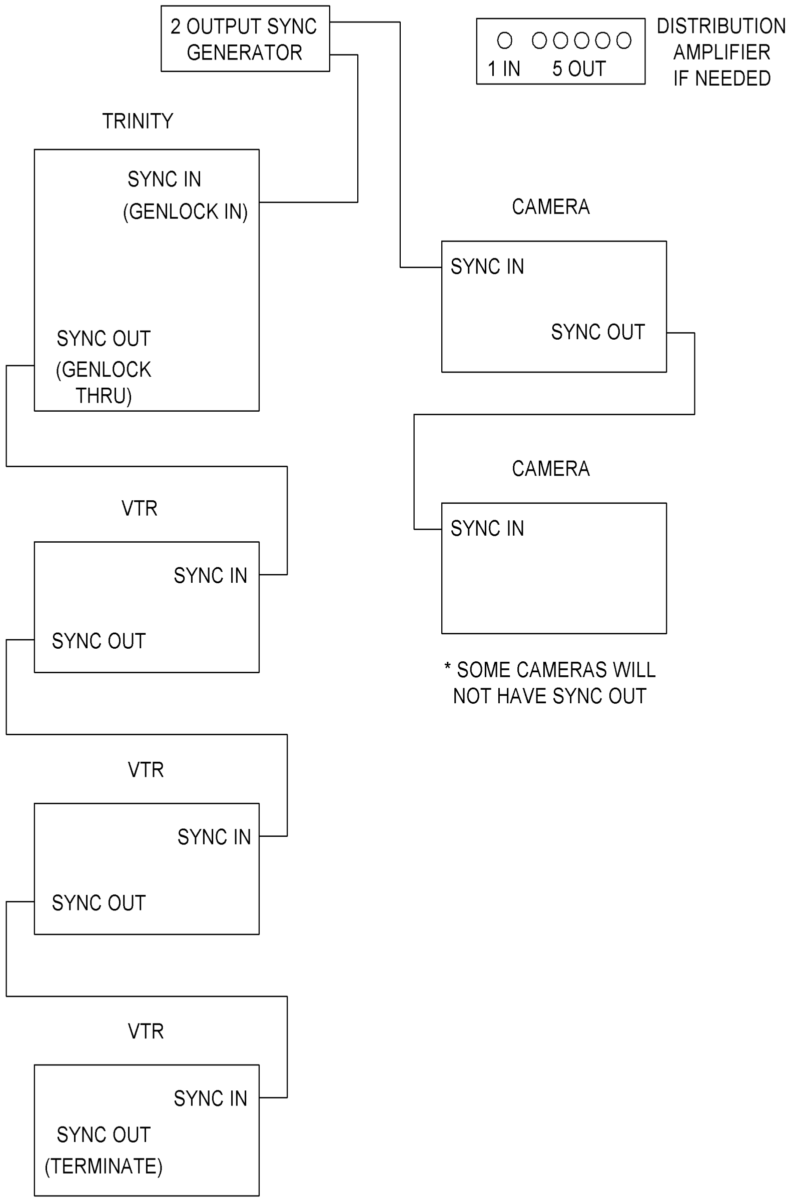
Syncing Video Equipment

There are probably unlimited configurations for video and sync. The following are two fairly standard setups with professional equipment.

Using a Separate Sync Source

From your sync generator, plug into a piece of video equipment (sync or genlock in), and loop (sync or genlock out) thru to the next piece, and so on until every item, including the Trinity, is genlocked (synced). Use the shortest route, and use all the outputs of the sync generator, if it has multiple outs. If the devices it loops thru have 75-Ohm termination switches, set them to off, except for the last item in the chain, which needs to be terminated. (If you are not running your sync very far or looping it through a lot of video equipment, a 1- or 2-output black burst (sync) generator should be fine.)

The following figure shows the basic configuration for using a separate sync source.



Setting Up a Separate Sync Source

Using Trinity's Built-in Sync

To use Trinity's sync, hook up all your video equipment, video ins, video outs, and audio. From Trinity's black burst out on the master encoder, plug into a piece of video equipment, source decks first (sync in) and loop (sync out) through to the next piece, and so on until every item is genlocked (synced). Use the shortest route. The last item in the chain needs to be terminated.

You can use the genlock in and loop thru *or* the black burst out of Trinity, but we do not recommend using both at the same time. Black burst out means you are using the Trinity as the sync source. Genlock in takes sync from another source, like house sync. The loop thru continues the signal on to another piece of equipment.

If your sync run is going through a lot of video equipment or a long distance, it's recommended you use a separate sync generator. This assures a strong sync signal all the way to the last item. Never split your sync signal. If you want to use Trinity Sync, you can use a distribution amplifier.

NOTE Keep in mind that some video equipment is self terminating.

Genlock Input Acquire Behavior

Trinity was designed to work with a wide variety of genlock input sources, even those that may not be pristine. Trinity does this by automatically analyzing and locking to an external genlock source when the source is first connected or the system is powered on. For this reason, it is not a good idea to apply an input genlock signal to Trinity and then later change its level. For example, applying a genlock signal and then connecting a terminator could result in less than ideal operation because the initial lockup would be to the unterminated signal.

There are three simple ways to get Trinity to re-acquire the genlock signal:

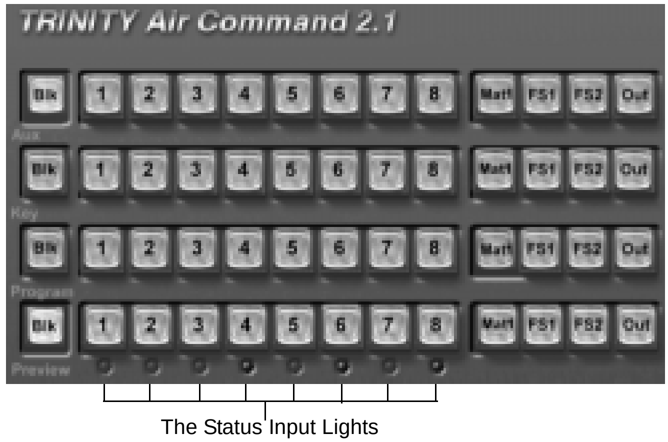
1. Disconnecting and reconnecting the genlock source input.
2. Switching over to freerun which is internally generated genlock, and back on the Output Settings software panel.
3. Switching the system off and back on.

Checking for Sync

Trinity includes LEDs on the interface to tell you if the inputs are properly in sync. If these LEDs are not already visible on the main Air Command panel, click on the **Configure** button, then go to **Global Settings** and turn **Input Status Light** to **On Main Panel** (see the following figure).

Turning on the Input Status Lights

This turns the input status lights on below the Air Command busses. Green lights mean good sync and red lights mean bad sync or no sync. Yellow lights indicate that the sync signal is not perfect. But this imperfection in the sync might not cause noticeable problems. You can right-click on the yellow lights to find out what is wrong with your sync (see the following figure).



Status Lights for Checking Sync

Using an Unsynced Source as the Master Sync

Without frame sync inputs, there is a way to use one unsynced source with a Trinity system. That is to let it be the master sync that the other decks and the Trinity all sync themselves to. That unsynced source needs to be stable, so it could be a live camera or a non-professional level camera such as a home camcorder. It also could be a DV deck which puts out a very stable signal, even while playing back a tape. However, do not try this with an analog deck.

To use an unsynced source as the master sync, feed the DV deck or camera's YC output into the usual Trinity input. Then run the composite out, from the DV device or camera, into the Trinity's genlock in (top BNC on the Master Output card) and then loop it back out to genlock any other devices like your other source deck. Remember to terminate that last device. Now the system is in sync.

If you use this configuration, be sure to leave the camera or deck on all the time. If the camera or deck is shut off, the rest of the devices (including Trinity) no longer have a reference (genlock) signal to sync up to, and distortion in the video image can result.

In situations where you need to use multiple unsynced sources, there are a couple options:

A genlockable TBC/frame sync device

These devices take a wild source and retime the signal to a common reference. When choosing a TBC/frame sync device, look for one that has a full-frame buffer and a genlock input. Less expensive TBCs are not genlockable and do not retime the vertical sync. Trinity requires genlockable devices that actually retime the vertical sync.

The Composite and Y/C input card with Frame Sync

This Trinity input card is now available and is designed to work with non-genlockable equipment.

Sync Exceptions

If a device is not in sync with the rest of the program, then the Trinity cannot do a perfectly clean cut or transition. Video equipment that is not genlocked, or synced, does not operate properly unless it falls into one of the following categories:

- If you are using our Composite/YC input cards with frame sync, they do the frame syncing for you. These are excellent for feeding in consumer and prosumer decks and camcorders that do not support external sync.
- If you are using the non synced source as a feeder for Time Machine only. Digitizing to Time Machine may be done directly from sources, even if they are not genlocked.

Connecting Cameras

Here's a guide to connecting cameras and making sure they are properly synced.

For A Single Camera

1. Hook the output of your camera to the input jack of the appropriate input module on the back of the Trinity.

2. Hook Black Out from either the Trinity or a separate sync source to the genlock input of the camera.

3. In the Input Sources panel, make sure the correct type of source is selected as the input.

   a. Click on the Configure button in Air Command or Preditor.

   b. Select Input Sources from the pop-up menu.

   c. Click on the button next to the slot number your camera is connected to. When you first connect an input, the button reads Empty.

   d. Select the appropriate input type from the pop-up menu.

   For more information on how to use the Input Sources panel, see the chapter "Using Configure Panels" in the *Trinity 2.1 User Guide*.

That's it. Your camera is hooked up.

For Multiple Cameras

Follow the above steps, but also you need a way to send a genlock signal to each camera. Some devices have a Genlock Thru jack that can be used to daisy-chain the genlock signal through multiple devices. If you are using the S-video connector of the camera to feed Trinity, the composite out of a camera can be used the same as a Genlock Thru jack to daisy-chain a genlock signal to other cameras.

Another method for syncing multiple cameras is to use a distribution amplifier. This device takes a single video signal and breaks it out into a bunch of output jacks. If you are using a distribution amp:

1. Hook the Black Out from Trinity to the input of the distribution amplifier.

2. Hook an output from the distribution amp to each of the genlock or reference inputs of each device.

Setting Up VTRs

This section includes recommended capabilities for your VTRs. It also explains how to hook up source and record VTRs, as well as general information for setting up VTRs.

Recommended Decks And Peripherals

There are many different types of video gear available, ranging from the professional level to the simplest home consumer gear. Trinity can work with all different types of equipment, provided it is configured properly. Here are a few things to keep in mind when purchasing VTRs.

The better the peripheral deck, the more flexible your system will be. While Trinity can use home VCR's for simple playback and recording functions, it takes a professional-level VTR to do accurate editing. For editing, you'll need a deck that is controllable using the RS-422 control protocol. Most pro decks have this feature, either built-in or as an option. Having at least one frame-accurate RS-422 controlled deck, even in a Trinity NLE suite, is an extremely useful peripheral to have.

If you are using a consumer-level peripheral, such as a home camcorder or VCR, you will need to use a frame synchronizer (or frame sync) to properly time the video signal. Play makes an input card with a built-in frame sync just for this purpose, or you can use an external frame synchronizer.

Hooking Up Source VTRs

To hook up source VTRs, do the following:

1. Hook up the video output of the VTR to the appropriate input(s) on a Trinity input module.

2. Hook up Black Out (or Genlock Thru) to the reference input on the deck.

3. Hook up the RS-422 control port of the VTR to one of the RS-422 control ports on Trinity.

Hooking Up Record VTRs

To hook up record VTRs, do the following:

1. Hook up the Trinity video output to the correct video input on the VTR.

2. If you are using the record deck as a playback deck, hook VTR Out to Trinity.

3. Hook up Black Out (or Genlock Thru) to the reference input on the deck. This step is absolutely essential for proper operation.

4. Hook up the RS-422 control port of the VTR to one of the RS-422 control ports on Trinity.

5. In the menu setting of the deck, set the deck to EE (edit to edit) mode in every mode except Search and Play.

6. Set the deck to Remote mode (rather than Local) so Trinity can communicate with it.

NOTE If you use another company's RS-422 to RS-232 or control-L converter box, you typically cannot use the deck as an editor. This means it can only be used as a source. It is highly unlikely with any protocol converter that the deck will be frame accurate.

Settings For VTRs

Once the decks are hooked up, the next thing to do is check the settings for each deck. This section explains the settings and adjustments for the decks.

Record Decks

Most professional record decks have numerous switches and buttons on the front panel. It is important that the deck be set up in the correct modes in order to work properly with Trinity. The following are tips for setting up your record VTR after you have hooked up the deck.

Many decks have a special composite output that shows the VTR's menu settings superimposed on the video. It is very useful when configuring your decks. Without it, you'll be stuck trying to match up menu numbers in a VTR manual with the numbers on the LED readout on the VTR. It is much easier to hook a monitor to the SUPER output and read the descriptions on-screen.

For convenience, when you are working with a stack of decks, always put the top deck in serial port 1 and designate it in Preditor as A. Also use audio inputs 1 and 2 for the first, or A, deck. Use serial port 2 for the second, or B, deck; use serial port 4 for the record deck.

Input

Many decks have multiple formats for the video input. Make sure that the deck is properly configured for the type of input you are using. For example, on a DVCPro deck, there is a switch on the front panel with choices for Digital

(SDI), Y, Pb, Pr, or Composite input. If you have the SDI output of your Trinity hooked up and the switch is set for Composite on the record deck, the deck will not record anything. Some decks inform you whether they see video on the selected input, but others do not.

Preset/Regen

This switch chooses which type of timecode to lay down on the tape during editing functions. When striping a tape (see the "Linear Editing Tutorial" in the *Preditor 2.1* manual for more information) the switch should be set to PRESET. When performing edits with Trinity, the switch should always be set to REGEN. This makes the deck REGENerate the timecode that is already on the tape, rather than recording new numbers on the tape.

External Sync

Record decks can operate with external sync connected but not active. It is important that the record deck actually read the reference input and make timing decisions based on it. In particular, bad edits can result when the deck is set to internal sync or Sync on Video. The sync options are usually either a switch or a menu setting within the deck.

Routing Video and Audio Cables

In most circumstances, you'll be attaching at least four cables to the back of each deck: reference, or house sync; two audio cables; one video cable. When connecting component video, you'll have three video cables. Make sure they are connected in the same order on both Trinity and the VTR. There is not any standard order to place the connectors, so color-code or label the cables and make sure the correct signal gets hooked to the correct connector. Trinity input and output connectors are always in this order, from top to bottom: y, Pb, Pr.

You need standard DB-9 to DB-9 male-to-male cables to connect your decks and Trinity. Check for any menu settings or switches on your decks that may affect the RS-422 control protocol. For example, Panasonic has a proprietary control protocol called "Panasonic 9-pin" that is different from RS-422. In some cases, you may need to change the menu setting. Also, look for a switch on the front of the deck labeled Remote/Local. This switch controls whether Trinity has control of the deck (Remote) or whether the controls on the front of the deck have control (Local).

NOTE There are a lot of converters on the market out there that claim to convert other control protocols to RS-422. Play does not recommend any of these converter boxes for use with Trinity.

Audio Levels

It is very important to calibrate audio levels between your playback decks and your record deck. The best way to calibrate audio is to use a tape in your source deck(s) with a reference tone striped on it. Follow these steps to calibrate audio levels:

1. Play the tape and set the outputs on the source tape for the reference level (most tones are set at 0dB).

2. Set your mixer for Unity gain. (On the Trinity audio mixer, this is accomplished by setting the sliders all the way to the top and setting the trim pots to 0dB.)

3. Take the output of the mixer and feed it into the record deck.

4. Set the levels on the record deck to 0dB.

The record deck audio is now calibrated.

NOTE If you are using XLR-to-RCA adapters, you may need to compensate by adjusting the trim pots on the mixer higher than 0dB because these adapters cause a drop in the signal.

Panasonic DVCPro 640/650

There is a menu setting (on the 650, it is #107 CAP. LOCK and on the 750, it is a switch hidden in a door at the bottom edge of the fold-up control panel) that can be set to 2F or 4F. If this setting is 4F, it means that the deck's servo will not lock to just any frame. It will only lock so that the deck's color framing matches that of the reference. (PAL has eight color fields, NTSC has four).

Effectively, this means that the deck MUST run so that even timecodes fall in color fields 0 and 1 and odd timecodes MUST fall in color fields 2 and 3 (NTSC). In an editing situation, it means that the deck DOES NOT sync up for certain edits that require it to violate color framing, and thus Preditor thinks it must abort the edit. Enforcing color framing is only necessary if the video on the tape came from a composite source or if the deck's video output is connected to Trinity using the composite format.

If one is enforcing color framing, then the setting in editor options should be set to Abort edit if off by more than 1 so that it allows the edit to continue even if a source is out of sync from where it should be by a single frame (which happens in about half the edits).

Both the 640 and 650 editor, in the scrollable Menu on item 202 ID SELECT, should be set to DVCPro, not OTHER (BVW-75). Do this before you have the Trinity perform the Auto Config 422 (see "Auto Config 422" below for more information).

Field delays for these decks should be changed as follows. The 640 play machines should be set to 20/12/12 and the 650 Editor at 6/12/12 (Play Delay, Edit Delay, Edit Stop Delay). You should get frame accurate edits with these settings. Again, under Edit Options you may need to change the Abort edit if off by field, to 1 or 2 instead of 0, but you will not get any frame accurate edits.

Profiling Decks

Once all your decks are hooked up, you need to make sure Trinity knows what type of deck you have so it can perform frame-accurate editing. If your deck is in Trinity's database of known decks, then Trinity automatically recognizes it. If it is not in this database, then Trinity can automatically build a profile of any deck that can record. If your deck is a source-only deck, or if for some reason Trinity cannot automatically profile it, there are several ways you can manually create a profile. The following sections describe the profiling methods.

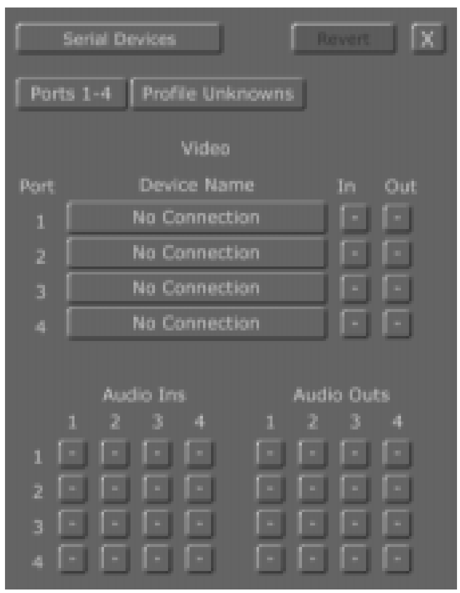
Auto Config 422

This is the first method you should try. This tells Trinity to look at your deck and see whether it is a familiar one. Here's how to use Auto Config 422:

1. Click the Configure button on the toolbar in either Air Command or Preditor.

2. Choose Serial Devices from the pop-up menu.

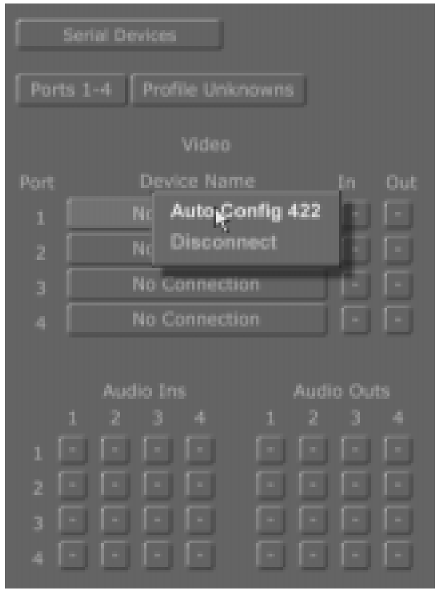
   The Serial Devices panel appears (following figure) in the upper left corner of the screen.



The Serial Devices Panel

3. Click on the No Connection button for the serial port number the deck is connected to.

4. Choose Auto Config 422 from the pop-up menu (following figure).



Choosing Auto Config 422 in the Serial Devices Panel

The name of the deck (or a deck similar to your deck) should appear on the Device Name button. If this is the case, you can proceed to "Configuring Inputs And Outputs" on page 112. If No Connection appears again, Trinity does not see anything attached to the port. Check the cables, and make sure the deck is turned on and set to remote. If you select Auto Config 422 and Unknown appears on the Device Name button, your deck is not in our database of known protocols. In this case, use one of the following profiling methods.

Building A Profile Automatically

If your deck can record and came up as Unknown when you tried Auto Config 422, this should be the next method you try. If your deck is a source-only deck, or if for some reason Trinity cannot automatically build a profile, use one of the manual profiling methods.

Trinity automatically builds a profile of a deck by laying down an edit, playing it back, and checking the delay values. To use this feature, do the following:

1. Make sure the output of the deck is connected to a Trinity input module, and the Trinity output module is connected to the active input of the deck.

   Even if you plan to use the deck as a source deck, it must be configured as a record deck in order to conduct the automatic profiling. You can reconfigure the deck as a source-only deck after it is profiled if you wish. Or, if you have a set of decks in the same model series, you can profile the record deck and use the same settings for source-only decks.

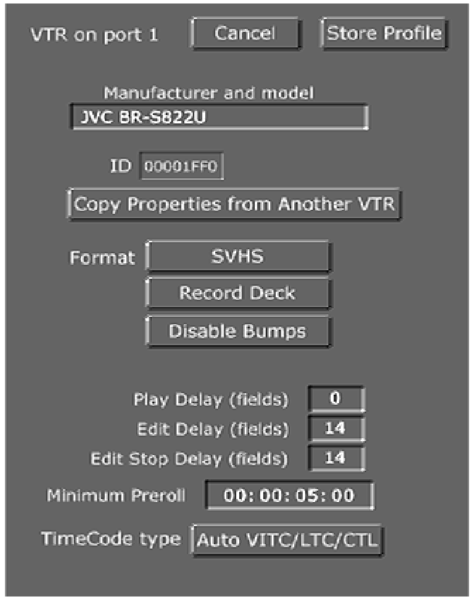
2. Follow the steps in "Configuring Inputs And Outputs" on page 112. This tells you how to assign a video input and output for the deck on the Serial Devices panel.

3. Place a striped (black with time code) tape in the deck.

   To make a striped tape, use an actual black video source, such as matte black from Trinity. An empty input is not stable enough.

4. Click the Unknown button and select Make Profile from the pop-up menu. (Clicking on the Profile Unknowns button profiles all unknown decks at the same time.)

   Preditor records to the deck, plays it back, and checks its delay values. When it finishes, it displays a message informing you that profiling is complete, and brings up the Deck Properties panel (following figure) in the upper left corner of the screen.



The Deck Properties Panel

NOTE

This panel is also available for decks that Trinity *does* recognize. To access it, click on the Device Name, and choose Properties from the pop-up menu. You must have a deck hooked up to Trinity in order to access this panel.

5. In the first field of the Deck Properties panel, type in the manufacturer and model of the deck.

6. Click Store Profile.

Building A Profile Manually

You can profile unknown source-only decks manually, either by copying properties from a similar VTR, entering information from the deck's owner's manual, or performing an edit and determining the delay values. You can also use manual profiling for record decks if for some reason Trinity cannot build a profile of your deck automatically. Here's how:

1. In the Serial Devices panel, click on the Unknown button for the port the deck is connected to.

2. Choose Manual Config from the pop-up menu.

The Deck Properties panel appears.

3. At this point, you can do one of two things:

a. Copy properties from another VTR

If the deck you want to profile is a minor variation of a deck in Trinity's list of known decks, you can use the known deck's profile. This is useful only if the models are very similar, such as a PVW-2650 and a PVW-2600, or using a UVW-1800 editor profile for a UVW-1600 source deck. It isn't recommended for decks that aren't similar models. To do this, click on the Copy Properties from Another VTR button in the Deck Properties panel. Choose the similar VTR from the pop-up menu and click Store Profile.

NOTE Once you copy properties from another VTR, even if you disconnect the deck and run it through Auto Config 422 again, Trinity remembers it and it shows up as the deck you copied properties from. This means it never appears as Unknown again, and thus never gives you the option to go back and try automatic profiling. So, unless the decks are very similar, Play recommends you try having Trinity build a profile automatically first.

Manually enter information

Manually enter the information in the Deck Properties panel. You can either look up the information in the deck's owner's manual (or request it from the manufacturer), or perform an edit (see following section) to determine these values. As a starting place, you can click on Copy Properties from Another VTR and select Misc. Edit Deck. This gives you a basic set of values to start from. The most crucial values for frame-accurate performance are Edit Delay and Edit Stop Delay for record decks, and Play Delay for source decks.

The fields on the panel are:

Manufacturer and model	The manufacturer and model number of the deck.
ID	The deck's ID number. If you don't know it, you can leave it blank.
Format	The tape format of the deck.
Record Deck	Turn this on if you are using the deck as a record deck; otherwise, turn it off.

Disable Bumps	Leave this off, unless your deck has trouble responding to Trinity when it "bumps" it a few frames to get it in sync. You also want to turn it on while performing edits to determine the deck's delay values.
Play Delay	The delay between when Trinity instructs the deck to play back and when it begins to play back. Listed in fields. Find this number in the deck's owner's manual and enter it here. If you don't know what this number is, try 0, as only a few decks have a play delay. Or, see the following section for instructions on how to determine this value.
Edit Delay	How long it takes the record deck to respond to Trinity's command to begin an edit. Listed in fields. Find this number in the deck's owner's manual and enter it here. Or, see the following section for instructions on how to determine this value.
Edit Stop Delay	How long it takes the record deck to respond to Trinity's command to stop the edit. Listed in fields. Find this number in the deck's owner's manual and enter it here. Or, see the following section for instructions on how to determine this value.
Minimum Preroll	Find this number in the deck's owner's manual and enter it here. If you don't know what this number is, try 5 seconds, or 7 seconds for older decks.

TimeCode type	Determines what type of timecode Trinity looks for on your deck. Select from Auto VITC/LTC/CTL, VITC/CTL, LTC/CTL, or Timer. When set to Auto VITC/LTC/CTL, Trinity looks first for VITC, then for LTC, and if neither are detected, uses control track (CTL), which is based on the deck's counter numbers. If you are using an older deck without a timecode board and you see no timecode numbers in Trinity when this is set to Auto VITC/LTC/CTL, you may need to set it to Timer. When set to VITC/CTL, Trinity looks for VITC code. If it is not detected, Trinity resorts to control track. LTC/CTL works the same way, except Trinity looks for LTC code. Timer is essentially the same as control track. Control track allows you to control the deck, but because it is based on the deck's counter numbers, it is not permanently coded on the tape and any marked points are lost once you remove the tape from the deck.

After filling in the fields, give the profile a unique name in the Manufacturer and model field. This is important, as the default settings cannot be overwritten. So, if you change the settings but not the name, your settings are not saved. After typing in a name, click Store Profile.

Manually determining edit delay values

If you don't know the edit delay, edit stop delay, and play delay values for your deck, you can determine them by performing an edit and looking at the results. This procedure takes some time, so get comfortable.

First you need to do a few things to prepare the equipment:

1. Click on Configure in Preditor or Air Command to open the Serial Devices panel, and click on Unknown for the serial device port number of the deck you want to profile.

2. Choose Manual Config.

   This opens the Deck Properties panel.

3. If you are profiling a source deck, click on the Record Deck button to turn it off.

4. Type in the manufacturer and model of the deck you want to profile, but don't worry about the rest of the fields yet.

5. Click Store Profile and close the panel.

   This adds the deck to the list of decks in the Serial Devices panel.

   Do this for all of the unknown decks you want to manually profile.

6. Prepare a striped tape.

   A striped tape has a black signal and timecode recorded on it. Use an actual black video source, such as matte black from Trinity (an empty input is not stable enough).

7. If you are using an older deck that has a Preset/Regen setting, set it to Preset.

   Basically, you want the switch or menu setting on the deck to be on Preset when you stripe the tape. Change it to Regen when you start editing. This tells the deck to regenerate, or re-insert the same timecode, when it performs an insert edit. If your deck performs one edit on a newly striped tape and then balks, check whether the timecode on the tape changed in the section of the first edit. If it did, you probably need to change the TC setting to Regen.

8. Make sure these menu settings or switches on your deck are in the proper position:

TC Int/Ext	Int
TC Mode	Regen
VITC Rec	On
VITC Regen	PB+Rec

Sync	Ext
TBC	On for source deck

9. Check that your decks are properly synced.

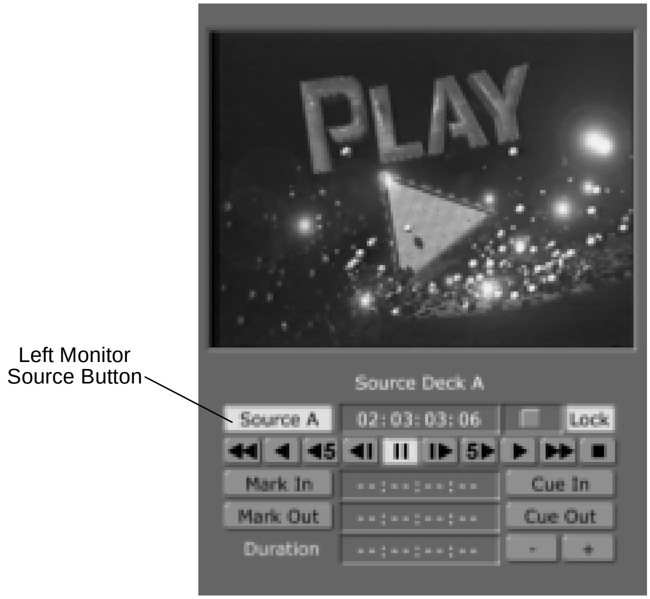
   You can check this by looking at the status lights on the Input Sources panel (see the section on Input Sources in the “Using Configure Panels” chapter of the *Trinity 2.1 User Guide* for more information on how to use this panel). If the lights are green, the sync is good; yellow or red indicate a problem. The light for a source deck with no time base correction (TBC) may not turn green until the deck plays a tape.

Now you need to set up your decks in Preditor to do an edit.

1. Open Preditor and make sure you are in Add Clip mode. The Add Clip button (following figure) is yellow when it is active.

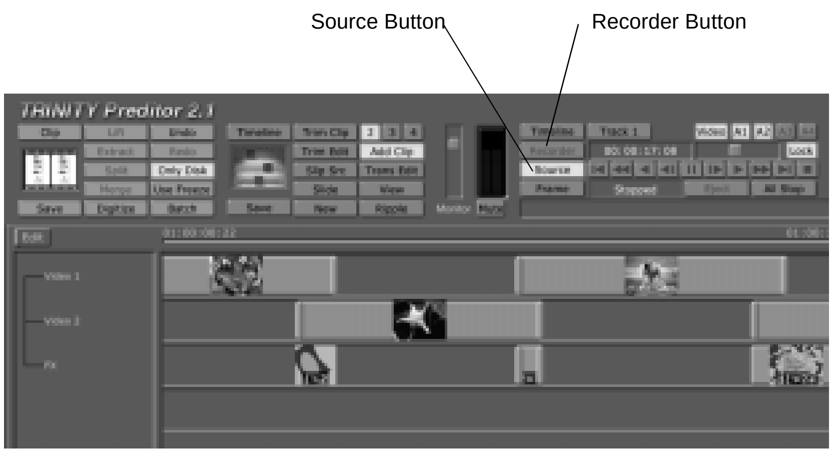
The Add Clip Button

2. Below the left monitor, right-click on the top left button (following figure). This button is where you select which input source the monitor displays, and it may say Source A (or B or C), Clip, Frame, Matte, or Black. Select Source A.



The Left Monitor Source Button

3. In the middle of the screen above the timeline is a set of transport controls. Right-click on the Source button in this group of controls.



The Source and Recorder Buttons

This brings up a pop-up menu. (If you only have one source connected to Trinity, you don't see the pop-up menu because clicking the Source button selects that single available source.)

4. From the pop-up menu, select the deck you wish to use as your Source A deck.

5. Repeat this process for any other source decks you have.

6. Right-click on the Recorder button, above the Source button.

7. Select the deck from the pop-up menu that you want to use as your record deck.

You are ready to begin doing edits and checking the delay values. First you will tackle the record deck, and then you will profile your source decks.

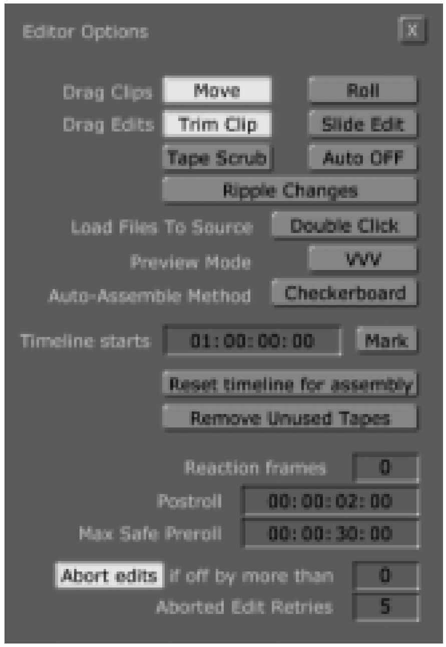
NOTE Setting these values correctly is most critical for linear editing. If you are doing non-linear editing, you may want your record deck to be frame-accurate, but may not need to worry about your source decks.

Here's how to determine the delay values for your record deck:

1. Click on the Recorder button so that it is active (yellow), and use the transport controls above the timeline to advance a few minutes into your striped tape.

2. Click on Options on the right side of the Preditor interface.

   This brings up the Editor Options panel.



The Editor Options Panel

3. Click the Mark button, next to Timeline starts. This imports the current time code from the record tape.

4. In the Timeline starts field, set the timeline to start at a 30 second mark by changing the last digits to 30:00.

   Setting it at a 30 second mark avoids any anomalies caused by drop frame compensations at the top of the minute.

5. Drag a framestore from a stills bin to the far left end of the timeline.

   Drag the clip to the left to make sure it is at the beginning of the timeline. Be sure to use a framestore provided with Trinity as the video source. This eliminates the possibility of problems with the source deck or tapes.

6. Click on the clip on the timeline to select it.

7. Set the left monitor to **Frame**, and make sure it says 5 seconds for the **Duration** (00:00:05:00) in the transport controls under the monitor.

8. Set the right monitor to **Recorder**. The out point under the monitor should say XX:XX:35:00.

9. Click **Perform**.

   Preditor performs the edit.

   If Preditor aborts the edit, do the following:

   a. Check the error message in the message display box under the timeline transport controls. If the message is longer than the display box, right-click on it and it shows you the entire message.

   b. If you still don't know what the problem is, check your sync, timecode, etc.

   c. If you are using an older deck, try increasing the **Minimum preroll** on the Deck Properties panel to 7 or 8 seconds.

   d. If it still won't perform the edit, go back to the Editor Options panel by clicking on the **Options** button on the right side of the Preditor interface. Change **Abort edits if off by more than** from **0** to between **10** and **20**. Obviously this is unacceptable for most editing, but try the edit again. It if works, you know the problem is frame accuracy and you can proceed to the next step.

   e. If the edit still aborts, contact your dealer for professional installation assistance or contact Trinity technical support.

10. Once the edit is finished, click **Cue In** under the right monitor to rewind the record tape to the beginning of the edit.

11. Use the jog forward one frame button () and jog back one frame button () to check whether the tape is black on frame XX:XX:29:29 and whether the framestore first appears on frame XX:XX:30:00.

12. Click **Cue Out** to move the tape to the end of the edit.

13. Check whether the last frame with the framestore is XX:XX:34:29, with black on frame XX:XX:35:00.

If the edit is frame accurate, leave the delay values set where they are, fill in the rest of the information on the Deck Properties panel, and click Store Profile. Remember to go back to the Editor Options panel and reset the Abort edits if off by more than setting. That's it, you now have a profile for your record deck.

If the edit is not frame accurate, you will adjust the edit delay values and run it through some more edits to correct this. Here's how:

1. Adjust the edit delay by the amount the beginning of the edit was off. If the framestore did not appear until XX:XX:30:03, the deck took 3 frames too long to respond. You need to subtract 6 (delay values are in fields, so you need to double the frame amounts) from the edit delay to have a shorter delay. If the framestore appeared at XX:XX:29:28, it started 2 frames too soon, and you need to add 4 to the edit delay for a longer delay.

2. On the Deck Properties panel, click on Disable Bumps to turn it on. (Remember, to get to the Deck Properties panel, open the Serial Devices panel, click on the manufacturer and model name you assigned to the deck, and choose Properties from the pop-up menu.)

   This prevents the record deck from bumping the tape to try to cue it up accurately, and allows us to see the deck's "true" response time. With the bumps turned off, you probably only can get within one or two frames of accuracy. But when you turn the bumps back on the edits are frame accurate.

3. Perform the edit again, and check when the framestore appears. If it is still off, adjust the edit delay value again. Repeat this process until you get the response time as accurate as possible, hopefully within 1 or 2 frames.

4. Click on Disable Bumps to turn it off.

5. Perform another edit, and check that the start is frame accurate.

6. Once you have the correct edit delay, check whether the edit ends at the correct point. In most cases it does end at the correct point, but if it does

not, repeat the previous process for the end of the edit to determine the Edit Stop Delay.

7. When you have the correct values for both edit delays, enter them and the other information required on the Deck Properties panel and click Store Profile. If you are only profiling a record deck, remember to go back to the Editor Options panel and reset the Abort edits if off by more than setting. Otherwise, leave it at 10-20 while you profile your source deck. That's it, you now have a profile for your record deck.

Now that you have a profile of your record deck, you will determine the Play Delay for a source deck. Most professional decks have at least one composite output that displays timecode (super, monitor, window burn, etc.) on the screen. This is the output that should be fed into Trinity for this procedure.

Here's how to determine the Play Delay for a source deck:

1. If you haven't already adjusted the Abort edits setting, click on Options on the right side of the Preditor interface. This brings up the Editor Options panel. Change the Abort edits if off by more than setting from 0 to between 10 and 20.

2. On the Deck Properties panel, click on Disable Bumps to turn it on.

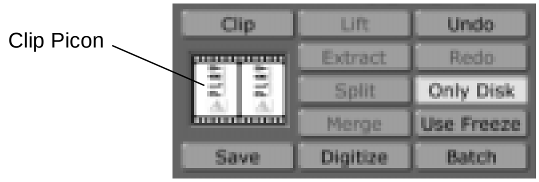
3. Start the timeline where you left off with the framestores, or at a 30 second mark (XX:XX:30:00).

4. Set the left monitor to Source A.

5. In the controls above the timeline, right-click on the Source button and select the source deck you want to profile from the pop-up menu.

6. Log a clip from the source deck that is 5 seconds long. Do this by typing in (in the controls under the left monitor) an in point at a 20 second mark (XX:XX:20:00), and an out point 5 seconds after that.

7. Drag the clip picon at the left side of the screen (following figure), onto the timeline and make sure it is all the way to the left.



The Clip Picon

8. Click Perform.

   Preditor performs the edit.

9. To check the edit, click the Cue In button to rewind to the first frame. The first frame of video should appear at 30:00 on the record tape's timecode. The timecode superimposed on the first frame of video should say 20:00.

   If the edit is accurate, your Play Delay value is fine. To finish profiling the deck, proceed to the next step.

   If the edit is not accurate, you need to adjust the Play Delay on the Deck Properties panel. To do this, follow the same procedure as for the record deck, adjusting the Play Delay and performing edits to get the first frame of the edit on the record tape as close to 20:00 as possible. Once you have done this, proceed to the next step.

10. Enter the necessary information on the Deck Properties panel.

11. Click Disable Bumps to turn it off.

12. Click Store Profile.

13. Open the Editor Options panel, and reset Abort edits if off by more than to 0, or as close as your deck can come.

Configuring Inputs And Outputs

Now that Trinity knows what your decks are, it needs to know where they are.

The most common problem people see when first connecting their system is that the inputs are set for the wrong format. This is especially true of the Component input card, which has six different factory presets. The quickest fix for this is to open the Input Sources configure panel, and select the correct setting for each input. For example, if input 1 has a Composite/YC card in it and has a composite camera connected to it, select Composite - Camera for input one. If input 2 has a component input card, and is connected to a Betacam UVW-1600, then select YUV Betacam as the input source. Fine-tuning can then be done in the different Input Settings panels.

In this section, you'll use the Serial Devices panel to tell Trinity which deck is hooked to which video input, output, and which serial device port. Open the Serial Devices panel by clicking on Configure in Air Command or Preditor, and selecting Serial Devices from the pop-up menu. Then do the following:

For Source VTRs:

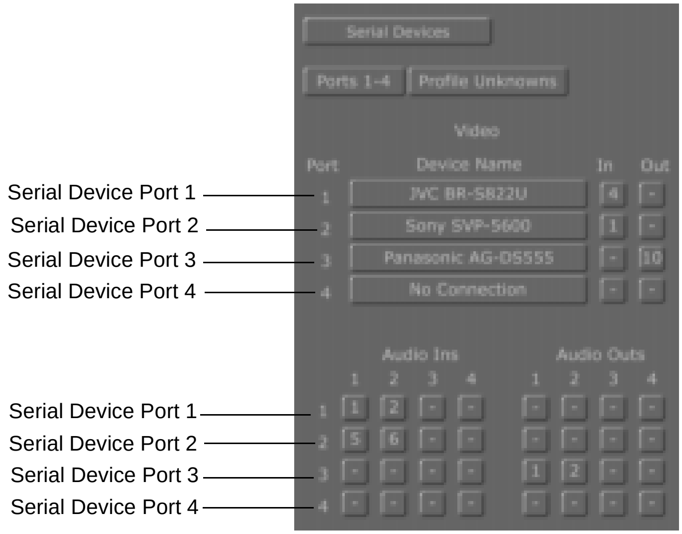
1. Click on the In button to the right of the Device Name.
2. On the pop-up menu, choose the number of the video input slot the deck is hooked up to. If the deck is hooked to the first input module on the back of the Trinity, click on 1.

For Record VTRs:

1. Click on the Out button to the right of the Device Name.
2. On the pop-up menu, choose the number of the video output slot the deck is connected to.

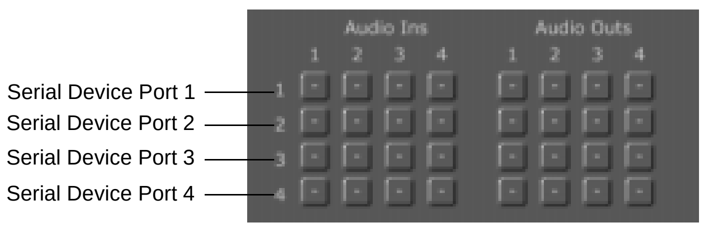
NOTE The master encoder card is always in slot 10 according to the software (but labeled 9 on the back of the Trinity).

The following figure shows a typical serial devices panel displaying the connections between the serial ports and the decks.



The Serial Port Connections on the Serial Devices Panel

Audio for VTRs: Inputs/outputs for audio can be configured in the lower portion of the Serial Devices panel.

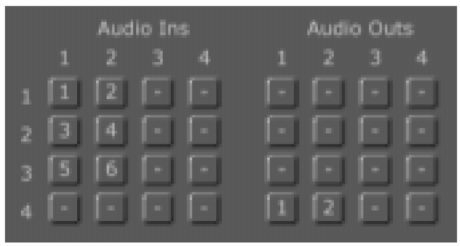


Audio Settings on Serial Devices Panel

The rows of the Audio Ins/Outs table correspond to the RS-422 serial device ports of the same number. In other words, row 1 corresponds to the deck hooked to port 1 of the RS-422 ports. The columns correspond to audio channels within Air Command and Preditor. The system provides for up to four channels from a single deck, although Preditor timelines have tracks for only two channels. If you are working with left/right stereo audio, use only the first two columns for each deck. The number you select from the pop-up menu for each box corresponds to the number of the actual input on the audio board on the back of the Trinity.

NOTE If you are using an external audio mixer and doing linear editing, you need to set audio ins and outs in this panel, even though your audio channels are not hooked up to Trinity's audio board. Doing this allows you to access Preditor's audio tracks so you can insert the audio from the external mixer. Set the audio buttons to match the following figure.

A typical configuration for three source decks (connected to the first three serial ports) and a record deck (connected to serial port number 4) looks like this:



A Typical Audio Configuration

To configure inputs/outputs for audio decks, do the following:

1. Choose the row that corresponds to the RS-422 port that the deck is hooked up to.

2. Choose the column that corresponds to the deck's channel you wish to set.

3. Click on the box in that row and column.

   A pop-up menu with a list of numbers appears.

4. Select the number that corresponds to the audio input/output number that channel is hooked up to on the back of the Trinity.

Examples:
If your first deck is connected to Trinity audio inputs 1 and 2, assign the first two columns of row 1 to 1 and 2.

If your second deck is connected to Trinity audio inputs 3 and 4, assign the first two columns of row 2 to 3 and 4, etc.

Connecting GPI Triggers And Tally Lights

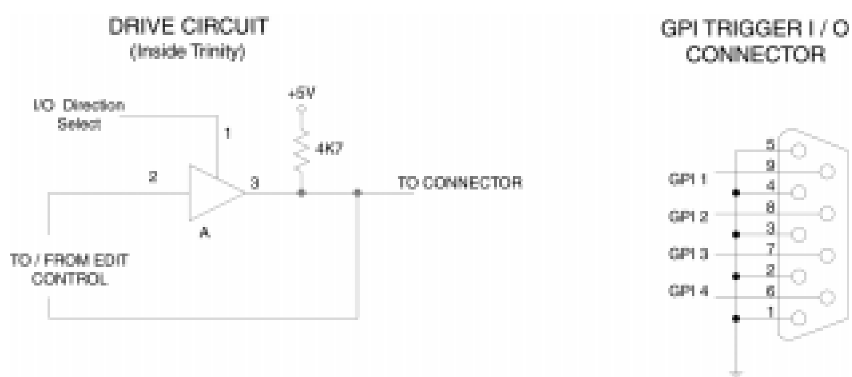
Here's how to connect GPI Triggers and tally lights to your Trinity system:

Connecting GPI Triggers

The term GPI stands for General Purpose Interface. GPI triggers have existed for some time as a way to allow one device to remotely start another device. As the name implies, GPI triggers can be used for almost anything. Common uses for GPI triggers include firing off an external digital video effects generator from a switcher, creating a remote "clicker" for a weatherperson to use during a broadcast, or working with motion control.

With the addition of the Preview card, Trinity has the capability of using four different GPI triggers. The following information is provided to assist professional broadcast engineers in creating GPI triggers. We recommend that only trained engineers attempt to do this because damage to the Trinity system can result.

The Preview card is found in the slot labeled 8 on the back of your Trinity, just to the left of the four serial ports (although it shows up as output 9 in the software). The Preview card has a male and a female 9-pin connector. The female 9-pin is the GPI connector. This 9-pin connector supplies four bi-directional triggers for Trinity. Pins 9, 8, 7, 6 are inputs/outputs 1 through 4, respectively; pins 1-5 are grounds. As inputs, they can accept TTL or CMOS levels, internal 4.7K pull-up to +5v. As outputs, they provide TTL drive levels, 15ma source, 50ma sink, 75 ohm series resistor, 4.7K pull-up to +5v.



GPI Trigger Connector

To create a GPI cable assembly, do the following:

1. Purchase a male 9-pin plug and two dual-end BNC cables. Or, if the device you want to connect uses different connectors, use the appropriate connectors.

2. Cut the BNC cables in half and connect the center wire of each cable to a different GPI pin.

3. Twist the braid of each cable so it forms a wire, and connect each to any of the five available pins.

4. Close up the 9-pin hood and plug it into the GPI connector.

The selection of input/output direction and other settings are made in the GPI Settings panel, accessed via Air Command or Preditor. See chapter on Using Configure Panels in User's Guide for information on how to use this panel.

Connecting Tally Lights

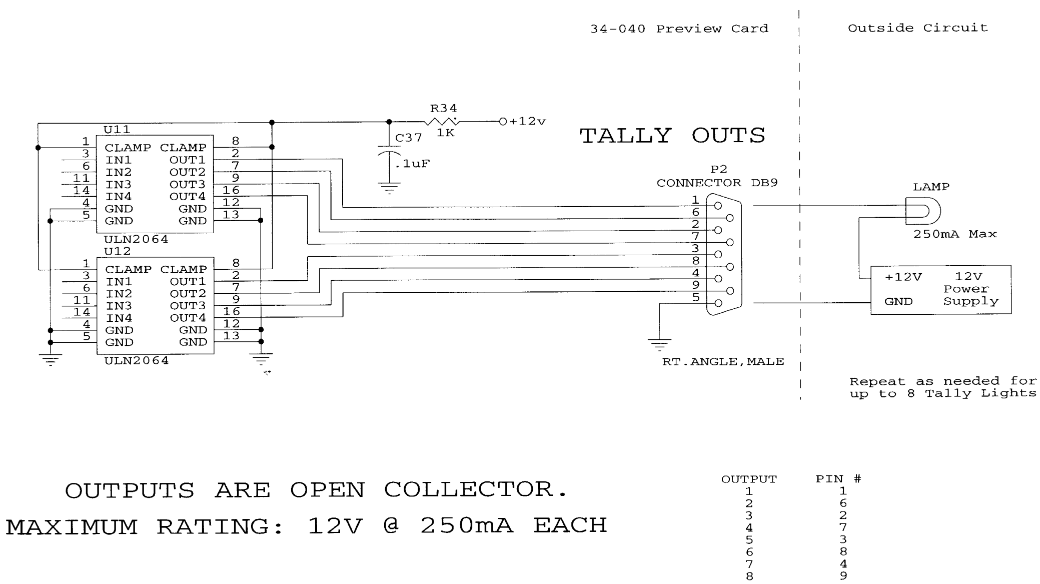
Tally lights are the lights on the tops of cameras in a broadcast environment. These lights are visual cues to the talent in front of the camera that the camera is "on," going out over the air. As the Air Command cuts between cameras, the light on the previous camera goes off, and the new camera's light goes on.

Trinity turns on the tally light for each video source that is active. During a fade transition, both the preview and program sources' lights are on until the fade completes. If the Key Bus is used, the light is lit on the camera used for the key. If a picture-in-picture effect is used, the tally lights of both sources are lighted. The golden rule to remember is, if the light is on, it's going out over the air.

With the addition of the Preview output card, Trinity can be connected to Tally lights. The following information is provided to assist professional broadcast engineers in hooking up tally lights. If you haven't messed with this type of thing before, you probably shouldn't now. If you damage your Trinity while attempting this, the warranty will not cover it and you will be sad.

The Preview card is found in the slot labeled 8 on the back of your Trinity, just to the left of the serial ports (although it shows up as output 9 in the software). The Preview card has a male and a female 9-pin connector. The male 9-pin is the tally light connector. There are so many different types of connections that you might run into in your studio, that we have to leave the final design to you and your engineer. What you need to know is:

- The outputs are open collector (meaning they are the third leg of a transistor).
- The maximum current draw on the outputs is 250mA.
- Maximum voltage is 12V on earlier models of the Preview card, and 24 V on later models. Later production 34-040-3 cards can be identified by a diode wired in series with the resistor near the card edge connector, or by the ID number 34-040-x, with x being 4 or higher.
- Pins 1, 6, 2, 7, 3, 8, 4, 9 are outputs 1 through 8, respectively. Pin 5 is the ground.



Pin Outputs for Tally Lights

Typical Setups

This section illustrates how to connect Trinity with other devices for two common configurations, an AB roll edit setup and a two-camera setup. For each, a list of cables needed and a wiring diagram is provided.

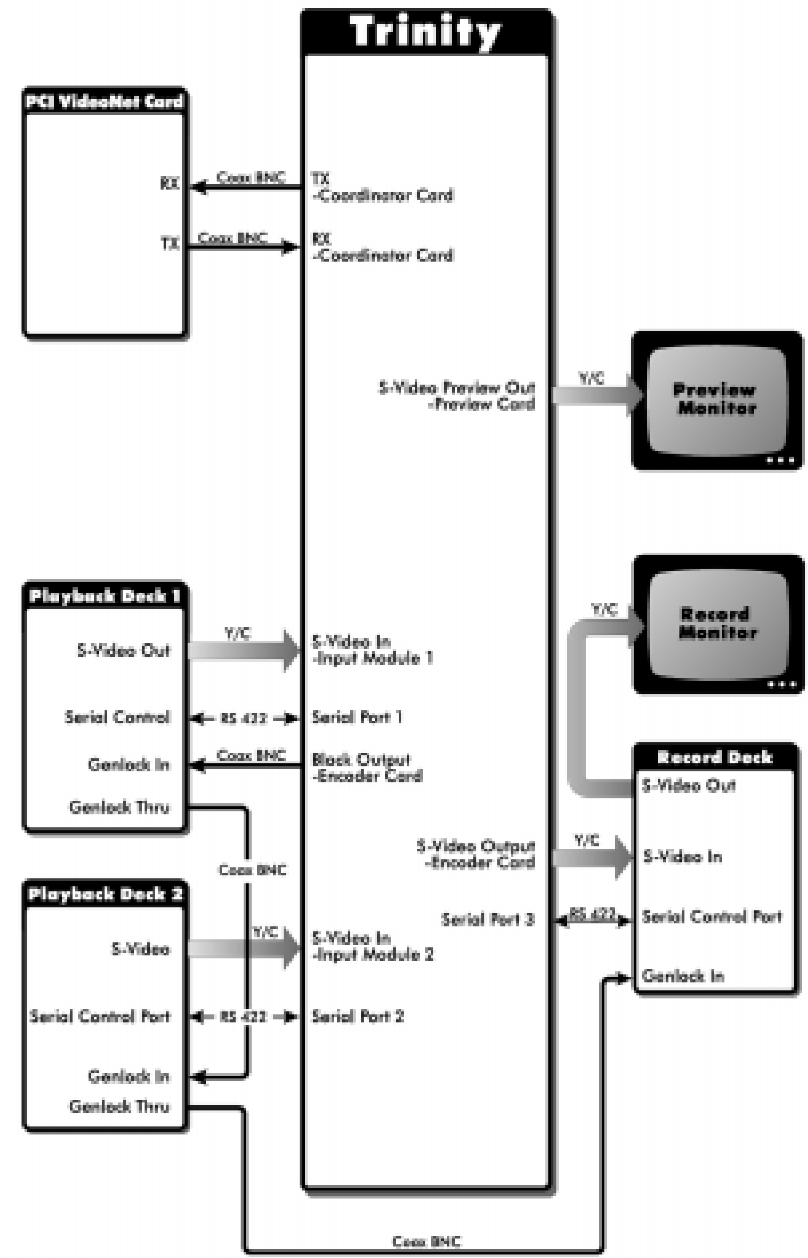
In order to take full advantage of Trinity's capabilities, properly configured video sources are essential. Depending on the type of work you'll be doing, you'll most likely need to use one of two basic configurations for your Trinity: live production with one or more live cameras, or post production with one or more inputs and one record VTR. There are countless variations on these two configurations, but we'll cover these basic ones here.

AB Roll Edit Setup (Post Production)

The typical linear post-production setup, or AB roll edit setup, is used for post production work. (See figure for wiring diagram.)

Here's a list of the cables you need for this setup:

- Three (3) BNC coaxial or Y/C cables (Video In to Trinity for A and B decks, Video Out from Trinity for record deck)
- Three (3) BNC coaxial cables (Genlock from Trinity to deck A; two (2) Genlock thru cables to decks B and Rec)
- Three (3) RS-422 control cables (from each deck to serial ports 1-3 on Trinity)
- Two (2) BNC coaxial or Y/C cables (to [optional] Program and Preview monitors)



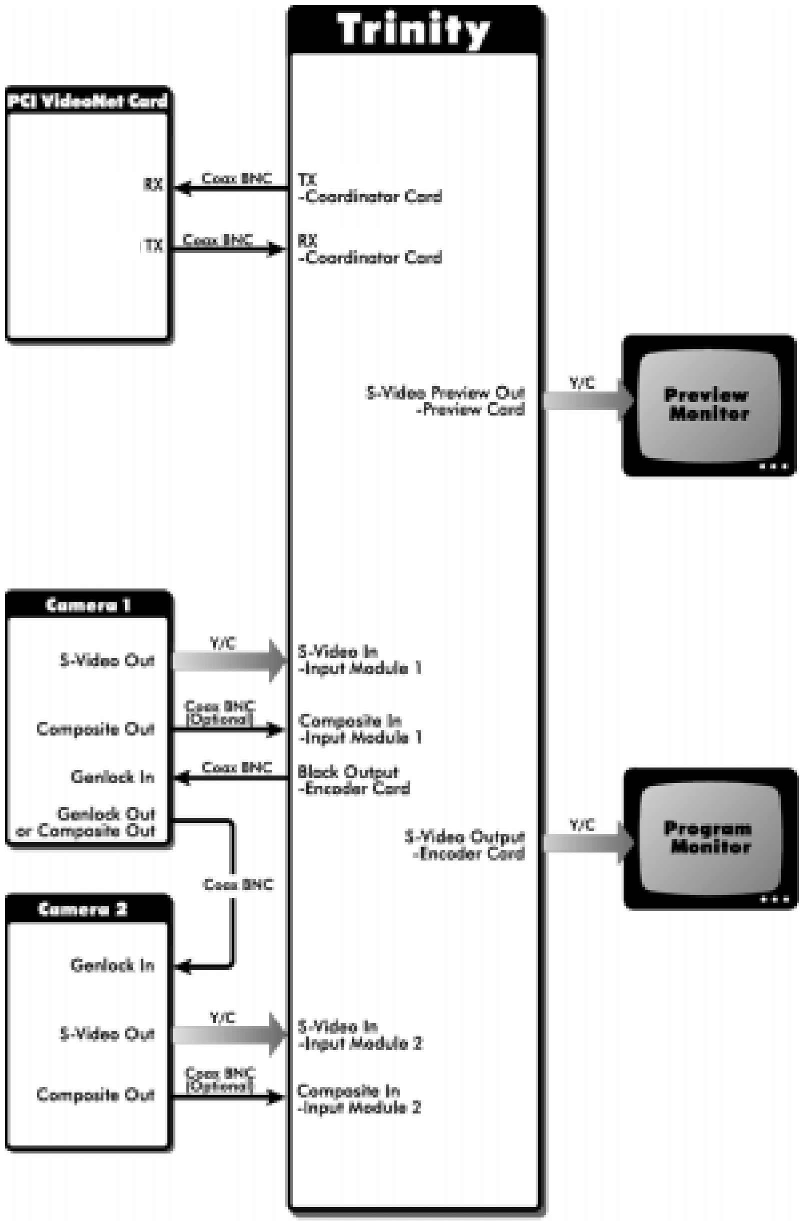
AB Roll Editing Setup

Two-Camera Setup (Live Production)

The typical live setup, or two camera setup, is used for live production work. (See figure for wiring diagram).

Here's a list of the cables you need for this setup:

- Two (2) BNC coaxial or Y/C cables (Video Out to Trinity from cameras 1 and 2)
- One (1) BNC coaxial for genlocking camera 1 to camera 2
- Two (2) BNC coaxial or Y/C cables (to [optional] Program and Preview monitors)



Two-Camera Setup

Chapter 6

Trinity Cards: A Reference

This chapter provides information for the technical user or engineer who wants to maximize the versatility built into the Trinity architecture. It gives an overview of hardware, BNC and other connectors, and Input Settings panels for the following cards:

Hardware

The input cards convert any incoming video signal into the 601 digital signal used inside Trinity. The inputs are designed to go in the slots labeled 1 through 7 on the back of the Trinity box. An eighth input can be placed in the slots marked 10, 11, and 12 on the back of the Trinity box.

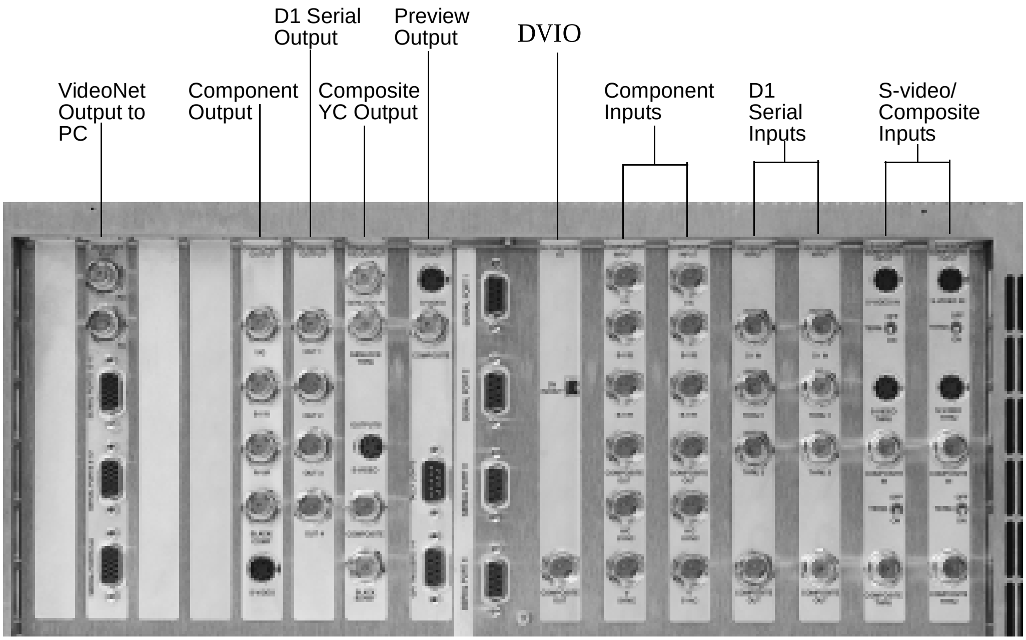
Whenever you are working with cards, remember that the Trinity hardware and software count the slot numbers differently. After the slot marked 8 on the back of the box, the software adds one to the slot number (so slot 9 on the back of the box is counted as slot 10 by the software).

The Trinity system must have a slave encoder card installed to have access to the alpha out data. Either the SDI out slave encoder or the YUV/composite out slave encoder will work. Play recommends using the Multi-Format Component Encoder as Trinity's Master Encoder when using alpha out. A Composite-YC Encoder allows you to use a slave encoder for alpha out, however it does not allow proper timing adjustments to the signal.

Connectors

There are multiple BNC and other connectors on the back of each of Trinity's cards (following figure). A BNC connector is a more robust version of the RCA connector commonly found on home VCRs and camcorders. It locks in place.

If you are using consumer gear with Trinity, there are adapters that convert BNC to RCA and vice-versa. In the section on specific cards, the functions of the BNC connectors are listed from the top down.



A Typical Configuration of Cards and their Connectors on the Back of Trinity

Input/Output Settings Panels

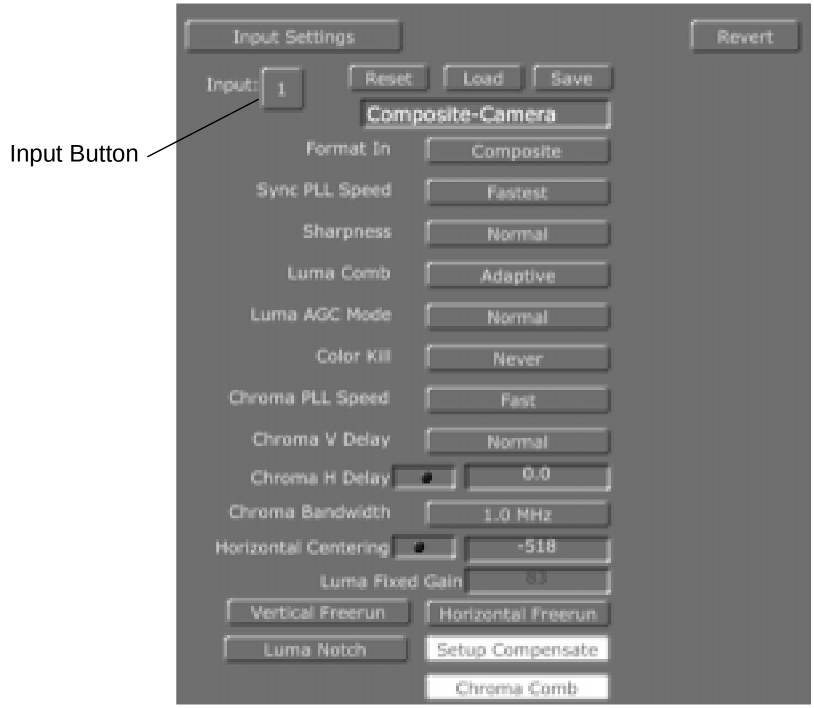
These panels are provided for those who want total control over the input/output card. It can also be used to create a custom input/output profile.

For the input and output settings panels, keep in mind that the active input or output card is shown by the number in the light red box near the top of the panel. To change to a different card, click on the number and select the input or output slot the card is located in.

NOTE

Remember, that the Trinity hardware and software count the slot numbers differently. After the slot marked 8 on the back of the box, the software adds one to the slot number (so slot 9 on the back of the box is counted as slot 10 by the software).

To access the input settings panel, click on the **Configure** button in either Air Command or Preditor, and select **Input Settings** from the pop-up menu. A panel appears:



An Input Settings Panel

By clicking on the Input button, you can select the number of the slot that the input card you want to profile is installed in. Only the numbers of slots in which you have cards installed appear on the pop-up menu.

The options on the panel vary according to the type of input card. There are four different types of input cards: the Composite/YC card, the component card, the serial digital card, the Composite/YC card with frame sync, and the DVIO card.

To create a custom profile, start by typing in a new name for the profile in the field under the Reset/Load/Save buttons.

NOTE We've designed the built-in profiles to be non-modifiable so you always have a basic set of values to work with. If you try to save over the built-in profiles without changing the name, they won't save, and your new settings will be lost.

Adjust the settings as needed, and click Save. The profile is now listed on the pop-up menu when you click Load. It is also listed in the pop-up menu on the Input Sources panel.

NOTE When working with the Composite/YC input card, be aware that the input must be switched between the Composite input and the YC input in the Configure panel labeled Input Sources. Both signals can be hooked up concurrently, but only one input and pass thru can be used at a time.

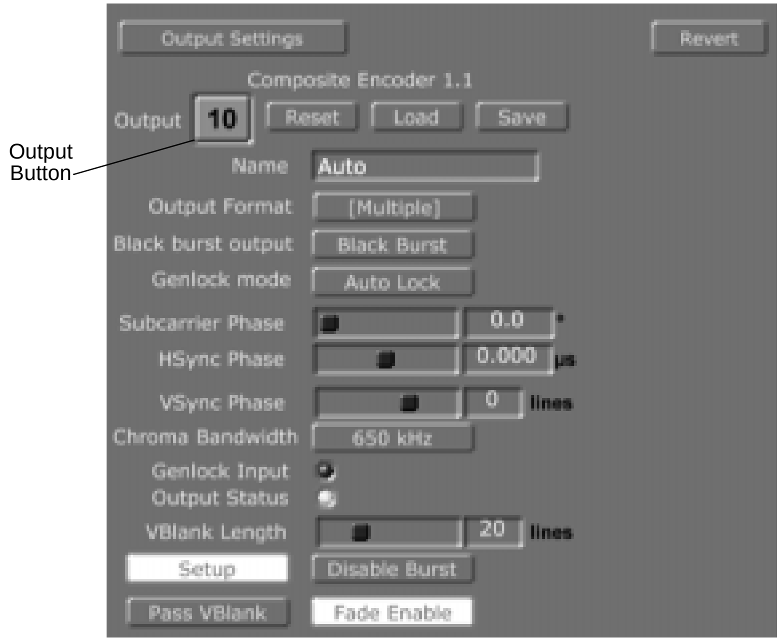
Output Settings Panel

This is the panel that allows you to fine-tune the output of your Trinity. It is also used for making adjustments to the overall timing of your system.

For the input and output settings panels, keep in mind that the active input or output card is shown by the number in the light red box near the top of the panel. To change to a different card, click on the number and select the input or output slot the card is located in.

NOTE Remember that the Trinity hardware and software count the slot numbers differently. After the slot marked 8 on the back of the box, the software adds one to the slot number (so slot 9 on the back of the box is counted as slot 10 by the software).

To access the output settings panel, click on the Configure button in either Air Command or Preditor, and select Output Settings from the pop-up menu. A panel appears:



An Output Settings Panel

By clicking on the **Output** button, you can select the number of the slot that the output card you want to profile is installed in. Only the numbers of slots in which you have cards installed appear on the pop-up menu. The options on the panel vary according to the type of output card.

There are two types of master output cards, two types of slave output cards, and the Preview output card. Earlier versions of the Preview output card did not require any adjustments, so there was no configure panel for the card. Newer versions, however, have adjustable options, and you see a configure panel when you select **Output 9**, the Preview card slot.

NOTE Remember that the Trinity hardware and software count the slot numbers differently. After the slot marked 8 on the back of the box, the software adds one to the slot number. For example, the software calls the Preview card slot **Output 9** and the Master output card **Output 10**. This differs from the labeling on the back of the Trinity, which calls the Preview card's slot 8 and the Master output card's slot 9.

To create a custom profile, start by typing in a new name for the profile in the field under the Reset/Load/Save buttons.

NOTE We've designed the built-in profiles to be non-modifiable so you always have a basic set of values to work with. If you try to save over the built-in profiles without changing the name, they won't save, and your new settings will be lost.

Adjust the settings as needed, and click Save. The profile is now listed on the pop-up menu when you click Load.

Composite/YC Input Card

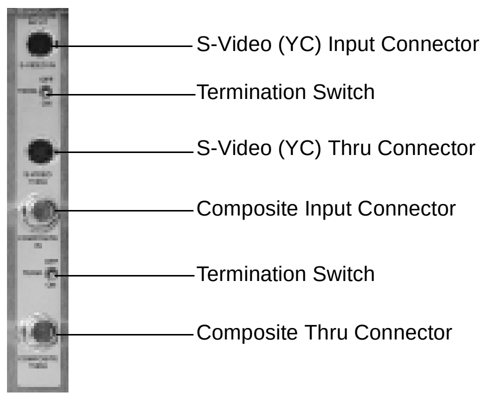
This section illustrates the functions of the BNC and other connectors and provides instructions for using the input/output settings panels for Composite/YC cards.

BNC Connectors

The termination switches on this card should be set to On if the loop thru connector is not being used. If you are using the loop thru connector, be sure to flip the switch to Off.

It is possible to connect signals to the Composite/YC inputs at the same time, but only one will be available at a time. Changing between Composite/YC inputs while the input is “on the air” is not recommended, because there is usually a momentary “pop” as the input changes. It does not hurt anything, but it usually looks bad.

Here are the functions of the connectors:

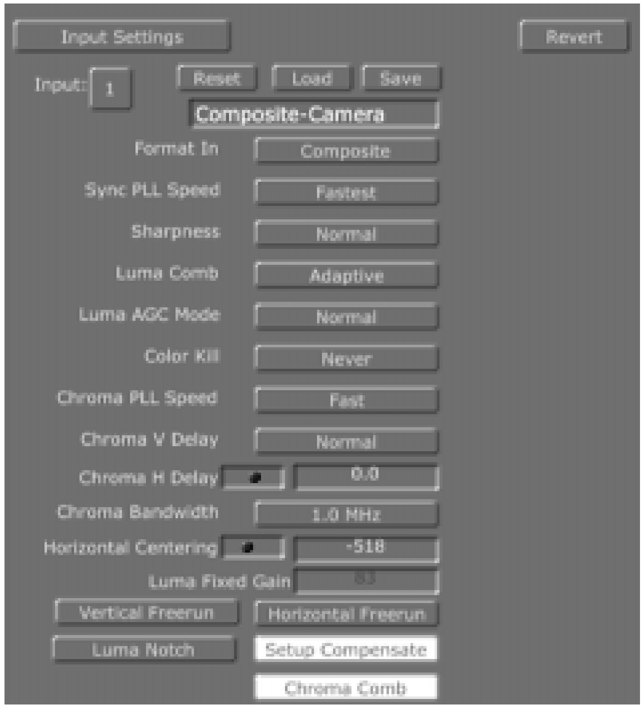


Composite/YC Input Card

Settings Panel

To access the panel, click on the **Configure** button in either Air Command or Preditor, and select **Input Settings** from the pop-up menu.

The Composite/YC card can process either composite or YC (S-video) signals. If this card is installed, the **Input Settings** panel looks like this:



Input Settings Panel for the Composite/YC Input Card

Here's how to use the settings for the Composite/YC (S-video) card:

Input	Selects the input source to be modified. The number corresponds to the number of the slot on the back of the Trinity that the device is connected to.
Reset	Resets values to default settings.
Revert	Resets values to previously saved settings.
Load	Brings up the list of input profiles.
Save	Adds a new input profile.
Name	Identifies the input profile. Be sure to type in a new name here when creating a new profile, or your profile won't be saved.

Format In	Sets which input format is active. Can be set for either Analog Composite or Analog S-Video (also called YC video). Click on the button and choose the desired format from the pop-up menu.
Sync PLL (Phase Loop Lock) Speed	Affects how fast Trinity tracks time base errors. Select from Fastest, Faster, Fast, or Slow. Should normally be left on Fastest. Fastest is better for unstable signals, such as non-time-base-corrected tape machines. Slow is more stable for noisy signals, but may be slower or may be unable to lock up to your input source when it is initially connected.
Sharpness	Enhances the sharpness of the video signal. Used purely as an aesthetic enhancement for video. Sharpening the picture can increase noise.
Luma Comb	Cleans up noise in the video from the original composite signal. Leave this button on Adaptive when working with composite video sources. Turn it Off for S-video, unless the source is a tape that was recorded from a composite source.
Luma AGC Mode	The AGC Mode controls circuitry for setting the input gain of the digitizer. The default settings for AGC should work in most situations. However, some video sources generate video that has distorted or inaccurate sync. These controls allow you to use a lower quality source. (The Component Input card doesn't need AGC because it is designed to be used with professional quality sources.) This is an automatic gain control for the luminance of the signal. It uses the signal input to determine what the brightness value should be, and adjusts the input from there. Normal sets the gain by looking at sync level only. The Protect setting backs off the gain if the white values are too hot (but still allows signals up to about 105 IRE). Off allows manual adjustment with the Luma Fixed Gain control.

Color Kill	Strips the colors from an input. Setting this to Always makes the input monochrome. Setting it to Normal means the color is stripped out only if Trinity notices something terribly wrong with the color information in the signal. Setting it to Never means the color is not stripped out even if it is out of whack. Color Kill, therefore, should usually be left on the Normal setting.
Chroma PLL (Phase Loop Lock) Speed	Controls the chroma lock dynamics. In practice, Fast is nearly always the best setting, but if the input source video has horizontal bands of hue shifts, some improvement may be possible by changing this setting.
Chroma V Delay	Designed to be used with “color under” tape formats, such as VHS, S-VHS, 8mm, Hi-8, and U-Matic. These machines tend to delay the color signal by a line, so by setting this value to Up 1 line you can clean up the colors.
Chroma H Delay	Adjusts horizontal positioning of the color in the picture. Composite video color is sometimes smeared to the right or left. This feature moves the chroma position relative to the luminance.
Chroma Bandwidth	A standard composite video signal uses a narrow color bandwidth. Some video signals use a wide bandwidth to give you more color detail. The wider the chroma bandwidth, the sharper the color transitions, at the expense of more dot crawl interference. This control allows you to choose the frequencies that the input cards' color processing circuitry uses. 1.0 MHz is a good general purpose setting, while 1.4 MHz may give sharper colors on some sources, including many PAL sources. With “color under” tape machines, such as VHS, S-VHS, 8mm, Hi-8, and U-Matic, the chroma bandwidth is 500kHz or less, so the 650 kHz setting results in the best performance.

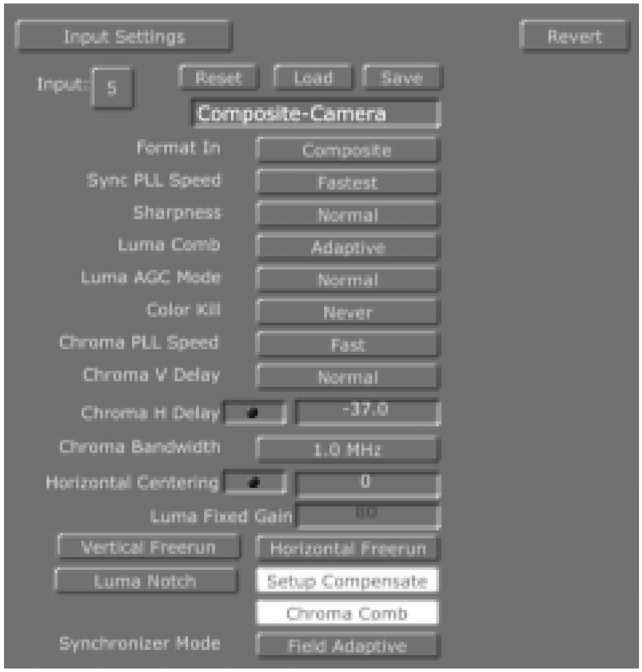
Horizontal Centering	Corrects footage that was recorded off-center. If you are doing recursive special effects, this can help get the exact effect you want. One Trinity user found this feature useful for centering the output of his VGA scan converter.
Luma Fixed Gain	Allows manual adjustment of the luminance level when Luma AGC Mode is set to Off. Numbers are steps of brightness from 0 to 255. Recommended to be used in conjunction with a waveform monitor.
Vertical Freerun, Horizontal Freerun	Tells Trinity not to try to sync up the image. This means the picture rolls vertically or horizontally. For 99% of your applications, these should be left off, but they may be useful for special effects, such as simulating communications problems on a movie set. Or you might use these to record "static" or "snow" off an empty TV channel. By turning these on, you can get a nice clean shot of static. Vertical Freerun can also be used to "flywheel over" sync problems on source tapes. To do this, start the tape with sync set to normal, then switch to Vertical Freerun. The input stops looking at vertical sync and just counts 525 lines per frame. Dropouts or corrupted vertical sync won't affect it. This is probably best used to make a copy or log to a nonlinear drive, but you may be able to use it on the fly during editing (using sync roll).

Luma Notch	A different way for Trinity to split the luma (brightness) and the chroma (color) out of a composite signal. Luma Notch is not as efficient as some other methods, but if you are playing back a tape from a deck without time-base correction (TBC), Luma Notch may help Trinity's TBCs further reduce dot crawl. It is primarily used to enhance composite sources, but it may be useful to reduce noise in S-Video sources as well. This filter gives a somewhat softer look. The Luma Comb filter, especially in Adaptive mode, results in the sharpest, cleanest image, but requires a stable video signal to do so. Because of this, Luma Notch is automatically enabled for Composite VCR mode.
Setup Compensate	A setting generally used by NTSC or PAL-M professional level gear. If there is Setup, then turn this button on. If you are using a consumer level camcorder that doesn't use Setup, turn this button off. If you are not sure whether Setup is being used, then go ahead and leave it on. Setup should be turned off for PAL or SECAM.
Chroma Comb	Reduces color crawl in the picture. The Chroma Comb filter averages lines together, and can also reduce noise like a vertical filter. Usually, for composite, leave this button on. Turn Chroma Comb off when working with S-video.

Composite/YC Card With Frame Sync

To access the panel, click on the Configure button in either Air Command or Preditor, and select Input Settings from the pop-up menu. A panel appears:

The Input Settings panel for the Composite/YC card with frame sync looks like this:



Input Settings Panel for Composite/YC Card with Frame Sync

This card allows the use of equipment without genlock capability, such as consumer cameras and VCRs. Because it must synchronize the input signal to Trinity's broadcast-quality internal reference, there is a variable delay through this card that ranges from less than a line of video to one frame (1/30 second for NTSC, 1/25 second for PAL), depending on the timing of the input source you feed to it. This delay affects only the picture, not the audio.

The Composite/YC (S-video) card with Frame Sync his a Synchronizer Mode button. The synchronizer modes are listed at the bottom of this table. Here's how to use the settings for the Composite/YC (S-video) card with Frame Sync:

Input	Selects the input source to be modified. The number corresponds to the number of the slot on the back of the Trinity that the device is connected to.
Reset	Resets values to default settings.
Revert	Resets values to previously saved settings.
Load	Brings up the list of input profiles.
Save	Adds a new input profile.
Name	Identifies the input profile. Be sure to type in a new name here when creating a new profile, or your profile won't be saved.
Format In	Sets which input format is active. Can be set for either Analog Composite or Analog S-Video (also called YC video). Click on the button and choose the desired format from the pop-up menu.
Sync PLL (Phase Loop Lock) Speed	Affects how fast Trinity tracks time base errors. Select from Fastest, Faster, Fast, or Slow. Should normally be left on Fastest. Fastest is better for unstable signals, such as non-time-base-corrected tape machines. Slow is more stable for noisy signals, but may be slower or may be unable to lock up to your input source when it is initially connected.
Sharpness	Enhances the sharpness of the video signal. Used purely as an aesthetic enhancement for video. Sharpening the picture can increase noise.
Luma Comb	Cleans up noise in the video from the original composite signal. Leave this button on Adaptive when working with composite video sources. Turn it Off for S-video, unless the source is a tape that was recorded from a composite source.

Luma AGC Mode

The AGC Mode controls circuitry for setting the input gain of the digitizer. The default settings for AGC should work in most situations. However, some video sources generate video that has distorted or inaccurate sync. These controls allow you to use a lower quality source. (The Component Input card doesn't need AGC because it is designed to be used with professional quality sources.) This is an automatic gain control for the luminance of the signal. It uses the signal input to determine what the brightness value should be, and adjusts the input from there. Normal sets the gain by looking at sync level only. The Protect setting backs off the gain if the white values are too hot (but still allows signals up to about 105 IRE). Off allows manual adjustment with the Luma Fixed Gain control.

Color Kill

Strips the colors from an input. Setting this to Always makes the input monochrome. Setting it to Normal means the color is stripped out only if Trinity notices something terribly wrong with the color information in the signal. Setting it to Never means the color is not stripped out even if it is out of whack. Color Kill, therefore, should usually be left on the Normal setting.

Chroma PLL (Phase Loop Lock) Speed

Controls the chroma lock dynamics. In practice, Fast is nearly always the best setting, but if the input source video has horizontal bands of hue shifts, some improvement may be possible by changing this setting.

Chroma V Delay

Designed to be used with "color under" tape formats, such as VHS, S-VHS, 8mm, Hi-8, and U-Matic. These machines tend to delay the color signal by a line, so by setting this value to Up 1 line you can clean up the colors.

Chroma H Delay

Adjusts horizontal positioning of the color in the picture. Composite video color is sometimes smeared to the right or left. This feature moves the chroma position relative to the luminance.

Chroma Bandwidth	A standard composite video signal uses a narrow color bandwidth. Some video signals use a wide bandwidth to give you more color detail. The wider the chroma bandwidth, the sharper the color transitions, at the expense of more dot crawl interference. This control allows you to choose the frequencies that the input cards' color processing circuitry uses. 1.0 MHz is a good general purpose setting, while 1.4 MHz may give sharper colors on some sources, including many PAl sources. With “color under” tape machines, such as VHS, S-VHS, 8mm, Hi-8, and U-Matic, the chroma bandwidth is 500kHz or less, so the 650 kHz setting results in the best performance.
Horizontal Centering	Corrects footage that was recorded off-center. If you are doing recursive special effects, this can help get the exact effect you want. One Trinity user found this feature useful for centering the output of his VGA scan converter.
Luma Fixed Gain	Allows manual adjustment of the luminance level when Luma AGC Mode is set to Off. Numbers are steps of brightness from 0 to 255. Recommended to be used in conjunction with a waveform monitor.

Vertical Freerun, Horizontal Freerun	Tells Trinity not to try to sync up the image. This means the picture rolls vertically or horizontally. For 99% of your applications, these should be left off, but they may be useful for special effects, such as simulating communications problems on a movie set. Or you might use these to record "static" or "snow" off an empty TV channel. By turning these on, you can get a nice clean shot of static. Vertical Freerun can also be used to "flywheel over" sync problems on source tapes. To do this, start the tape with sync set to normal, then switch to Vertical Freerun. The input stops looking at vertical sync and just counts 525 lines per frame. Dropouts or corrupted vertical sync won't affect it. This is probably best used to make a copy or log to a nonlinear drive, but you may be able to use it on the fly during editing (using sync roll).
Luma Notch	A different way for Trinity to split the luma (brightness) and the chroma (color) out of a composite signal. Luma Notch is not as efficient as some other methods, but if you are playing back a tape from a deck without time-base correction (TBC), Luma Notch may help Trinity's TBCs further reduce dot crawl. It is primarily used to enhance composite sources, but it may be useful to reduce noise in S-Video sources as well. This filter gives a somewhat softer look. The Luma Comb filter, especially in Adaptive mode, results in the sharpest, cleanest image, but requires a stable video signal to do so. Because of this, Luma Notch is automatically enabled for Composite VCR mode.
Setup Compensate	A setting generally used by NTSC or PAL-M professional level gear. If there is Setup, then turn this button on. If you are using a consumer level camcorder that doesn't use Setup, turn this button off. If you are not sure whether Setup is being used, then go ahead and leave it on. Setup should be turned off for PAL or SECAM.

Chroma Comb	Reduces color crawl in the picture. The Chroma Comb filter averages lines together, and can also reduce noise like a vertical filter. Usually, for composite, leave this button on. Turn Chroma Comb off when working with S-video.
Synchronizer Mode A. Bypass B. Field Adaptive C.Frame Sync	A. Bypass Turns off the synchronizer function to eliminate any extra delays if the input source is already timed properly. We recommend you use this mode whenever the video source is already genlocked or timed. We also highly recommend you use this mode when digitizing tapes to Time Machine for non-linear editing, as it eliminates the possibility of jumps in motion, and keeps the audio perfectly synced to the picture (the Time Machine locks to the source when digitizing, even if it is not timed). B. Field Adaptive Compensates for the stuttering that can occasionally be seen with all frame syncs and external TBCs. This mode provides much-improved results over traditional broadcast equipment. This mode has a maximum delay of 1/60th of a second, and drops or repeats only single fields when necessary. It has reverse field interpolation, so it never stutters on motion. Depending on how far your input video source drifts, it may occasionally exhibit a small vertical shift, but you'll probably never be able to see it.

C. Frame Sync

This is the traditional full-frame TBC function with the standard delay of up to 1/30th of a second. It is only available in NTSC. Like all broadcast frame syncs and external TBCs, if the input video source continues to drift far enough, the synchronizer must eventually compensate and bring the source back into alignment by dropping or repeating a frame. This can cause occasional subtle jumps or stutters in motion that may be noticeable, depending on the source content.

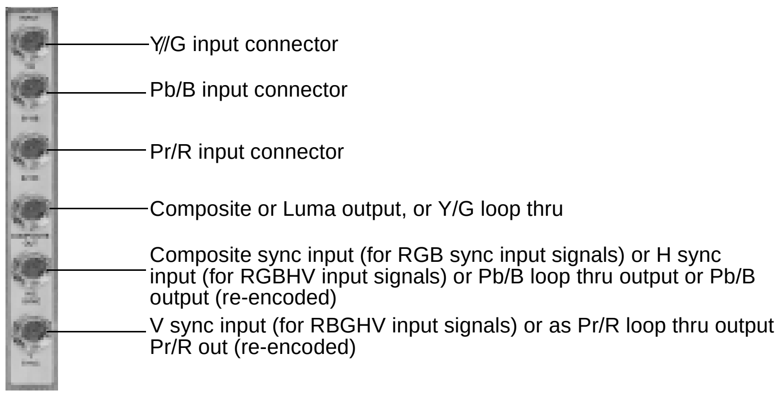
Component Input Card

This section illustrates the functions of the BNC and other connectors and provides instructions for using the input/output settings panels for Component input cards.

BNC Connectors

This card was designed to provide maximum flexibility regarding sync. It accommodates sync on green and separate H and V sync as well as composite sync. It offers multiple fits because there are so many different types of signals it accepts and there are so many different ways to use the bottom three connectors (following figure).

Here are the functions of the connectors:



The Connectors on the Component Input Card

If set for external sync input (RGB or YUV + sync), the lower two connectors double as sync inputs. When it is in this mode, the card still provides monitor output in composite or luma on the fourth BNC from the top. Composite sync or horizontal sync input is taken on the fifth BNC from the top, and the sixth BNC from the top is used for separate vertical sync input if needed.

An RGB video signal is made up of separate red, green and blue video information. Because the luma (brightness) information is contained in all three signals, the signals must be carefully realigned in order to make the picture clear. To do this, the signals must have a separate sync signal to recombine the information. This sync signal is different from genlock or "house sync." The sync signal that is sent out with the RGB signal comes in three different forms:

1. Sync on Green (also called RGsB). This means that the syncing information is sent along with the Green video information. No other cabling is required.

2. Composite Sync (also called R-G-B-Sync or RGBS). This means that the Sync information is sent along a single cable, which must be connected to the input card with the RGB cables. Connect the composite Sync to connector five from the top.

3. Separate H and V sync (also called RGBHV) This signal uses separate cables to transmit the horizontal and vertical sync pulses, so a total of five cables must be connected to the input card. Connect the H sync to connector 5 and the V Sync to connector 6.

Make sure that you understand what type of RGB signal you are dealing with before you try to connect it to Trinity. Also, be aware that there are RGB signals that are not video resolution signals. Trinity only works with video resolution signals that correspond to NTSC or PAL specifications. High-resolution signals, such as the VGA output of a computer, need to be scan-converted to NTSC or PAL specifications before the signal is input to Trinity.

The software defaults to sync on green. If you are using RGB-sync or RGBHV, then go into the Input Settings panel and turn on the External Sync button. Trinity will auto-detect RGB-sync or RGBHV.

Lastly, know what level component signal you are sending. Component levels vary with manufacturer and equipment. We have included presets in the input panel for some of the most common formats - Betacam, MII, and SMPTE levels. The levels can be adjusted manually in the Input Settings panel, if needed.

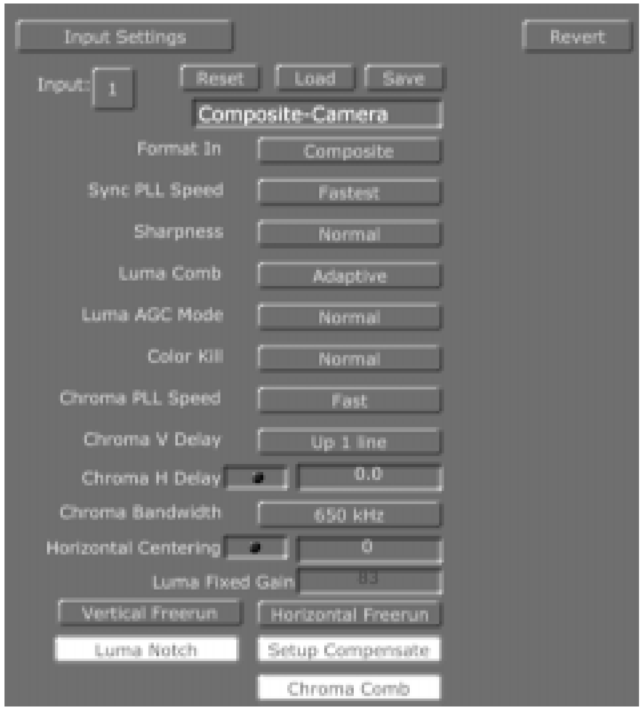
NOTE

The component input card processes YUV and RGB formats. The factory presets allow for YUV Betacam, YUV MII, and RGB SMPTE, with or without external sync.

Settings Panel

To access the panel, click on the Configure button in either Air Command or Preditor, and select Input Settings from the pop-up menu.

If this card is installed, the Input Settings panel looks like this:



Input Settings Panel for the Component Input Card

Here's how to use the settings for the component input card:

Input	Selects the input source to be modified. The number corresponds to the number of the slot on the back of the Trinity that the device is connected to.
Reset	Resets values to default settings.
Revert	Resets values to previously saved settings.
Load	Brings up the list of input profiles.
Save	Adds a new input profile.
Name	Identifies the input profile. Be sure to type in a new name here when creating a new profile, or your profile won't be saved.

Format In — Sets which input format is active. Can be set for either YUV or RGB.

Sync PLL (Phase Loop Lock) Speed — Affects how fast Trinity tracks time base errors. Select from Fast or Slow. Should normally be left on Fast. Fast is better for unstable signals, such as non-time-base-corrected tape machines. Slow is more stable for noisy signals.

Format Out — The Format Out is used to choose what the three extra BNC jacks are used for on the back of the input. The choices are: Analog Composite, Analog YUV, Analog RGB, Analog Luma, and Pass thru. These jacks can provide a buffered pass thru of the same signal being fed into the input card. These jacks can also be set up to output a re-encoded output after the signal has passed through the color corrector. This re-encoded output can be in a different format than what goes into the input. For example, a YUV Betacam signal can be fed in, and an RGB signal can be fed out of the re-encoded outputs. This can also be set up for a composite or luminance output. Because of limited space on the back of the card, if external sync is being used for an RGB input signal, only composite or luminance output is available because the other two BNCs are used for sync.

NOTE: Keep in mind that the re-encoded outputs are designed as “monitor quality” outputs with ~5% accurate signal levels. The buffered pass thru signal levels are 1% accurate or better.

Clamp Speed	Adjusts the black level on a line-by-line basis. In most situations Slow is the best setting for a high-quality signal, as it is the most immune to random noise in the signal. The faster the clamp speed, the quicker it tries to compensate for errors in the black level. Use Fast when trying, for example, to correct the black level in a signal with a 60 Hz hum in the picture. Can also be used for vertical tilt problems in the input signal. Try both settings when trying to correct a problem with external equipment. Unless there is a problem, however, it is hard to tell the difference between these settings.
Chroma Gain Trim, Luma Gain Trim	These control the A/D dynamic range of the chrominance and luminance values and are used to adjust for various component formats, such as SMPTE, Betacam, and MII. Can also be useful to compensate for losses in long cable runs. The value listed is a number in steps from 0 to 255. Before adjusting these values manually, try using one of the factory presets by pressing the Load button and choosing an option from the pop-up menu. If the values still do not look up to your equipment's specifications on a waveform monitor, try adjusting these levels.
Chroma H Delay	Adjusts horizontal positioning of the color in the picture. Because of distortions, video color is sometimes smeared to the right or left. This feature moves the chroma position relative to the luminance.
Horizontal Centering	Corrects footage that was recorded off-center. If you are doing recursive special effects, this can help get the exact effect you want. One Trinity user found this feature useful for centering the output of his VGA scan converter.

Vertical Freerun, Horizontal Freerun	Tells Trinity not to try to sync up the image. This means the picture rolls vertically or horizontally. For 99% of your applications, these should be left off, but they may be useful for special effects, such as simulating communications problems on a movie set. Or you might use these to record “static” or “snow” off an empty TV channel. By turning these on, you can get a nice clean shot of static. Vertical Freerun can also be used to “flywheel over” sync problems on source tapes. To do this, start the tape with sync set to normal, then switch to Vertical Freerun. The input stops looking at vertical sync and just counts 525 lines per frame. Dropouts or corrupted vertical sync won’t affect it. This is probably best used to make a copy or log to a nonlinear drive, but you may be able to use it on the fly during editing (using sync roll).
Output Setup	Controls whether Setup is added to the monitor output. Normally this is on for NTSC, and off for PAL.
Setup Compensate	A setting generally used by NTSC or PAL\M professional level gear. If there is Setup, then turn this button on. If you are using a consumer level camcorder that doesn’t use Setup, turn this button off. If you are not sure whether Setup is being used, then go ahead and leave it on. Setup should be turned off for PAL or SECAM.
External Sync	Tells Trinity whether to look for a separate sync signal. In most formats, the sync signal is an internal part of the video signal. The most common format that has a separate sync signal is RGB, which sometimes has H Sync and V Sync on two separate cables. If you are using a video source that has a separate sync cable (or cables), turn this button on.

Monitor Output

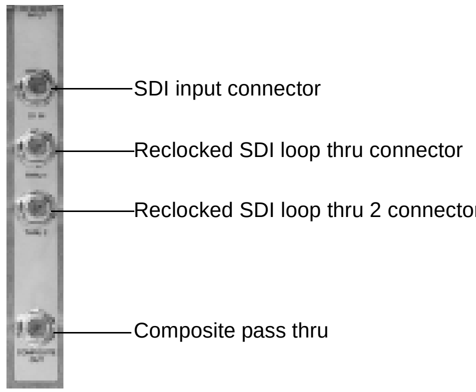
The monitor output on this card is provided for monitoring the input signal. It can be set to several output formats, so this card can act like a transcoder. It is re-encoded digital data tapped off after the digitizer and color corrector, so you can view changes in those settings on the monitor. The monitor outs can optionally be set in the software to buffered loop thru in which case they are exact high quality copies of the input without alteration. Buffering eliminates any need to worry about termination.

Serial Digital Input Card

This section illustrates the functions of the BNC and other connectors, and provides instructions for using the input/output settings panels for Serial Digital input cards.

BNC Connectors

Here are the functions of the connectors:



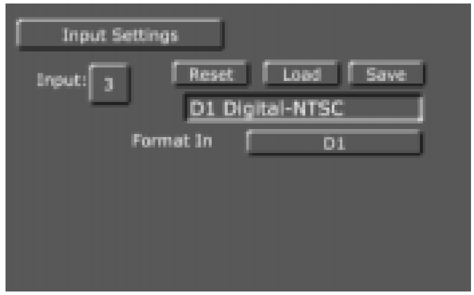
The BNC Connectors on the Serial Digital Input Card

NOTE The composite pass-thru on earlier versions of this card have a straight pass-thru of the video signal, before the proc-amp and color corrector. However, the revision 5 cards and later have a Composite pass-thru that happens after the color corrector, so changes can be seen on a monitor off-air.

Settings Panel

To access the panel, click on the **Configure** button in either Air Command or Preditor, and select **Input Settings** from the pop-up menu.

The **Input Settings** panel for the serial digital input card looks like this:



Input Settings Panel for Serial Digital Input Card

As you can see, there are no options on this panel. That's because there isn't anything you need to adjust for digital inputs.

Master Encoder Output Cards

This section illustrates the functions of the BNC and other connectors and provides instructions for using the input/output settings panels for Composite Master Encoder and Component Master Encoder output cards.

General Hardware Information

There are two types of master encoder output cards. However, Trinity can have only one master encoder output card in the system, so do not install more than one of these cards in a Trinity system. All timing information comes from the master encoder output card, either by way of the built-in black burst generator or the genlock input and loop thru.

This section provides instructions for configuring the cards, making adjustments on them, and performing genlock.

The master encoder output card gets its signal from the Switcher card, and must be as close as possible to the Switcher card. There should not be any empty slots between the Switcher card and the master encoder output card. In most Trinity configurations, this means that the master encoder output card will be in the slot marked 9 on the back of the Trinity box, although future expansion cards could push the master encoder output card over a couple of slots. For example, if you have a downstream key card, put the downstream key card in slot 9 and move the master encoder output card one slot higher. The master encoder output card must be the last in the line of downstream devices.

NOTE

Remember, that the Trinity hardware and software count the slot numbers differently. After the slot marked 8 on the back of the box, the software adds one to the slot number. Although the master encoder output slot is marked 9 on the back of the Trinity box, the Trinity software refers to it as input 10.

When hooking up Reference either use the black burst output of Trinity to time other devices, or use an external sync source and hook it to the genlock input. If you need to loop thru Trinity, use the genlock thru connector to do so. If you are not using the genlock loop thru, place a 75-Ohm terminator on the loop thru connector. The loop thru is a passive loop thru and will not auto-terminate.

Output Levels

The output levels are precisely calibrated at the factory and should never need adjustment in normal operation. However, such adjustments may be useful to compensate for the loss inherent in extremely long cable runs or inaccuracies in external video distribution amplifiers. The output levels on these cards can be adjusted without removing the cards, via a control pot. This control is accessible from the top of the box and located approximately in the center of the card when viewed from the top. This control affects all outputs, including black burst. In the case of the component multiformat master output card, there are additional trims for the three component outputs, but they should not require user adjustment.

Frequency Trim

There is also a frequency trim control at the top center of the card. It affects the free-run frequency clock, including chroma, when the system is not externally genlocked. It could even affect genlock behavior if severely mis-adjusted. If ultra-precise free run performance is needed, a precision oscillator, which is an additional hardware component offered by Play, may be plugged into the socket provided on the Component Multiformat Master Output card. This may be useful for certain low-power TV or satellite remote applications. Jumper JP11 enables this oscillator when installed. (The oscillator needed is 20.000MHz, sine or square wave output, of whatever precision is desired.)

Genlock Input

The genlock input on early production Composite Master Output cards had a termination switch and no loop thru connector. In later production and in all Component Master Output cards, this termination switch was replaced with a passive loop thru connector. If the loop thru is not used, these cards should be terminated by plugging a standard 75 ohm terminator into the loop thru BNC connector (terminators are available from most electronic parts suppliers).

Passive termination allows for the signal to pass thru, even if the power is turned off. This avoids a disruption of sync to downstream devices. The genlock input was designed to work with any composite video signal in place of an actual black burst signal. However, best performance will be obtained with a clean and stable black burst signal.

This ability to work with standard video signals, as well as black burst, supports live production with a non-genlockable camera. In these situations, the camera, such as the VX-1000, generates sync for the system. You can loop composite out of the camera through the genlock in and pass it on to a composite input card, or use the camera's S-Video Out for the input card.

Genlock Input Acquire Behavior

Trinity was designed to work with a wide variety of genlock input sources, even those that may not be pristine. Trinity does this by automatically analyzing and locking to an external genlock source when the source is first connected or the system is powered on. For this reason, it is not a good idea to apply an input genlock signal to Trinity and then later change its level. For example, applying a genlock signal and then connecting a terminator could result in less than ideal operation because the initial lockup would be to the unterminated signal.

There are three simple ways to get Trinity to re-acquire the genlock signal:

1. Disconnecting and reconnecting the genlock source input.

2. Switching over to freerun which is internally generated genlock, and back on the Output Settings software panel.

3. Switching the system off and back on.

Genlock Lock Range for Composite Master and Component Master cards

The genlock acquisition frequency range is different between the Composite Master and the Component Multiformat Master output cards. The Composite Master has about +/- 5% lock range while the Component Master has +/- 100ppm (parts per million). This is because the Composite Master was designed to be more tolerant of widely varying genlock sources for maximum versatility with low-end sources where the quality of external genlock signals may be marginal.

The Component Master was designed with the assumption that its external genlock sources will be more closely in spec and that users of this card would not want the Trinity to lock to illegal sources (which might affect the Trinity output). This difference in the design tolerance between the two master cards could be important in some situations because slave output cards derive their sync from the master.

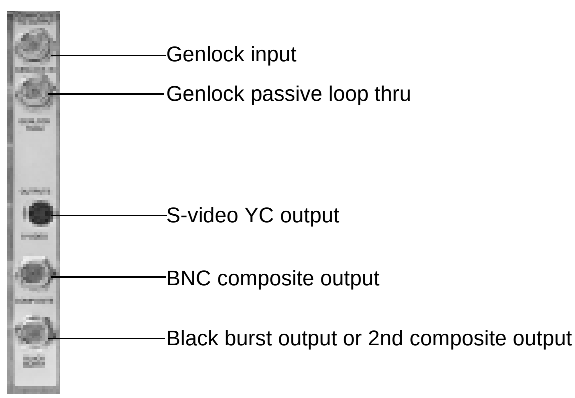
Due to the nature of the SMPTE 259M specification, the Slave Serial D1 card has increased sync stability requirements in some applications. You should keep this in mind if you are using a Composite Master with a Slave Serial D1 card. To avoid any possible problems, we recommend using a Component Master in such situations. However, you can probably get away with using the Composite Master with a Serial D1 Slave output as long as the cable runs are not too long. The jitter may exceed the SMPTE spec but most D1 gear will work perfectly with it.

Black Burst Out (setup level)
The black burst out on the master encoders was designed as a high-quality sync reference. We do not recommend that you use it as a video source, such as a source of black for striping tapes, because the setup level might not match Trinity's actual Program Out. If you do this, it may appear as subtle shifts in black level on a tape. If you want perfectly matched black output, use Trinity's Program Out with black selected in Matte Generator or with the output faded to black. Trinity's software allows you to select the black burst output or a second program output. In this case it would be perfectly matched.

NOTE One of the major questions we get with Output cards is how to permanently change the Black burst output to a second output. Open up the Output Settings panel, and change the button for Black Burst to read Second Output. Now, click in the name window at the top of the panel, and change the name to something like "second output." Click the Save button. Now, the Black output will default to a composite output instead.

Connectors

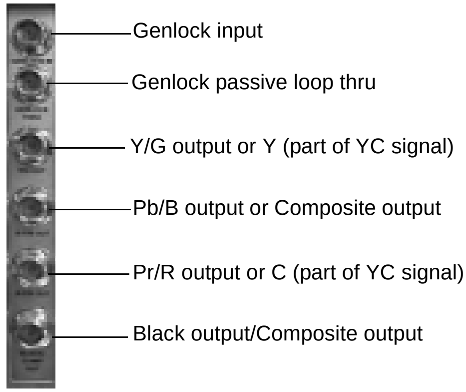
Master Composite/YC output card
Here are the functions of the connectors:



The Connectors on the Master Composite/ YC Output Card

Master multi-format output card
This card can output YC from two BNC connectors. There are adapters available that combine this back into a single S-video cable.This card also can output YUV at Betacam levels and RGB (sync on green) at SMPTE levels.

Here are the functions of the connectors:



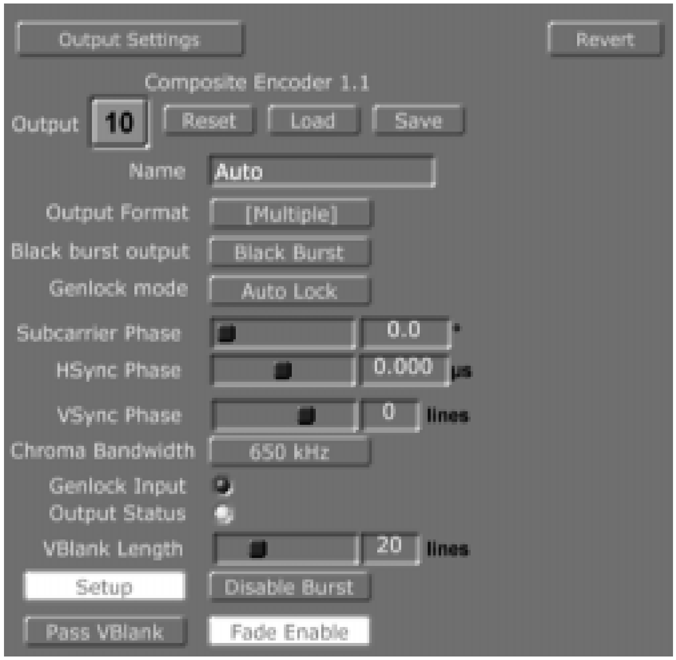
The BNC Connectors on the Master Multi-Format Output Card

Settings Panels

To access the panel, click on the **Configure** button in either Air Command or Preditor, and select **Input Settings** from the pop-up menu.

Composite Master Encoder Output Card

If you installed the composite master encoder card, the **Output Settings** panel looks like this:



Output Settings Panel for Composite Master Encoder Card

Most of these settings are straightforward. Here is an overview of how each setting could be useful in certain situations:

Output	Selects the output card being adjusted.
Reset	Resets the values to the default settings.
Load	Brings up a pop-up list of existing output settings profiles.
Save	Saves the current values as a profile.
Name	Shows the name of the profile. Be sure to type in a new name here when creating a new profile, or you won't be able to save it. This is so you can't overwrite the factory pre-sets and will always have a basic set of values to work with.
Output Format	Click on this button and select the desired output format from the pop-up menu.

Black burst output	Sets the output of the black burst connector on the master output encoder card. If you are not using the black burst generator and need a second composite output, set this to Second Output. Otherwise, leave it on Black Burst. When set to Black Burst, we do not recommend you use this as a video source, such as a black source for striping tapes, because the setup level might not match Trinity's actual Program Out. (This is not a problem if it is set to Second Output.) If it is set to Black Burst and you want perfectly matched black output, use Trinity's Program Out with black selected in the Matte Generator or with the output faded to black.
Genlock mode	Tells Trinity whether or not to lock to an outside source. The default mode is Autolock. This allows Trinity to automatically sense whether an external Genlock signal is hooked up to the Genlock input. Free Run turns off the external Genlock. Leave this set on Autolock unless you are troubleshooting a timing or color issue.
Chroma Bandwidth	Allows you to tailor the bandwidth of the color information. Can be set to 1.3 MHz or 650 kHz. To be absolutely sure the signal is within NTSC specs, set the bandwidth to 650 kHz. There is an advantage in color quality to bumping this value up to 1.3 MHz. Wide bandwidth (1.3 MHz) gives you sharper color definition, but also has a greater chance for dot crawl on older monitors. Narrow bandwidth (650 kHz) is used on older equipment. The colors are fuzzier and less defined, but there is a lower chance of seeing dot crawl in the output. Generally it is OK to use the 1.3 MHz bandwidth. The correct setting for PAL is always 1.3 MHz.

Genlock Input	Shows the status of the external genlock. If there is no light, this means Trinity is not genlocked to an outside source. A green light indicates Trinity is genlocked to a good reference signal. A red or yellow light means a bad reference signal is being fed into the Genlock input. This could mean a PAL or monochrome signal is being used as a genlock reference signal. While this could create some really nifty color effects, it's generally not what you want to see. Note that if the Black Out is used to genlock all other devices, this light is off. The status light reflects only what is hooked to the Genlock input. Right-clicking on the light brings up a window with a message regarding the nature of the problem.
Output Status light	A yellow or red light indicates a problem with the signal, usually related to genlocking. Right-clicking on the light brings up a window with a message regarding the nature of the problem.
VBlank Length	Allows you to tailor the size of the vertical blanking interval (VBI). The standard is 20 or 21 lines for NTSC, 25 lines for PAL. This is useful when working with large projection monitors. Sometimes a distracting data line from the VBI is visible at the top of the screen. If you increase the VBlank Length, the line disappears.
Setup	Makes some subtle changes to the black level of the signal. The Setup modifier is kind of a throwback to old 1950s and 1960s television. It is either turned on or off. Most modern equipment does not require Setup, but NTSC equipment usually expects it to be there. Unless you know for a fact it is not being used, leave it on for NTSC. It should be off for PAL.
Disable Burst	Turns off the color burst in the signal. If you ever wish to harken back to the days of yesteryear and work with a true monochrome video signal, turn Disable Burst on.

Pass VBlank	If this button is off, any data stored in the vertical blanking interval, such as time code or closed captioning, is lost. This can be handy if the footage you are working with is only partially closed-captioned, and you wish to strip out the existing closed captioning and start fresh. Or you may wish to blank out the time code or closed captioning on a video projector during a live event. When this feature is turned on (is passing on the vertical blanking information), Fade to black does not affect it. The vertical blanking signal on the Program bus is the signal passed to the output.
Fade Enable	Connects this output to the master Fade button in the Air Command. Turning this button *off* means that the master Fade does *not* affect this particular output.

The following three features should only be tinkered with by an experienced video engineer. They are used to make adjustments to Trinity's timing to account for spatial distance or cable length in an environment with a single house sync source. Use the slider to make coarse adjustments. Use the numeric values to fine-tune each value.

Subcarrier Phase	Measured in degrees.
HSyncPhase	Measured in microseconds.
VSync Phase	Measured in lines. Usually set at 0.

NOTE **Genlock Status Meanings**

The SC/H (subcarrier/horizontal) phase of the input genlock signal is measured by special circuitry in the Trinity and used to automatically ensure correct color framing of the output. The Trinity may generate status messages regarding the SC/H phase. Such messages may be useful if you are using composite video sources and externally genlocking while doing tape-based editing. They can also be useful in determining signal or cable quality.

If you see one of these warning messages and you are not editing in a 1-inch or D2 environment, it probably isn't an issue to be concerned with. Color framing and genlock is a complicated subject, and the short answer is that Trinity automatically tries to do the right thing in a given situation. Engineers should note that in these situations the Trinity's encoder chroma out tracks the genlock input signal. This means that if the SC/H phase of the input drifts, the output also drifts. The drift status is measured from the initial genlock acquisition state.

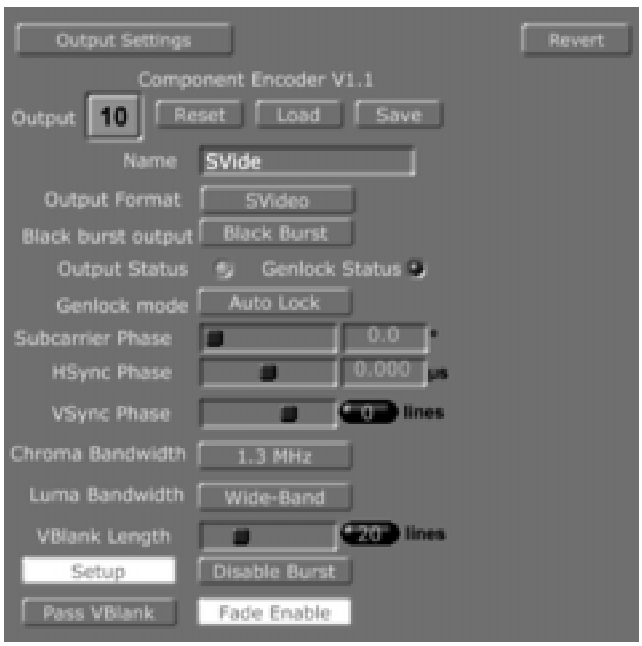
Output Status Meanings

Similarly, the output status indicator is provided to advise the user about possible problems in the encoded output with respect to the SC/H phase and color framing. The same statements given above apply here as well. If the SC/H phase of the external genlock source is not correct (but stable), the output can be corrected by simply adjusting the genlock timing controls in the Trinity software.

Multi-Format (Component) Master Encoder Output Card

To access the panel, click on the **Configure** button in either Air Command or Preditor, and select **Input Settings** from the pop-up menu.

If you installed the multi-format (component) master encoder card, the **Output Settings** panel looks like this:



Output Settings Panel for the
Multi-Format (Component) Master Encoder Card

Here is an overview of how each setting on the multi-format (component) master encoder output card could be useful in certain situations:

Output	Selects the output card being adjusted.
Reset	Resets the values to the default settings.
Load	Brings up a pop-up list of existing output settings profiles.
Save	Saves the current values as a profile.
Name	Shows the name of the profile. Be sure to type in a new name here when creating a new profile, or you won't be able to save it. This is so you can't overwrite the factory pre-sets and will always have a basic set of values to work with.
Output Format	Click on this button and select the desired output format from the pop-up menu.
Black burst output	Sets the output of the black burst connector on the master output encoder card. If you are not using the black burst generator and need a second composite output, set this to Second Output. Otherwise, leave it on Black Burst. When set to Black Burst, we do not recommend you use this as a video source, such as a black source for striping tapes, because the setup level might not match Trinity's actual Program Out. (This is not a problem if it is set to Second Output.) If it is set to Black Burst and you want perfectly matched black output, use Trinity's Program Out with black selected in the Matte Generator or with the output faded to black.
Output Status light	A yellow or red light indicates a problem with the signal, usually related to genlocking. Right-clicking on the light brings up a window with a message regarding the nature of the problem.

Genlock mode	Tells Trinity whether or not to lock to an outside source. The default mode is Autolock. This allows Trinity to automatically sense whether an external Genlock signal is hooked up to the Genlock input. Free Run turns off the external Genlock. Leave this set on Autolock unless you are troubleshooting a timing or color issue.
Chroma Bandwidth	Allows you to tailor the bandwidth of the color information. Can be set to 1.3 MHz, 2.0 MHz, 1.0 MHz or 650 kHz. To be absolutely sure the signal is within NTSC specs, set the bandwidth to 650 kHz. There is an advantage in color quality to bumping this value up to 1.3 MHz. Wide bandwidth (1.3 MHz) gives you sharper color definition, but also has a greater chance for dot crawl on older monitors. Narrow bandwidth (650 kHz) is used on older equipment. The colors are fuzzier and less defined, but there is a lower chance of seeing dot crawl in the output. Generally it is OK to use the 1.3 MHz bandwidth. The correct setting for PAL is always 1.3 MHz. For component signals, the recommended setting is 2.0 MHz.
Luma Bandwidth	The wider the luma bandwidth, the better the image quality. But if there is too much information in the signal, it can bleed into the audio signal when transmitting. A rule of thumb is, if broadcasting the signal, set this to Low-Pass; otherwise, set it to Wide-Band. Low-Pass may also be useful when sending to an MPEG CODEC (for streaming video applications).
VBlank Length	Allows you to tailor the size of the vertical blanking interval (VBI). The standard is 20 or 21 lines for NTSC, 25 lines for PAL. This is useful when working with large projection monitors. Sometimes a distracting data line from the VBI is visible at the top of the screen. If you increase the VBlank Length, the line disappears.

Setup	Makes some subtle changes to the black level of the signal. The Setup modifier is kind of a throwback to old 1950s and 1960s television. It is either turned on or off. Most modern equipment does not require Setup, but NTSC equipment usually expects it to be there. Unless you know for a fact it is not being used, leave it on for NTSC. It should be off for PAL.
Disable Burst	Turns off the color burst in the signal. If you ever wish to harken back to the days of yesteryear and work with a true monochrome video signal, turn Disable Burst on.
Pass VBlank	If this button is off, any data stored in the vertical blanking interval, such as time code or closed captioning, is lost. This can be handy if the footage you are working with is only partially closed-captioned, and you wish to strip out the existing closed captioning and start fresh. Or you may wish to blank out the time code or closed captioning on a video projector during a live event. When this feature is turned on (is passing on the vertical blanking information), Fade to black does not affect it. The vertical blanking signal on the Program bus is the signal passed to the output.
Fade Enable	Connects this output to the master Fade button in the Air Command. Turning this button *off* means that the master Fade does *not* affect this particular output.

The following three features should only be tinkered with by an experienced video engineer. They are used to make adjustments to Trinity's timing to account for spatial distance or cable length in an environment with a single house sync source. Use the slider to make coarse adjustments. Use the numeric values to fine-tune each value.

Subcarrier Phase	Measured in degrees.
HSyncPhase	Measured in microseconds.
VSync Phase	Measured in lines. Usually set at 0.

NOTE

Genlock Status Meanings

The SC/H (subcarrier/horizontal) phase of the input genlock signal is measured by special circuitry in the Trinity and used to automatically ensure correct color framing of the output. The Trinity may generate status messages regarding the SC/H phase. Such messages may be useful if you are using composite video sources and externally genlocking while doing tape-based editing. They can also be useful in determining signal or cable quality.

If you see one of these warning messages and you are not editing in a 1-inch or D2 environment, it probably isn't an issue to be concerned with. Color framing and genlock is a complicated subject, and the short answer is that Trinity automatically tries to do the right thing in a given situation. Engineers should note that in these situations the Trinity's encoder chroma out tracks the genlock input signal. This means that if the SC/H phase of the input drifts, the output also drifts. The drift status is measured from the initial genlock acquisition state.

Output Status Meanings

Similarly, the output status indicator is provided to advise the user about possible problems in the encoded output with respect to the SC/H phase and color framing. The same statements given above apply here as well. If the SC/H phase of the external genlock source is not correct (but stable), the output can be corrected by simply adjusting the genlock timing controls in the Trinity software.

Analog Slave Output Card

This section illustrates the functions of the BNC and other connectors and provides instructions for using the input/output settings panels for Analog Slave output cards.

General Hardware Information

Slave outputs can be hooked up to slots marked 10, 11, or 12 on the outside of the Trinity box. Each slave card uses the timing information of the master output card as a baseline level. All slave cards can have their timing adjusted relative to the master output by using the Output Settings panel (see “Master Encoder Output Cards” on page 151 for more information on the output settings). Slave outputs are optional.

Slave Multiformat Analog Card Timing

The analog slave encoder was designed so that its output can be independently adjusted in relation to the Component Master's output, both for horizontal and subcarrier phase. This is possible regardless of whether the system is genlocked or not. This may be useful to compensate for unequal cable lengths, or in the case of key out, to adjust the key signal to align with the content.

Note that the Composite Master Encoder has a shorter delay, and the Multiformat Slave’s output does not have enough range to match it, meaning it runs slightly behind. Also, when in external genlock mode the Multiformat Slave will exhibit a small amount of jitter when used with the Composite Master. We recommend that you use the Component Master Encoder for stringent broadcast environments and in certain situations where Slave outputs are used in timing sensitive applications.

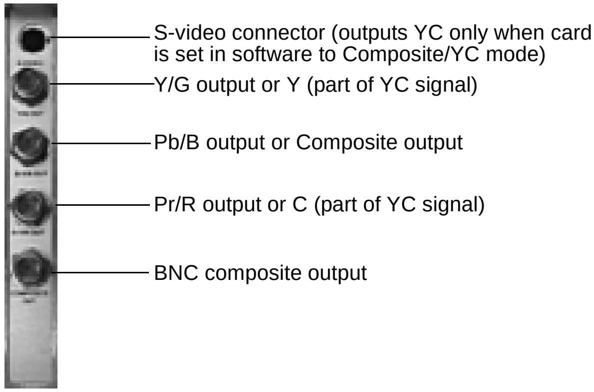
Output levels

The output levels are precisely calibrated at the factory and should never need adjustment in normal operation. Such adjustments may be useful to compensate for the loss inherent in extremely long cable runs, or inaccuracies in external video distribution amplifiers. The output levels on these cards can be adjusted without removing the card, by using a control pot, accessible from the top, located approximately in the center of the card when viewed from the top. This control affects all four outputs.

Connectors

This card can output YUV at Betacam levels and RGB (sync on green) at SMPTE levels. It also has an option for Composite/YC mode. The S-video connector on the card is only active if the card is in Composite/YC mode.

Here are the functions of the connectors:

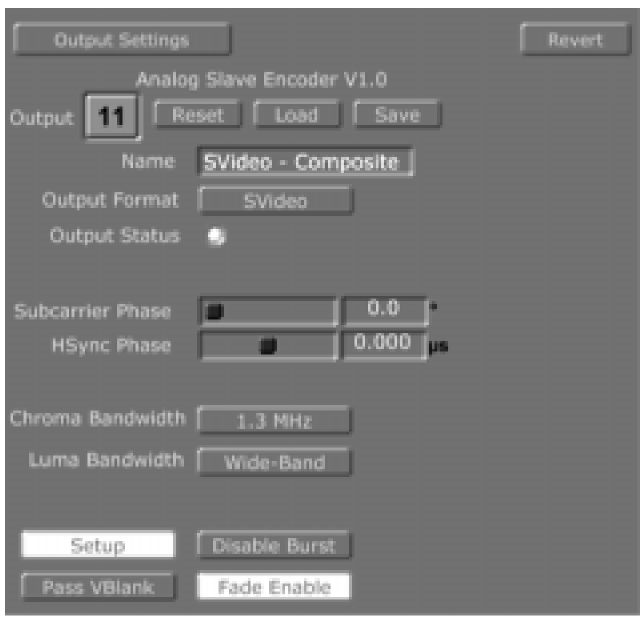


The Connectors on the Analog Slave Multi-Format Output Card

Settings Panel

To access the panel, click on the **Configure** button in either Air Command or Preditor, and select **Input Settings** from the pop-up menu.

If you installed the analog slave multi-format output card, the **Output Settings** panel looks like this:



Output Settings Panel for the
Analog Slave Multi-Format Output Encoder

The settings are basically the same as in the panel for master outputs, but there are fewer settings in this panel. Here is an overview of how each setting could be useful in certain situations:

Output	Selects the output card being adjusted.
Reset	Resets the values to the default settings.
Load	Brings up a pop-up list of existing output settings profiles.
Save	Saves the current values as a profile.
Name	Shows the name of the profile. Be sure to type in a new name here when creating a new profile, or you won't be able to save it. This is so you can't overwrite the factory pre-sets and will always have a basic set of values to work with.
Output Format	Click on this button and select the desired output format from the pop-up menu.
Output Status light	Refers to this card's output only. A yellow or red light indicates a problem with the signal, usually related to genlocking. Right-clicking on the light brings up a window with a message regarding the nature of the problem.
Subcarrier Phase, HSync Phase	These adjustments are relative to the phase of the master output. If the master output is adjusted, it adjusts the phasing of the slave output by the same amount. Adjusting these phases independently of the multi-format (component) master encoder may be useful to compensate for unequal cable lengths, or in the case of key out, to adjust the key signal to align with the content. Note that the composite master encoder card has a shorter delay, and the analog slave's output does not have enough range to match it (it will run slightly behind).

Chroma Bandwidth	Allows you to tailor the bandwidth of the color information. Can be set to 1.3 MHz, 2.0 MHz, 1.0 MHz or 650 kHz. To be absolutely sure the signal is within NTSC specs, set the bandwidth to 650 kHz. There is an advantage in color quality to bumping this value up to 1.3 MHz. Wide bandwidth (1.3 MHz) gives you sharper color definition, but also has a greater chance for dot crawl on older monitors. Narrow bandwidth (650 kHz) is used on older equipment. The colors are fuzzier and less defined, but there is a lower chance of seeing dot crawl in the output. Generally it is OK to use the 1.3 MHz bandwidth. The correct setting for PAL is always 1.3 MHz. For component signals, the recommended setting is 2.0 MHz.
Luma Bandwidth	The wider the luma bandwidth, the better the image quality. But if there is too much information in the signal, it can bleed into the audio signal when transmitting. A rule of thumb is, if broadcasting the signal, set this to Low-Pass; otherwise, set it to Wide-Band. Low-Pass may also be useful when sending to an MPEG CODEC (for streaming video applications).
Setup	Makes some subtle changes to the black level of the signal. The Setup modifier is kind of a throwback to old 1950s and 1960s television. It is either turned on or off. Most modern equipment does not require Setup, but NTSC equipment usually expects it to be there. Unless you know for a fact it is not being used, leave it on for NTSC. It should be off for PAL.
Disable Burst	Turns off the color burst in the signal. If you ever wish to harken back to the days of yesteryear and work with a true monochrome video signal, turn Disable Burst on.

Pass VBlank	If this button is off, any data stored in the vertical blanking interval, such as time code or closed captioning, is lost. This can be handy if the footage you are working with is only partially closed-captioned, and you wish to strip out the existing closed captioning and start fresh. Or you may wish to blank out the time code or closed captioning on a video projector during a live event. When this feature is turned on (is passing on the vertical blanking information), Fade to black does not affect it. The vertical blanking signal on the Program bus is the signal passed to the output.
Fade Enable	Controls whether this particular output fades to black when that button is pressed in the Air Command. By turning the button off on a slave output encoder and leaving it on in the master output encoder, only the master output fades to black. This gives you added flexibility when sending a program feed to several different sources.

NOTE The following two features should only be tinkered with by an experienced video engineer. They are used to make adjustments to Trinity's timing to account for spatial distance or cable length in an environment with a single house sync source. Use the slider to make coarse adjustments. Use the numeric values to fine-tune each value.

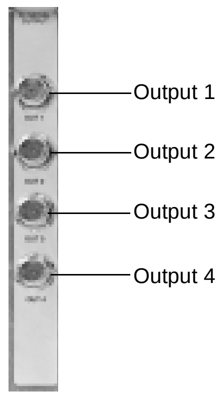
Subcarrier Phase	Measured in degrees.
HSyncPhase	Measured in microseconds.

Serial Digital Slave Output

This section illustrates the functions of the BNC and other connectors and provides instructions for using the input/output settings panels for Serial Digital Slave output cards.

Connectors

Here are the functions of the connectors:

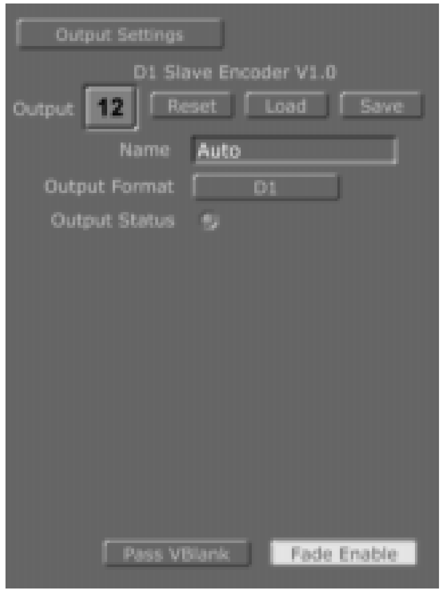


The BNC Connectors on the Serial Digital Slave Output Card

Settings Panel

To access the panel, click on the **Configure** button in either Air Command or Preditor, and select **Input Settings** from the pop-up menu.

If you installed the serial digital slave output card, the **Output Settings** panel looks like this:



Output Settings Panel for Serial Digital Slave Output Card

There are only two options you can adjust on this panel, Pass VBlank and Fade Enable.

Fade Enable	Controls whether this particular input fades to black when that button is pressed in the Air Command. By turning the button off on a slave output encoder, and leaving it on in the master output encoder, only the master output fades to black. This gives you added flexibility when sending a program feed to several different sources.
Pass VBlank	Controls whether this particular output transmits the vertical blanking information of the source. By turning this button on for the master output encoder and turning it off for the slave card, only this particular output strips out the vertical blanking information. This gives you added flexibility when sending a program feed to several different sources.

Preview Output Encoder

This section illustrates the functions of the BNC and other connectors and provides instructions for using the input/output settings panels for preview output encoder cards.

General Hardware Information

The Preview card has a special home inside Trinity. It always goes into the slot marked 8 on the outside of the Trinity box. This slot has a special hook-up to the Switcher card to provide a Preview output. In addition to providing Composite/YC preview output, this card also provides the in/out for GPI triggers and the output for tally lights. There can be only one Preview Output card in any given system.

Because there is no standard hookup for GPI triggers or tally lights, you have to create a custom adapter to use either of these functions (see “Connecting GPI Triggers And Tally Lights” on page 116 for more information on hooking up GPI triggers and tally lights).

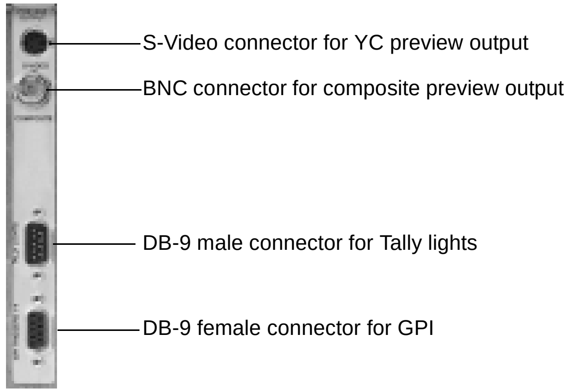
Quality

The Trinity Preview Output card was designed as a low-cost way to preview sources in the studio. It was not designed as an alternate program output, so it does not have the same broadcast-quality encoder as Trinity's main program outputs. If additional program outputs are desired, slave output cards should be used for perfect quality. The Preview Output card also has limiting that clips whites above 100% and blacks below Setup. This limiting is not present on the program outs or Trinity's internal data paths. For this reason, we recommend using the main outputs (either master or slaves) for any in-depth signal analysis. The internal waveform monitor/vectorscope function of the ClipGrab card also looks at the internal data directly and is not affected by the limiting on the Preview Out.

Need for Termination

The output encoder of the Preview Out requires proper termination to operate correctly. We have had reports of some models of video monitors from some manufacturers auto-terminating the chroma of an S-Video signal in a non-standard way. If you connect the preview output of Trinity to one of these monitors, you may see distorted colors. If this occurs, it can be quickly remedied by applying an external terminator to the chroma portion of the S-Video signal. We have developed a way to eliminate this monitor-specific problem and have implemented it on later revisions of the Preview Output card. This design change will have no effect on all the monitors that terminate their S-Video inputs correctly.

Connectors Here are the functions of the connectors:



The Connectors on the Preview Output Card

DVIO Card

The newly available DVIO card provides Trinity users with the capability of inputting DV format digital video and audio (via Firewire) while staying completely in the digital domain.

General Hardware Information

This card includes the same ProcAmp and Color Corrector capabilities found on the Component and SDI Input cards. Because DV devices generally lack genlock capability, a frame synchronizer is also included on the board to allow utilizing DV sources in live situations.

The DVIO card may also be used to output the Program Output of Trinity in DV format, including 2 channels of digital audio (for systems with TDM audio capabilities). Although the card can only be used for either DV Input or DV Output at one time, it can do so without being moved to a different slot or even changing the cabling.

Another feature of the DVIO card is an encoded composite output, similar in function to that of the Component and SDI Input cards. This allows the user to connect a monitor directly to this input in order to view the incoming signal (with color correction) as it will appear at the router inside Trinity. This is especially useful in live situations where individual camera monitors are a valuable tool.

As with the other input modules for Trinity, this card also includes a “header path” for use with the Time Machine NLE system. The header path includes the full ProcAmp and color corrector capabilities as on the Component and SDI Input cards. Unique on the DVIO card, is the ability to utilize this header path while simultaneously providing DV format output of the Trinity Program Out. This makes it an especially valuable resource for Time Machine users.

Connectors

The top connector on the back of the DVIO card is a four-pin firewire connector. The lower connector is a BNC composite out connector.

Video Processing Cards

The primary purpose of each video processing card is to provide a channel of video that travels through the system. They give the router a place to send a video input. Video processing cards also have at least a one-frame buffer that enables them to hold stills.

The minimum number of cards that a Trinity can have is two. If the system is started with less than two cards, an error message results. There are hardware slots in the system to handle up to eight video processing slots. Currently the software supports up to three. These are used in the Air Command as Program, Preview and Aux. The Aux bus can be set for any of the inputs, just as the Program and Preview bus can. You will also see the Aux option used in Trinity applications where more than two video sources are used.

Currently, there are two main types of video processing cards: the Warp Engine and the Framestore card. The ClipGrab card, which is covered in more detail later in this section, is a special purpose card that does not provide a video path.

The actual assignment of a processing card to Program, Preview, or Aux video is handled by the Switcher card communicating with the router. As the user loads effects, the Switcher automatically tells the router where to send each video stream to make the effect happen. A lot of switching goes on behind the scenes.

For example, if Program video is running through the Warp Engine and Preview is running through a Framestore card, the router is automatically told to swap Preview video from the Framestore card to the Warp Engine when you double-click on an effect that warps the preview source.

The Warp Engine

The Warp Engine is a single channel digital video effects card within the system. In addition to providing a basic video path, it also maps video in 3D space. Each Warp Engine has a frame buffer to act as a Framestore as well. Still pictures used as framestores can be loaded into this buffer.

As effects are loaded in the Air Command interface, the effect file is sent from the PC hard drive to the RAM located on the Warp Engine card. The effect information gives the Warp Engine directions where to warp its video channel. A single Warp Engine can warp the same video signal many times, which is what allows us to have the multiple reflections in some of the virtual sets.

Adding an additional Warp Engine to the system gives you the ability to create multiple warping effects in PersonalFX, utilizing the Aux bus. Using this enables effects such as warping Aux and Preview video over Program video.

Installing a Warp Engine is simple. It can be installed in any of the slots labeled Channel 1 through Channel 8 on the motherboard. The card fits only in one direction -- it's keyed to prevent installing it backwards. (See "Card Placement In Trinity" on page 28 for more information on installing cards).

Framestore Card

Each Framestore card acts as a full-screen basic video channel. The Framestore card has a one frame buffer that holds still frames. Trinity systems can store hundreds of framestores and have up to four loaded and ready for instant use.

Adding an additional Framestore card provides another full-screen video path. With multiple Framestore cards, wipe or dissolve effects can use this video path. An additional Framestore card also adds the ability to input an external key signal.

The ClipGrab Card

The ClipGrab card is a special video processing card. It is installed into one of the video processing slots, but it does not provide a video path. Instead, it pulls video from the video bus and sends it to the Coordinator card. This allows 30 fields of video per second to be sent to the Program and Preview windows on the PC screen in the Air Command. It also allows the same amount of video to be sent to the monitors in Preditor as well as a waveform monitor/vectorscope. The ClipGrab Card is not necessary for the Trinity to be able to grab ClipMems or the picture picons for Preditor.

Since the current capability of the card is a total of 30 fields of video per second, each window in the Air Command interface updates at the rate of 15 frames per second. However, two ClipGrab cards in a single Trinity provide a total of 60 fields of video, 30 fields per second for both Program and Preview.

Switcher Card

The Switcher card mixes video signals, triggers effects at the correct time, and adds a layer of graphics to the system. Most of the functions of the Switcher are performed automatically by the software. In addition, graphic overlays are loaded into Switcher RAM.

RAM Upgrades

There are several cards within Trinity that use upgradable RAM sockets to load information, graphics, and effects. These sockets use 5V RAM on 72-pin

SIMM Sticks. Your Trinity dealer can supply you with the correct RAM to upgrade your system.

Switcher RAM

The RAM on the Switcher card stores graphic data for playback of transitional effects and downstream key graphics. This RAM can be upgraded to a maximum of 128MB.

Warp Engine RAM

The RAM on the Warp Engine has several uses. It loads all of the 3D warping data for digital video effects and holds framestores in Preditor on a long timeline. In ClipMem, the RAM on Warp Engine also functions as an uncompressed video recorder for short video clips. This RAM can be upgraded to a maximum of 128MB.

Time Machine RAM

The RAM on the Time Machine is used for various accounting purposes in the hard drive file structure. Play does not recommend upgrading the RAM on Time Machine.

Coordinator Card SRAM

The socket on the Coordinator card is different from the sockets on the other cards. It is designed for static RAM (SRAM) only. Normal RAM will damage the card if installed, so be sure you are installing SRAM. The SRAM on the Coordinator card should only be upgraded if a new hardware component or software release calls for it. As of this printing, Time Machine is the only Trinity peripheral that requires an SRAM upgrade on the Coordinator card.

Chapter 7

Hardware And Video Flow

This chapter walks you through the physical layout inside the Trinity box and describes the flow of video processing inside Trinity. It covers the following topics:

Overview Of Trinity Hardware

Following is the general layout inside the Trinity box.

NOTE Before touching any cards make sure you are grounded. Do this with either a grounding strap or by first touching the metal case which is plugged in but not turned on (see “Electrostatic Discharge” on page 18 for more information on electrostatic shock precautions).

These directions assume that you are standing behind the Trinity box, facing the slots on the back with the lid off. Starting on your right you see slots for seven of the eight possible external inputs. Behind the input slots are the video processing cards. The eighth video input is a little different because the corresponding card is put in one of the slave output slots 10, 11, or 12.

Between the video processing cards, flat on the motherboard, is the 9-by-8 router that sends the D1 output of any of the input cards to any one or more of the video processing cards. The ClipGrab card also plugs into these slots.

The number of video processing cards, not counting the ClipGrab card, generally determines the number of channels of video that can be mixed together and displayed in real-time. A base system includes two cards: one Framestore and one Warp Engine. The current software supports the addition of one more card, most likely a second Warp Engine, which allows two digital video effects plus a full screen source to be displayed at once.

In the back of the case near the fans, the D1 output from all of the video processing cards moves to the left, over to the Switcher card where it is re-assembled into a single video stream. Then the downstream key is added by the Switcher card.

To the left of the seven input slots is the serial port bar, a vertical metal bar with four RS-422 deck control ports. To keep track of hookups, you may find it easiest to connect the A-Deck to port 1 and route its video into input 1 and connect the B-Deck to port 2 and route its video into input 2, and so forth.

The Preview card plugs into the next slot to the left of the serial port bar. The next slot to the left of that plug is where the single Master Output Encoder card plugs in. The Trinity software on your interface calls this slot 10, but it is labeled 9 on the outside of the box.

NOTE After slot 7, there is a discrepancy between the way the system's software and hardware count the slots. Basically, the software adds one to the slot number on the outside of the box. For example, the Trinity software calls the Master Output Encoder slot 10, but it is labeled 9 on the outside of the box.

The Master Encoder also controls sync. There is a Blackburst Out, as well as a Genlock In and Thru, on the Master Output Encoder card. Use one or the other but not both. When using the Genlock In, be sure to either use or terminate the Genlock Thru, because it is not auto terminating. You cannot put in another Master Output card. However, you can put slave output cards in the next three slots to the left of the Master Output card.

In the next-to-the-last slot to the left, you see the Coordinator card. It connects with the two BNC cables supplied to the VideoNet card that is installed in the host PC. On these cards, TX means Transmit, and RX means Receive. So connect each cable to it's opposite, RX to TX and vice-versa. The VideoNet can run a few hundred feet but be sure to use 75 Ohm video cable, not 50 Ohm Ethernet cable.

While slots 1 to 7 are typically used for input modules and slots 10 to 12 are typically used for outputs, all of these slots are actually capable of handling inputs or slave outputs. The master encoder output, however, must be as close as possible to the Switcher card. There should not be any empty slots between the Switcher card and the master encoder output card. In most Trinity configurations, this means that the master encoder output card will be in the slot marked 9 on the back of the Trinity box, although future expansion cards could push the master encoder output card over a couple of slots. For example, if you have a downstream key card, put it in slot 9 and move the master encoder output card one slot higher. The master encoder output card must be the last in the line of downstream devices.

Trinity And The PC

A Trinity workstation uses a PC running Windows NT as its interface, but all of the real-time video processing is done in the custom Trinity box. The benefits of this approach should be readily apparent to anyone who has tried to cram multiple video processing cards into a PC, hoping the cards get along with each other, the IRQs don't conflict, and that the large bandwidth video can squeeze through the computer's bus with no glitches.

In a Trinity system, the PC houses the Trinity software programs and content such as stills, graphics, wipes, and effects. Other than that, the PC only contains one simple PCI card, using one IRQ. This VideoNet card is one end of a high speed (up to 400 Mb per second) network that communicates with everything else that is in the Trinity box. Virtually all of the manipulation and compositing of video is done in the Trinity box, which is specifically designed for that job.

The software and content, approximately 1.8 GB, is installed on the PC's hard drive. In systems with the optional Time Machine, no software is stored on the Time Machine hard drives in the Trinity box. These hard drives are dedicated to digitized video and audio. The software in the PC includes all the operating software programs. It also includes content from Play and content created by the user. This content includes D1 stillstores, title pages, wipes and digital video effects, animated overlays and effects, and the edit decision lists, timelines and scripts to recreate or alter the content.

When an effect or graphic is loaded into Air Command or cued up by Preditor, the information is moved from the PC's hard drive, through the VideoNet network, and loaded into the RAM buffers on the cards inside Trinity. D1 stills load into whichever video processing card is free. Wipes and digital video effects load into the Warp Engine RAM, and downstream keys load into the Switcher RAM. Previously loaded data stays in those RAM buffers until bumped out by more recent data.

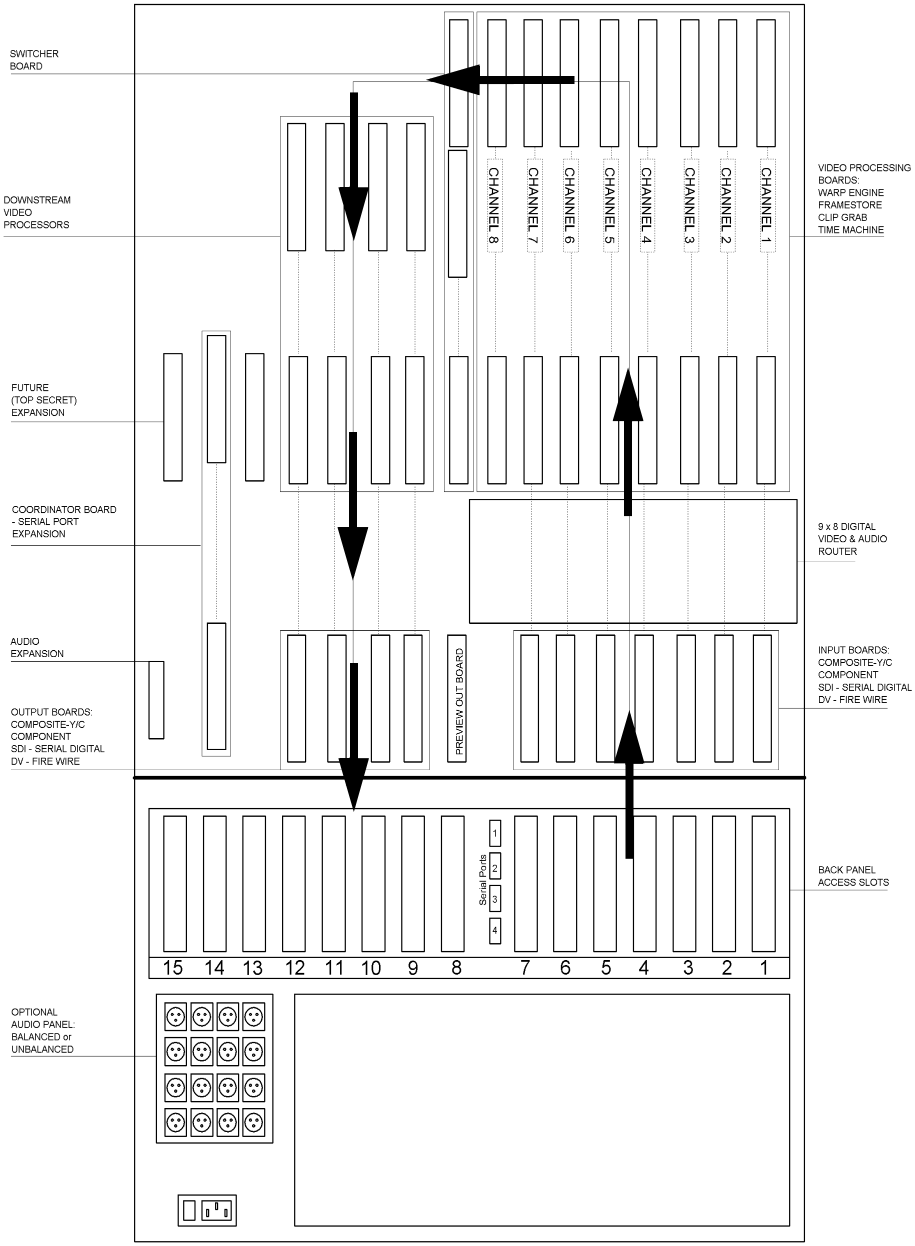
After a few effects or downstream keys have been loaded into Air Command, you can take stock of which effects or downstream keys are in the RAM buffer by right-clicking on the FX or DSK picon in the lower right of the screen. A list appears with **Properties** at the top and **Unload all effects** at the bottom. Everything you see in between are the effects or downstream keys currently in the RAM buffer. You can select them right from this list or select them again from the bin. Either way, there is no loading time for Air Command to be ready to use them again.

Users in certain applications, especially live shows, find additional RAM to be a valuable upgrade. The largest size SIMMs available are usually 128 MB and that is the most Trinity recognizes anyway. There is one RAM slot on each card, and Play DOES NOT recommend the use of slot expanders to try to use multiple SIMMs. The RAM should be standard 72 pin, 60 ns or better, RAM SIMMs. They can be EDO or Non-EDO, but (VERY IMPORTANT) they need to be 5 volt, not 3.3 volt.

The Warp Engine RAM is also where ClipMem grabs are captured. 128 MB gives you just over 6 seconds of full-screen, uncompressed video. If you build something in Panamation using the ClipGrab video, then you can save it as a ClipMem (full screen effect) that plays from the Warp Engine. It can also be saved as an overlay, even if it uses ClipMem video. In that case, it loads into and plays from the Switcher card. There are many situations where you may want to upgrade both RAM SIMMs.

Overview Of Video Flow

This section describes the flow of video through Trinity's input cards, processing cards, Switcher, and output cards. The basic flow of video happens as indicated by the arrows in the next figure.



Overview of Video Flow

Input Cards

The input cards bring video into the Trinity system and, if required, convert that signal to the digital format used by Trinity (CCIR-601, D1). These cards are placed in the slots marked 1 through 7 on the back of the Trinity box. You also can place input cards in the slots marked 10, 11 or 12, providing the eighth input position on the Switcher buses.

Video Processing Cards

From the input cards the video is routed through the video processing cards (Framestores, Warp Engines, ClipGrab, and Time Machine). You can place these cards in any of the internal slots labeled Channel 1 through Channel 8. The more Warp Engines and Framestores you have, the more streams of live video you can have on the screen at the same time (current software supports three channels). For example, with one Warp Engine you can have the same stream of live video on all three sides of a spinning 3D triangle. With three Warp Engines you can have three different live streams of video, one on each side of a 3D triangle.

ClipGrab Card

The ClipGrab card enables you to see the Program and Preview monitors in Air Command and Preditor. It samples the video signal and sends it through the Coordinator card to your PC for display in Air Command or Preditor interfaces. The ClipGrab card helps create the picons in your bins. It also allows you to access a waveform monitor and vector scope.

The Switcher Card

The Switcher card switches the video through the proper card. It uses the Framestore for full screen, flat video (grabbing framestores) and the Warp Engine for warped video. Also on the Switcher card is the graphics engine and chroma/luma key. The Switcher card goes in the internal slot marked Switcher.

After Trinity processes your video, it sends the video out through the output cards. Only one Master Encoder card is used per Trinity and is placed in the slot marked 9 on the back of your Trinity. Other outputs are slave outputs; any format slave output card can be placed in any of the remaining output slots 10, 11, or 12.

The Coordinator Card

The Coordinator card, located inside Trinity and connected to the PC with the two BNC cables, receives information from the VideoNet card in your PC and sends information back to your PC. The Coordinator card tells the Trinity software, on the host PC, whether everything is working correctly inside Trinity. It also coordinates what happens through the Play bus and I/O bus.

NOTE TX is an abbreviation for “Transmit”, RX for “Receive.” Be sure the TX on the Coordinator card is connected to the RX on the VideoNet card and vice-versa.

The Composite Preview Output Card

The Composite Preview output card allows an external monitor to display the preview bus. It sends a video signal to any standard NTSC or PAL video monitor that accepts composite or Y/C video. The video you see on this monitor is the same as the preview bus in the Air Command interface. This card is in the slot numbered 8 on the back of the box, right behind the Switcher card. The Preview Output card also has GPI triggers and tally light support for cameras.

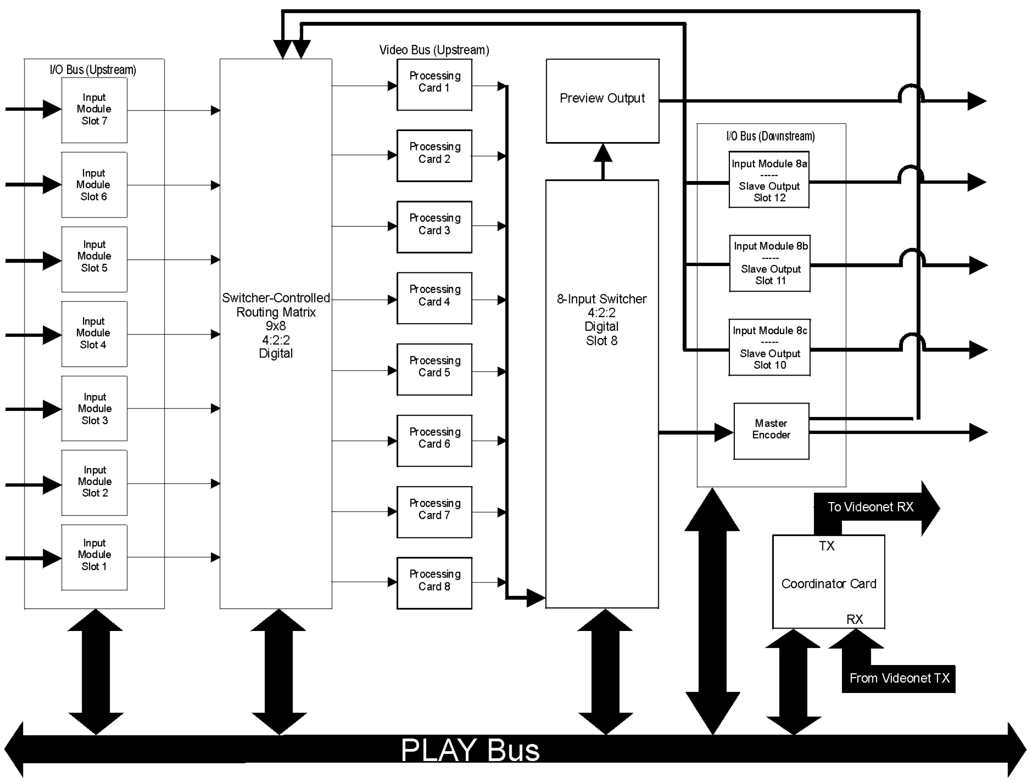
VTR And Audio

The serial ports 1 through 4 on the RS-422 back panel of the Trinity are for VTR control. These ports allow for A, B, C roll editing with Trinity. Trinity comes with four RS-422 ports, but optional equipment that will soon be available allows you to connect up to 16 controllable devices.

The optional audio sub-system, balanced or unbalanced, allows for eight inputs, two program outputs and two monitor outputs. There are also two sends and two returns for use with external effect boxes.

Overview Of Busses And Video Routing Matrix

The Trinity system performs its magic via three primary busses. They are the Input/Output (I/O) bus, the Play bus, and the Video bus. Each bus is divided into components, which are described in detail in this section. See the following figure for a flow diagram of the Trinity system.



Flow Diagram of the Trinity System

The I/O Bus

The I/O bus is the primary path for bringing information into your Trinity system. On this bus, all video information first enters the Trinity processing architecture at the input module. This bus also sends control commands from the host computer via VideoNet to the input and output modules for color correction and input selection. These commands include the crucial timing information that is needed for the card to operate properly. The I/O bus is a data path composed of 12 numbered slots that run along the motherboard.

The I/O bus is divided into upstream and downstream sections, which denote the position in the system relative to the Switcher. All of the slots in the I/O bus are dual function (input/output), except slot 8. Slot 8 is reserved for the Preview output card. The master encoder card only goes in the slot labeled 9 on the back of the Trinity, the slot next to the Air Command card inside the Trinity. If you have a downstream key card, however, put that in slot 9, and move the master encoder card up one slot. The master encoder card must be the last in the line of downstream devices. With the exception of these two slot assignments, all the slots can be configured for either input or output function. This is important to understand when configuring a Trinity system for operation with eight Switcher input channels. To do so, put input modules in the seven upstream I/O bus slots, the preview output module in slot 8, the Master Encoder card in slot 9 (the first downstream I/O slot) and the eighth input module in slot 10, 11, or 12. The seven upstream slots have direct inputs into the 9-by-8 video routing matrix, while the three available downstream slots share one input into the router. Therefore, if you have more than one input card in the downstream slots, you can only activate one of them at a time to be the eighth input to the Switcher.

There is a thirteenth “slot” on the I/O bus, although you may not see it at first. This thirteenth connector is the connector for the Trinity audio base system. Remember, the I/O bus handles all I/O functions and the transmittal of control information for the input modules. Because the audio base system is technically an input module for audio, it receives its control information on this bus as well.

Video Routing Matrix

The next stage of video processing is the 9-by-8 video routing matrix. This is where the digital data from the analog/digital conversion process on the input module makes its way to the video processing card that performs the next piece of digital magic.

The 9-by-8 router is basically a 4:2:2 component digital router with external control capability. In this case, the control information that tells the router what to do is sent via VideoNet from the host computer to the Switcher and is then passed from the Switcher to the router. The router has nine inputs, eight for video switching and one dedicated to the system output. The reason the Switcher has its own input to the router is so that you can perform recursive effects on the program output. An example of this is to load up the spinning cube effect, hit the Auto button, and then select Out as your Switcher input. What you see on the program out is a Warp Engine effect running through the Switcher, out of the Switcher and back into the router, back through the Warp Engine and back through the Switcher etc., ad infinitum.

What you tell the Air Command to do through the interface on your computer monitor determines what the Switcher tells the routing matrix to do. This chain of command is evident when you punch up input 2 on the Air Command as Preview and select input 1 as Program. If you double-click on a page peel transition in the FX/Sampler bin, then it loads into the Air Command to tell the router to send input 2 from its router input to an output that sends it to an available Warp Engine which performs the selected effect on it. When you press the Auto button on the interface you see this effect.

Play Bus And Video Bus

Next on our journey through Trinity are the Play bus and the Video bus. The Play bus is a high speed 32-bit data bus that moves the complex commands that are used by the system's upstream and downstream video processing cards. These cards, in turn, perform the effects on your Trinity system.

The Video bus is a high-speed data bus that takes the 4:2:2 information from the router and passes it to the upstream processing cards. It also allows the upstream cards to send the information downstream to the Switcher.

The upstream video processing cards provide incoming video signals with a path that allows them to be processed in the 4:2:2 digital domain. By the time the video information hits the routing matrix, it has already been converted to the 4:2:2 digital format that Trinity uses to process information.

The router is a matrix, so it can switch any one of its inputs to any number of its outputs. Each of these outputs is connected to a distinct slot on the upstream Video Bus. Each upstream slot can hold one upstream processing card: the Warp Engine, the Framestore, or the ClipGrab (see "Video Processing Cards" on page 175 for more information on video processing cards). Once the processing on a selected stream is done, it leaves the processing card via the Video bus and travels downstream to the Switcher card for further processing and output to the system's Master Encoder Output card.

The Switcher

The Switcher is the next stop on our tour, and it is the heart of the Trinity system. The Switcher card resides on both the Play bus and the Video bus and is actually the connector between the upstream and downstream sections of the Video Bus. It provides live switching of all input channels and keying and graphics functions. It is capable of chrominance, luminance, additive, and linear (alpha) keying. It also has a 32-bit graphics engine that is capable of displaying 24-bit graphics with an 8-bit alpha-channel signal for keying purposes. This is the downstream key channel where Panamation overlays and TitleWave CG elements are displayed.

The Coordinator Card

The Coordinator card is the master card for both the Play bus and the I/O bus. The Coordinator card sends commands to appropriate cards.

Chapter 8

Troubleshooting

This chapter gives the technical user a quick reference guide for troubleshooting common problems with a Trinity system. It covers the following topics:

Error Messages

This section explains the most common card error messages. They usually can be fixed by reseating or replacing a card or re-installing the software and applications. These messages are sometimes seen only in the NT event viewer.

NOTE Make sure your Trinity is turned off before swapping cards, otherwise you could damage the system. (See “Card Placement In Trinity” on page 28 for detailed information on card installation.)

In all instances where swapping a card is involved, if swapping the card does not fix the problem, do not forget to replace the original card when you are finished troubleshooting. (See “Card Placement In Trinity” on page 28 for detailed information on card placement.)

The error messages are arranged numerically with their associated text string. Following each are possible solutions in the order they should be tried.

E800000B Unable to configure the hardware.	1. Swap VideoNet card. 2. Re-install software.
E800000C Error ‘?’ occurred while reading hardware configuration data file.	1. Re-install software.
E800000F Unable to verify correct programming of VideoNet's PCI to local bus bridge.	1. Change PCI slot the VideoNet is in. 2. Swap VideoNet card.
E8000002 A request timed out.	1. Reset Trinity. 2. Reseat Coordinator card. 3. Swap Coordinator card.
E8000008 The VideoNet Kernel failed to start.	1. Change PCI slot the VideoNet is in. 2. Swap VideoNet card. 3. Re-install software.

E8000009 The memory test of the VideoNet board failed.	1. Change PCI slot the VideoNet is in. 2. Swap VideoNet card.
E8000012 Error '?' occurred while claiming system resources.	1. Follow these steps to check to see if the PCI card should be removed: a. In WinNT go to Start, Programs, Administrative Tools, then Windows NT Diagnostics. b. Under the Resources tab, locate the PCI cards installed in the system (we're not concerned with ISA). c. Double-click and check the PCI cards on the list. d. If the type is latched, and under share disposition it is shared, then that card should be removed and the system re-booted.
E8000013 Unable to find the VideoNet hardware.	1. Change PCI slot the VideoNet is in. 2. Swap VideoNet card.
E8000014 Error '?' occurred while configuring the hardware.	1. Change PCI slot the VideoNet is in. 2. Swap VideoNet card. 3. Re-install software.
E8000021 The processor on the VideoNet board did not respond.	1. Change PCI slot the VideoNet is in. 2. Swap VideoNet card. 3. Re-install software.

E8000101 The driver was unable to allocate contiguous, page-locked memory.	1. Not enough RAM on PC. 2. NT not installed properly or NT not working correctly: Re-install NT.
E8060201 The VideoNet communications link is down.	1. Verify VideoNet cables are good. 2. Change PCI slot the VideoNet is in. 3. Swap VideoNet card.
E8060210 Configuring the hardware failed.	1. Reset Trinity. 2. Verify VideoNet cables are good. 3. Reseat Coordinator card. 4. Swap Coordinator card.
E8060211 The local loop-back test of the VideoNet hardware failed.	1. Swap VideoNet card.

NOTE Any other messages you come across are either self-explanatory or require Tech Support assistance. If none of these suggestions work, call Trinity Tech Support at 916.636.2444.

Tips For Configuring Your System

If you encounter problems when configuring your Trinity system, here are some key points to keep in mind:

- Every system must have only one Master Output Encoder card. If there is no Master Output Encoder, then the Trinity will have no way to time video signals and will not function.
- The Master Output Encoder belongs in the slot next to the last downstream source. In all current configurations, this means the Master Output Encoder card belongs in the slot next to the Switcher card, which is the slot marked 9 on the outside of the Trinity box.
- Remember that the genlock thru connector is NOT auto terminating.
- If the loop thru on a Composite/YC input module is not being used, you must turn on the terminating switch. Likewise, turn it off if the pass thru is being used.
- Use either genlock in and loop thru or black burst out. You should not use both at the same time.
- Preview output cards only function in the slot marked 8 on the outside of the Trinity box. If the Preview output card is placed in any other slot, then it will not output video.
- The slots marked 1 through 7 on the outside of the box are the primary locations for input modules. One additional input module can be placed in slots 10-12 to provide eight external inputs to the upstream router.
- TX means transmit, RX means receive. When hooking up VideoNet cables, remember that the cables run TX to RX, *not* TX to TX and *not* RX to RX.
- Horizontal and Subcarrier phase adjustments are automatic on the input modules. When configuring a Trinity system, some engineers or technical users may inquire how to make these important timing adjustments on each input, similar to a traditional switcher. We have designed each of the inputs so these timing issues are a thing of the past. Trinity handles Horizontal and Subcarrier phasing adjustments automatically.
- More than three video processing cards won't hurt anything, but it won't do much right now. Currently the software supports a combination of up to three Warp Engine and Framestore cards. Adding more cards does not hurt the system, but additional video channels are not utilized in the

current software configuration. Trinity will take advantage of the additional memory on extra Warp Engines for certain functions, but it is a negligible effect right now.

- The most common problem people see when first connecting their system is that the inputs are set for the wrong format. This is especially true of the Component input card, which has six different factory presets. The quickest fix for this is to open the Input Sources configure panel, and select the correct setting for each input. For example, if input 1 has a Composite/YC card in it and has a composite camera connected to it, select Composite - Camera for input one. If input 2 has a component input card, and is connected to a Betacam UVW-1600, then select YUV Betacam as the input source. Fine-tuning can then be done in the different Input Settings panels.

Patch Disks And Service Packs

Play frequently posts updates to the Trinity software at http://www.play.com/trinity/updates for users to download. These are called service packs and you only have to install the latest.

NOTE Make sure you do not re-install 1.2 patch disks over newer software.

Tips For Video Problems

To troubleshoot a video problem, it's important to isolate where the problem is occurring in the video stream. I like to think of the video as a flowing river. By starting at the source, and working your way down the stream, you can determine where the problem starts, and fix it.

- Look at the output of the input cable. When checking the video source, it's important to check the output of the cable used to feed Trinity. If the cable is bad, checking the output of the peripheral won't help.
- Check the Loop-thru. All of Trinity's video analog inputs have a loop-thru. This will determine if the problem is in the input module, or further down the road. For the Component input module, try setting the loop-thru to passive loop-thru and try a re-encoded loop-thru. This will show if the problem is happening in the color corrector of the input.
- Page Peel and Cut. The next stage the video flows through is the Router and a video path card. This next step can be used to determine if the video problem is occurring in the Warp Engine or Switcher card in the system. Run the Switcher software and load up one of the page peel effects in the Sampler directory. Use the T-bar to step halfway through the effect. Does the problem occur on the video being peeled off the screen, or on the video behind the page peel? Cut between sources and see if the problem follows the video, or if it stays on the page peel or background. If it follows the video, it's specific to the input, and may be a router problem. If it stays on the page peel, then it's most likely a Warp Engine issue. If it stays on the background video, then the Framestore card is suspect.
- Check Program and Preview on the screen. If you have a ClipGrab card installed, then you'll have Program and Preview monitors in the Switcher interface. Look and see if the video problem shows up in these monitors, or if it only shows up on an external monitor. The ClipGrab monitors are fed before the video goes to the output module, so this can help determine if the problem is in the output module. If the problem is in both the Clipgrab monitors and the external output, then it may be in the Switcher card.

Most Common Video Problems

A line or "tear" in the video image. A line or horizontal tear appears in the video. It's invisible on a static camera shot, but becomes noticeable during horizontal movement. It sometimes moves up or down in the picture, and sometimes isn't there at all:

This is called a Pointer Crossing and is caused by running an unsynced video signal through Trinity. The fix is simple - connect up sync or Genlock to the video source, and the problem will go away. If the video source doesn't have a genlock or reference input, then connect it to a frame synchronizer that can be genlocked.

A "pop" or flash when running a DVE transition. This happens at the beginning of a transition, and looks like a few frames of garbage video at the beginning of the effect:

This is called Switcher Glitch and is also a symptom of unsynced video sources. Connect sync or Genlock to the offending video source, and it'll go away. A handy check for sync issues is to turn on the input status lights by using the button in the Global Settings panel. This will add lights under each input in the Switcher. A red light means that the signal is not synced properly. A yellow light means that the signal is synced, but there is some other technical problem with the signal.

A Troubleshooting Guide

One of the most important questions to ask yourself when troubleshooting is what has changed since the system last worked correctly? This question applies to both hardware and software. Sometimes it's the smallest change to the system that causes everything to stop operating properly. When troubleshooting, remember that the Trinity software relies on a correctly functioning PC. If the PC is not working correctly or does not meet the minimum requirements for a Trinity system, then it could affect the Trinity software or VideoNet drivers and cause unpredictable results.

This section is a troubleshooting guide to problems and possible solutions for specific hardware components and software applications.

WindowsNT

When you encounter errors starting up Trinity software, try the following diagnostic tests and solutions.

- Check the Event Viewer in the Windows Administrative Tools for a red stop sign and VideoNet as the source.
- Next, check Windows NT Diagnostics. Under the resources tab, locate the PCI cards installed in the system. (You do not need to be concerned with ISA.)
- Double-click and check the PCI cards on the list.
- If the type is latched, and under the share disposition it is shared, that card should be removed and the system re-booted. This should fix the problem.

I've got tons of RAM in my computer, 128-256 MB, but after working a while my system acts like it's out of RAM and starts swapping to the hard drive.

- There is a quirk in Windows NT that needs the Virtual Memory size to be larger than the amount of actual RAM on the system. Otherwise the RAM gets filled up and NT thinks it's out of memory. Right-click on My Computer, choose the Performance tab, hit the Change button and change the initial Size to a higher number, preferably double the amount of available RAM you have in the system.

Air Command

I have a ClipGrab card but I don't see monitors on the VGA screen.

- Click on the Panels button and turn on the check mark next to monitors.

When I freeze video, my framestore is jittering.

- Go into Framestore Settings and select interpolate Field 1 or Field 2. This will eliminate any jittering from fast motion video.

Preditor

I don’t see video on the monitor in the Preditor interface.

- In serial devices, check that the correct input numbers are dedicated to the correct decks or other video equipment.

Preditor won’t import my EDL.

- The file doesn't end in .edl. Solution: rename it so the extension is .edl.
- Or the EDL isn't in CMX 3400 or 3600 format. Solution: save the EDL in that format in whichever tool you are saving the EDL.

Preditor EDLs don’t look the same when loaded back in.

- This is because Preditor can't save all the transitions, downstream keys, color corrections, audio settings, etc. in a text EDL. It may also have to alter the data slightly so that the timeline can be understood by a CMX editor. If you want all your settings saved, don't save your timeline as an EDL until you want to take it to another system.

“Whip” Edits

There is a jump in the image for the first frame or two at the in-point of the edit on the record tape.

This is called a “whip” edit. We know of two potential causes and their corresponding solutions.

- Old media. If the tape is highly used, or if an edit has been done at that point several times, the area of the tape could get tired. Solution: Try newer media.
- The heads on the deck have seen a lot of action. The heads may not switch cleanly from playing to insert editing. Solution: get the deck(s) serviced.

Aborted Edits

When I am editing in Preditor, the system aborts the edit.

Several possible problems can cause aborted edits. Two things to look at right off the bat are:

- If you have a Panasonic DVC Pro 640, 650, or 750, check the CF or CAP.LOCK menu setting. If there is a choice between 2F and 4F, set it to

2F. Setting it to 4F can cause some edits to be off by one frame EVERY time.

- Is the timecode continuous during the preroll of the edit on all the tapes involved? If not, this can cause the editor to believe the edit will be wrong and therefore abort the edit. Try running decks using Timer timecode, which you can set in Serial Device Properties (see the chapter on “Serial Devices” in the User’s Guide for more information on setting serial device properties).

If neither of these things is causing the problem, try the following:

1. In Edit Options turn OFF Abort Inaccurate Edits.

2. For all playback decks involved in the edit, go to Deck Properties Panel and turn ON Disable Bumps. Also set Play Delay to zero (0).

3. Use the superimpose video out of all playback decks, so you can see a timecode window on the screen for each deck you look at.

4. Run simple cuts-only edits from each playback deck.

5. Cue to the in point of the edit on the record deck (after it's been performed) and look at the timecode in the superimpose text. Compare this time to the actual IN point for the source deck.

There can be multiple problems observed, and they should be fixed in this order:

1. If in step 5 you didn't see anything from the source clip you marked, then it may mean that the edit deck didn't start recording at the right time. Although this wouldn't cause an edit to abort, it will make it more difficult to diagnose and fix that problem.

Solution: Count out how many frames pass on the record deck before you see a frame from the source clip (including the one at the record in point). Multiply this number by 2 (to get fields) and call that the “edit delay adjustment.” (Note: if the edit actually started recording BEFORE the in-point this would be a negative number, the number of frames of source that were recorded before the in point multiplied by -2).

Go to Configure--Serial Devices panel and select Properties for this edit deck. Add this "edit delay adjustment" to the number in the Edit Delay box and enter the result there. If the Edit End Delay was the same as the Edit Delay before you changed it, put the same result into Edit End Delay that you put into Edit Delay.

Remember to go into Properties for the source decks and turn off the Disable Bumps button which you turned on at the beginning of this solution. It should improve the accuracy of the edits with most tape decks.

2. If the record tape correctly shows the source material starting at the record in frame, and ending on (but not including) the out frame, then do this:

Look at the recorded timecode overlay at the in point on the record deck, and subtract that timecode from the actual source in-point for the clip. Multiply this number by 2 to get fields and enter it in the Play Delay number box in the Properties window for the source deck that the clip came from. (Get Serial Device Properties from Configure--Serial Devices panel). You may have to do this fix for each playback deck. At this point, you should be able to run an edit and have it be frame-accurate at least some of the time. If you go into Properties for the source decks and turn off the Disable Bumps button, it should improve the accuracy of the edits with most tape decks.

Panamation

When I load a still or paint on the workspace I can't see it on my program monitor.

- Right click on the workspace border, select Properties, turn on Video (to see on the video monitor what you are doing in Panamation) and turn on Alpha (to key the images over live video).

When I use the spline tool to cut out an object, I right-click and choose Complete Shape and choose Lift Stroke. When I try to move it, it's a square rather than the shape I carefully traced.

- Go to Workspace Properties and make sure Video and Alpha are turned off.

Personal FX

When I click make test frame I get a black screen only.

- Go into effect properties and turn 'wipe' on.

Video And Video Equipment

Every time I perform an effect in the Air Command, I get a flash or a glitch.

- The Trinity and video equipment are not ‘in sync’. (See “Synchronizing Video Equipment” on page 82 for information on syncing video equipment.)

Everything is plugged in and working correctly, but I’m not getting video to my record deck.

- Check the Serial Devices Panel (see the chapter on “Serial Devices” in the User’s Guide for more information). Check that the correct inputs and outputs are designated to the proper decks.

My VTR goes to stop, before pausing, each time I do a frame advance.

- When a VTR advances it might go to stop before pausing on the new frame. This can usually be changed by a menu setting in the deck like FUNCTION MODE AFTER CUE-UP. You should set this to still mode rather than stop. This problem shouldn't happen on digital decks because they usually keep the picture in a digital frame buffer even if the tape is despooled.

Miscellaneous

I changed my output setting and chose Save, but the next time I booted up it had returned to the default settings?

- Change the name that’s in the Name field and then choose save. The file named “Auto” is write protected so you will never loose the default settings.

When I right click on the gray space in the bins area, ‘NEW BIN WINDOW’ is not available.

- Increase the available space for the new bin. There is a minimum space that must be available before a new bin can be opened.

Trinity Hardware

When troubleshooting Trinity’s hardware, always check connections and cables. In particular, check VTR and other video equipment format and configuration settings. Make sure everything is properly connected to work correctly with your setup. If you still have problems, then consult the following list of common problems and solutions.

I see video on my ClipGrab monitors, but the program out is black.

- Make sure the fade to black button on the Air Command interface is not selected.
- See that the video format in the output settings is correct.
- Check all connections on the Trinity and attached video equipment.

I get Pink/Green in the program or preview channel.

This problem is called “gak” by many technicians at Play. Gak refers to a video path not receiving a signal. To solve this problem, you need to find the break in the chain and replace the card causing the gak. If possible, see if both the outputs of the output module(s) and the ClipGrab PC display in the Air Command are showing the problem. Gak can be caused by a number of things, so it is important to follow these steps when troubleshooting.

- Determine if the gakked screens are tied to a specific input module. You can check this by going to the Air Command and directly punching up the various inputs in the system on both the Program and Preview bus. If this pink/green screen is only on one input module, and the pink and green show up on both Program and Preview, then the input module is the most likely culprit. Replace it and try restarting the system. Keep in mind that a SDI input module will show gak if there is not a valid SDI source hooked up. This is normal.
- Determine if the problem is visible using framestores. Double click on a framestore in a bin, and press the cut button. Now double-click on another framestore. Cut back and forth between the two. Does the Gak appear on only one framestore, or on both? Does it appear only on one bus?
- If the problem doesn't show up with framestores, but does with any input source, first check the input sources one more time. It could be the router causing the problem, but this is highly unlikely. Check all of the settings in the Input Sources Configure panel to ensure that the inputs are set to receive the correct input format. To access the panel, click on the Configure button in either Air Command or Preditor, and select Input Settings from the pop-up menu.
- In the event that all of the settings check out, and the gak shows up everywhere but the framestores, call your dealer or Trinity Tech Support at 916.636.2444 (7:00 AM to 6:00 PM PST, Monday-Friday).
- If the problem swaps between Program and Preview when you press cut, and is only affecting one bus at a time, the problem is either the Warp

Engine or the framestore card. Perform this simple test to determine which card is gakked: double-click on a warping effect, like a page peel, and T-bar halfway through the effect. Determine which video source is gakked, the warped video or the full-screen video. Click the cut button and verify that the gak remains on either the warped video or the full screen video when the digital video effect is midway. If the full-screen video is gakked, then the Framestore card is bad and should be reseated or replaced. If the warped video is gakked, then the Warp Engine is the culprit.

- If the gak shows up consistently on the Program video source, and moves from the warped video to the full-screen video when the simple test in the above paragraph is performed, then the problem has to be further upstream. This points toward the input module or router. If it shows up everywhere, it is probably the Switcher or the output module.

When I turn on the power for my Trinity, it doesn't do anything. The fans don't start and the light doesn't even turn on.

- The Coordinator card may be improperly seated in the sockets on the motherboard. Immediately turn the power off and re-seat the card. Make sure that the card is in both sockets and is pushed down evenly in the unit.
- If the unit still won't start, pull the Coordinator card and inspect the sockets on the motherboard for damage. There is a slim possibility that the motherboard sockets have been damaged. Look for any pins in the socket that look bent or out of shape.
- Check the control cable for the audio sub-system and make sure it is properly plugged into the Trinity motherboard. If you unplug the audio sub-system and the Trinity powers up, the ribbon cable was not connected properly. In this case, you need to re-connect the ribbon cable properly.

NOTE Be careful when connecting the 40 pin ribbon cable. If it is not plugged in correctly you can damage the system.

If you have moved the Trinity box lately, it's also possible some wires in the bottom half have come loose. Take off the bottom cover and make sure there is not a loose lead to the little circuit board behind the green Play light.

NOTE There is also a fuse next to the power switch on the back.

VideoNet I do not see video coming to my input module.

- Check the Input Sources and Input Settings Configure panels. Make sure you have selected the correct format for the incoming video signals.

The VideoNet connection is not being recognized.

- Make sure proper VideoNet cable types are being used (75ohm, RJ-59 for shorter runs up to 300 feet, RJ-6 for up to 500 feet). Any other cable may produce unpredictable results.
- Make sure that the VideoNet card is seated well.
- Make sure that the VideoNet cables are good and working.
- Sometimes switching slots in the PC will cure VideoNet problems.

I get an error stating I couldn't find attached Trinity System.

- Check the VideoNet cable connections between the PC and Trinity. The cables run from the TX connector on the PC to the RX connector on the Trinity, and the RX connector on the PC runs to the TX connector on Trinity.
- If the cables are correct, the VideoNet or Coordinator cards may not be properly seated in the PC or Trinity. Turn everything off and re-seat the VideoNet and Coordinator cards.
- Check the cables that run from the PC to the Trinity. Verify the cables are good and working. (The system can handle 300 feet with straight runs of RJ-59 cabling and up to 500 feet with RJ-6 cabling).
- If you get similar errors that you cannot connect to the Trinity, check Event Viewer under Administrative Tools. It will give you some valuable feedback on whether the VideoNet card in the PC is starting properly. If it is, try the above suggestions. If there are warnings that the VideoNet driver is not starting, then look for conflicts in the PC.

Audio Sub-System

Everything is plugged in correctly and I'm not getting audio to my record deck.

- Select the Serial Devices panel. See that the correct inputs and outputs are designated to the proper decks. It is easy to confuse Audio Inputs 3 and 4 on the Trinity Audio Module with the A3 and A4 tracks in Preditor.
- Make sure the source signals are making it to the audio board. Open the mixer panel in the Air Command and fade up the sliders for your source

and program audio. You should hear it on your monitors and see VU activity on the mixer panel.

- Check the deck connections and line input levels.

My VTRs work fine, but the microphones do not.

- Open the audio mixer. Right-click on the slider the microphone is connected to and select mic.

This setup doesn't even have a Trinity Audio module, but I am adjusting the levels with my own mixer. Why can't I perform an Audio Insert Edit with Preditor? The clip acts like it has no audio tracks, or I can't highlight A1 and A2

- Configure the decks as if you were using a Trinity Audio Sub-System. Then Preditor knows that there are supposed to be audio tracks there, even though you are riding the levels manually.

The Lights On Trinity's Cards

The lights on Trinity's cards can sometimes help diagnose a problem. Here is a list of the activity of different lights on Trinity's cards and what it means.

34-054 VideoNet Card

This description is for a 34-054-6 board.

- RED - Hardware not initialized.
- YEL - CPU activity.

  In normal, idle operation YEL appears to be faintly on. With a Trinity application running, YEL flickers in brightness. If YEL is steady ON or steady OFF, the CPU is not running.

- GRN - VideoNet Activity (this light protrudes through a small hole in the back panel plate, between the two BNC connectors).

34-003 Coordinator Card

- RED - Hardware not initialized.
- GRN - VideoNet activity.
- YEL - CPU crashed.

Normally at power on, RED is on and GRN flashes on briefly. If GRN does not flash on briefly immediately after power-on, there is a problem on the Coordinator card in the VideoNet interface. When the VideoNet driver starts on the PC, GRN will pulse again, this time slightly longer than the flash at power-up and RED will go out. If this longer GRN pulse does not appear, there is a problem with VideoNet (PC off, unplugged, cables swapped, improperly installed software). If RED does not go out after the longer GRN pulse (when the VideoNet driver starts), there is most likely a problem on the Coordinator card. Once the card is initialized, GRN indicates VideoNet activity (and will normally pulse continuously due to ClipGrab activity). There is not necessarily a problem if the YEL light occasionally flickers. However, if this light continuously flickers or stays on, it means the CPU crashed.

Play Bus Board

This description is for the following cards: 34-076 Framestore,34-099 Warp Engine,34-101 Switcher,34-105 ClipGrab,34-097 Time Machine, and 34-367 TDM Audio Router.

- RED - Hardware not initialized.
- GRN - Play bus base address set.
- YEL - Local CPU crashed (if present).

At power on, RED is on and the other lights are off. RED should go out during Trinity software start-up (the pause when the first Trinity application starts up after power-on/reset). If RED does not go out, the board is either malfunctioning or the software installed does not recognize the board (could be wrong coordinator kernel version, wrong DLL's, missing files, missing registry entries). Immediately after RED goes off, GRN should come on. If GRN does not come on, there is probably a fault in the board and the board will not be usable by the Trinity software (because it is not addressable on the Play bus). If the YEL light comes on, the on-board CPU has probably crashed. If the encoder or Switcher fails to initialize, the lights on other cards may indicate yellow as a result, although these other cards might actually be working properly.

34-389 BAS TDM expander

- RED - Hardware not initialized.
- GRN - TDM Expansion mode on when cables are connected to the router board.

Everything Else

This description is for I/O boards, including Master Encoders.

- RED - Hardware not initialized
- GRN - Normal operational mode entered OK

NOTE Input modules have only one red light and no green lights.

At power on, RED is on and the other lights are off. RED should go out during Trinity software start-up (the pause when the first Trinity application starts up after power-on/reset). If RED does not go out, the board is either malfunctioning or the software installed does not recognize the board (could be wrong coordinator kernel version, wrong DLL's, missing files, missing registry entries). GRN means different specific things for different boards, but usually GRN indicates that the software is happy with the board and is using it in the normal operational mode. (In some cases it is simply indicating that at least some normal I/O has occurred to the board.)

Chapter 9

Technical Specifications

This chapter lists the features and typical specifications of each of the following Trinity cards:

Composite/YC Input Card

Here are the features of the Composite/YC input card:

Features

- Composite or YC (S-video) input
- Loop thru outs
- Three-line comb filters in decoder (Adaptive in luminance for NTSC)
- User controls for decoder operation including comb filter operation, PLL time constants, color kill, etc.
- Adjustable luminance peaking for image enhancement
- Chroma line advance to correct for VCR chroma smear
- Module supports NTSC, PAL-M (525 line); PAL-M, PAL-N, SECAM (625 line)
- Will pass vertical interval
- Setup compensation can be selected
- Good performance with VCRs or other marginal signals, including jog/shuttle modes
- 27 MHz oversampling 8 bit A to D converters
- True color corrector in addition to H,S,C,B controls allowing:

  Independent white and black balance

  Nonlinear hue and saturation curves

  Complex chroma/luma modifications and effects

  Out of range signals passed or blocked (superblack, etc.)

Typical Specs Here are the typical specs for the Composite/YC input card:

Table 1: Composite/YC Input Card

Frequency Response	Composite	
	DC -4.2MHz	(+/- 0.5dB, -3dB~5.2MHz)
	YC (S-video) Luma	
	DC -5.0MHz	(+/-0.5dB)
	Chroma	
	narrow	650KHz (-3dB)
	medium	1.0MHz (-3dB)
	wide	1.4MHz (-3dB)
Signal to Noise	Luma noise	
	-54dB	(100 IRE unmodulated ramp, unweighted10KHz-5MHz)
	-60dB	(100 IRE unmodulated ramp, unified weighting 10KHz-5MHz)
	Chroma noise	
	Amplitude	-56dB (red field, 10KHz high pass)
	Phase	-52dB (red field, 10KHz high pass)

Table 1: Composite/YC Input Card

Linearity	Luma +/- 1% (luma ramp, setup compensate off) (2% p-p) Chroma Gain 1% Phase 1 degree
Differential Phase	1 deg. (40 IRE ModRamp)
Differential Gain	1% (40 IRE ModRamp, peak signal <105 IRE)
K Factor	0.5%
Gain Accuracy	Luma AGC on +/- 1% (depends on input sync level) Luma AGC off +/- 5% (absolute)
Chroma-Luma Gain Error	+1 / -1% (Adjustable thru Saturation control)
Chroma-Luma Delay Error	+/- 10nS (Adjustable +111/-166 in 18.5nS steps)
Horizontal Centering Range	+/-555nS (steps of 37nS)
Chroma Lock Range	+/- 70ppm (min.,+/- 250Hz for NTSC)
Saturation Control Range	0-200% (1.5% steps)
Hue Control Range	+/-45deg. (1.4 deg. steps)

Table 1: Composite/YC Input Card

Black Level Control Range	+/-50% (0.4% steps)
Luma Control (Contrast) Range	10%-180% (0.7% steps)(measured with module preset to camera mode)

Component Input Card (34-209)

Here are the features of the Component input card:

Features

- Accepts G,B,R (sync on green or separate) or Y,B-Y,R-Y in Betacam, MII, or SMPTE levels
- Self-terminated inputs require no switches or external terminators
- User controls for front end operation including clamp speed, PLL time constants, etc.
- Setup compensation that can be selected
- Module supports 525 line or 625 line formats
- Will pass vertical interval
- 27 MHz oversampling eight bit A to D converter for Luminance
- 13.5 MHz oversampling eight bit A to D converters for R-Y and B-Y
- Half-band digital filter for excellent luma freq. response
- Analog GBR to YUV translator for maximum quantizing accuracy
- Three multifunction outputs configurable as:

  Buffered loop-thru

  Re-encoded out (after color corrector) in GBR, YUV (Betacam) or Composite (NTSC or PAL)

  Luma/Composite out plus external sync inputs (C. Sync or separate H,V)

- True color corrector in addition to H,S,C,B controls allowing:

  Independent white and black balance

  Nonlinear hue and saturation curves

  Complex chroma/luma modifications and effects

  Out of range signals passed or blocked (superblack, etc.)

Typical Specs

Here are the typical specs for the Component input card:

Table 2: Component Input Card

Frequency Response	Luma DC-5.75MHz (+/-0.2dB, -12dB @6.75MHz) Chroma DC-2.0MHz (+/-0.3dB, -1dB @ 2.75MHz, -6dB @ 3.375MHz)
Signal to Noise	Luma noise -56dB (100 IRE unmodulated ramp, unweighted 10KHz-5MHz) -62dB (100 IRE unmodulated ramp, unified weighting 10KHz-5MHz) Chroma noise -56dB (100% R-Y,B-Y ramp, unweighted 10KHz-5MHz)
Linearity	Luma 1% Chroma 1%
K Factor	0.4%
Luma Gain Accuracy	+/- 1% (Adjustable thru Luma Gain Trim control)
Chroma-Luma Gain Error	+/- 1% (Adjustable thru Chroma Gain Trim control)
Chroma-Luma Delay Error	+/- 10nS (Adjustable +/-600nS in 37nS steps)
Horizontal Centering Range	+/-1.1uS (steps of 37nS)

Table 2: Component Input Card

Re-Encoded Monitor Out	Output level +/- 10% (Absolute error) Channel matching +/- 5% (Relative error)
Loopthru Output Error	+/- 1%
Saturation Control Range	0-200% (0.4% steps)
Hue Control Range	+/-45deg. (0.1deg. steps)
Black Level Control Range	+/-100% (0.4% steps)
Luma Control (Contrast) Range	0-200% (0.4% steps)

D1 Input Card (34-058)

Here are the features for the D1 input card:

Features

- Accepts industry standard SMPTE 259M SDI input signal (270Mbps)
- Automatic cable equalization (up to 300m of high quality cable typical)
- Two buffered and reclocked loop thru outs
- Composite monitor signal output (NTSC or PAL)
- True color corrector in addition to H,S,C,B controls allowing:
- Independent white and black balance
- Nonlinear hue and saturation curves
- Complex chroma/luma modifications and effects
- Out of range signals passed or blocked (superblack, etc.)

Typical Specs

Here are the typical specs for the D1 input card:

Table 3: D1 Input Card

Re-Encoded Monitor Out	Output level +/- 10% (Absolute error)
Saturation Control Range	0-200% (0.4% steps)
Hue Control Range	+/-45 degrees (0.1deg. steps)
Black Level Control Range	+/-100% (0.4% steps)
Luma Control (Contrast) Range	0-200% (0.4% steps)

Preview Output Card (34-040)

Here are the features of the Preview output card:

Features

- Monitor quality, NTSC (525 line) or PAL (625 line)
- Composite and YC (S-video) preview output
- Four GPI triggers, configurable as input or output
- Eight tally light outputs

Typical Specs Here are the typical specs for the Preview output card:

Table 4: Preview Output Card

Preview Video Out	Output level +/- 10% (absolute error)
GPI Triggers	Connector DB-9 female, pins 9,8,7,6 (1-5 grounds) As Inputs TTL or CMOS levels, internal 4.7K pullup to +5v. As Outputs TTL levels, 15ma source, 50ma sink, 75 ohm series resistor, 4.7K pullup to +5v.
Tally Light Outs	Connector DB-9 male, pins 1,6,2,7,3,8,4,9 (pin 5 ground) Open collector type 250mA sink, max. 12 volt, no internal pullup

Master Composite/YC Encoder Output Card

Here are the features of the Master Composite/YC Encoder output card:

Features

- Simultaneous composite and YC (S-video) program outputs
- Auxiliary output can be selected between black burst and second composite out
- Built in fade to black function
- Supports NTSC (525 line); PAL (625 line)
- Genlock input (with loopthru)
- Provides video timing for Trinity system
- 27 MHz oversampling 9 bit D to A converters
- Sync pulses, burst envelope, etc. in accordance with appropriate world standards (SMPTE 170M, ITU-R BT.470)
- Can pass super-black or over range signals
- Vertical interval pass or force blanking
- Adjustable vertical blank length
- Setup can be selected by user

Typical Specs

Here are the typical specs for the Master Composite/YC Encoder output card:

Table 5: Master Composite/YC Encoder Output Card

Signal to Noise	Luma noise -59 dB rms (100 IRE unmodulated ramp, unweighted, 10KHz-5MHz) -64 dB rms (100 IRE unmodulated ramp, unified weighted, 10KHz-5MHz) -77 dB rms (pedestal, unweighted, 10KHz-6.5MHz) Chroma noise Amplitude -60 dB (red field, 10KHz high pass) Phase -54 dB (red field, 10KHz high pass) -58 dB (red field, 100KHz high pass)
Differential Gain	1.25% (40 IRE ModRamp)
Differential Phase	1.25 deg. (40 IRE ModRamp)
Luma Nonlinearity	+/- 1% (luma ramp) (2% p-p)
K Factor	0.4%
Chroma Gain Nonlinearity	+/- 1.0%
Chroma Phase Nonlinearity	+/- 1.25deg.
Chroma-Luma Delay Error	+/- 1 nS (+/- 5 nS max.)

Table 5: Master Composite/YC Encoder Output Card

Chroma-Luma Gain Error	+/- 2% (composite out)
Output Level Error	+/- 1% (composite out, on board trim)
YC (S-video) Level Error	+/- 5% (trim affects all three channels)
Luma Bandwidth	5.0MHz (+/- 0.25dB max.)
Chroma Bandwidth	narrow 650KHz (-3dB) wide 1.3MHz (-3dB)
Free-run Frequency	+/- 20ppm (15-45deg. ambient, on board trim)
SC/H Phase (free run)	0 deg. (+/- 5 deg. max.)
Vertical Blanking Width	19-22 lines (525 line standards) 23-26 lines (625 line standards)
Genlock (Stable Black Burst in)	Chroma phase range 360deg. (0.1 deg. steps) Horiz. phase range +/- 9 uS (2.3 nS steps) Vertical phase range +3/-11 lines Pixel phase jitter <+/-3 nS Horiz. lock range +/- 5%

Analog Multiformat Master Encoder Output Card

Here are the features of the Analog Multiformat Master Encoder output card:

Features

- Program output in GBR (w/ or w/o sync), YUV (Betacam), or YC (S-video) and composite (three BNCs)
- Auxiliary output can be selected between black burst and second composite out
- Built in fade to black function
- Supports NTSC, PAL-M (525 line); PAL, PAL-N (625 line)
- Genlock input (with loopthru)
- Provides video timing for Trinity system
- 27 MHz oversampling 10 bit D to A converters
- Sync pulses, burst envelope, etc. in accordance with appropriate world standards (SMPTE 170M, ITU-R BT.470)
- Can pass super-black or over range signals
- Vertical interval pass or force blanking
- Adjustable vertical blank length
- Setup can be selected by user
- Highly stable genlock suitable for SDI (D1) and analog slave outs
- Timing compatible with Analog Multiformat Slave output card
- Precision reference option for ultra-stable free run applications

Typical Specs

Here are the typical specs for the Analog Multiformat Encoder output card:

Table 6: Analog Multiformat Master Encoder Output Card

Signal to Noise	Luma noise -64 dB rms (100IRE unmodulated ramp, unweighted, 10KHz-5MHz) -70 dB rms (100 IRE unmodulated ramp, unified weighted, 10KHz-5MHz) -77 dB rms (pedestal, unweighted, 10KHz-6.5MHz) Chroma noise Amplitude -70dB (red field, 10KHz high pass) Phase -68dB (red field, 10KHz high pass)
Differential Gain	0.5% 1.0% Max.(40 IRE ModRamp)
Differential Phase	1.0 deg. 1.5deg. Max.(40 IRE ModRamp)
Luma Nonlinearity	+/- 0.5% (luma ramp) (1% p-p)
K Factor	0.3% 0.5% max.
Chroma Gain Nonlinearity	+/- 1.0%
Chroma Phase Nonlinearity	+/- 0.6deg.
Chroma-Luma Delay Error	+/- 1 nS
Chroma-Luma Gain Error	+/- 0.6% (composite out)

Table 6: Analog Multiformat Master Encoder Output Card

Output Level Error	+/- 1%	(luma/green out, on board trim)	
Channel to Channel Matching	+/- 1%	(referenced to luma/green, trim affects all 3 channels)	
Luma Bandwidth	5.0MHz	(+/- 0.2dB, -1dB ~5.75MHz, wideband mode)	
Chroma Bandwidth (applies to composite and component outs)	narrow	650KHz	(-3dB)
	medium	1.0MHz	(-3dB)
	wide	1.3MHz	(-3dB)
	widest	2.0MHz	(-3dB)
Free-run Frequency	standard:		
		+/- 20ppm	(15-45deg. ambient, on board trim)
	precision option:		
		+/- 1ppm	(0-45deg. ambient, on board trim)
SC/H Phase (free run)	0 deg.	(+/- 5 deg. max.)	
Vertical Blanking Width	19-22 lines	(525 line standards)	
	23-26 lines	(625 line standards)	

Table 6: Analog Multiformat Master Encoder Output Card

Genlock (Stable Black Burst in)	Chroma phase range 360deg. (1.4 deg. steps) Horiz. phase range +/- 9 uS (2.3 nS steps) Vertical phase range +3/-11 lines Pixel phase jitter <+/- .35 nS (>10Hz),meets SMPTE 259M jitter spec. Horiz. lock range +/- 75ppm

Analog Multiformat Slave Output Card(34-233)

Here are the features of the Analog Multiformat Slave output card:

Features

- Program output in GBR (w/ or w/o sync), YUV (Betacam), or YC (S-video) and composite (three BNCs)
- Fourth output is composite out
- YC (S-video) connector for convenience (only for use in YC (S-video) mode)
- Can output program alpha (key) signal (all 4 outputs switch together)
- Built in fade to black function
- Supports NTSC, PAL-M (525 line); PAL, PAL-N (625 line)
- 27MHz oversampling 10 bit D to A converters
- Sync pulses, burst envelope, etc. in accordance to appropriate world standards (SMPTE 170M, ITU-R BT.470)
- Can pass super-black, or over range signals
- Vertical interval pass or force blanking
- Setup can be selected by user
- Timing compatible with Analog Multiformat Master out
- Timing is adjustable +/- 2uS from Analog Master

Typical Specs

Here are the typical specs for the Analog Multiformat Slave output card:

Table 7: Analog Multiformat Slave Output Card

Signal to Noise	Luma noise -64 dB rms (100IRE unmodulated ramp, unweighted, 10KHz-5MHz) -70 dB rms (100 IRE unmodulated ramp, unified weighted, 10KHz-5MHz) -77 dB rms (pedestal, unweighted, 10KHz-6.5MHz) Chroma noise Amplitude -70dB (red field, 10KHz high pass) Phase -68dB (red field, 10KHz high pass)
Differential Gain	0.5% 1.0% Max.(40 IRE ModRamp)
Differential Phase	1.0 deg. 1.5deg. Max.(40 IRE ModRamp)
Luma Nonlinearity	+/- 0.5% (luma ramp) (1% p-p)
K Factor	0.3% 0.5% max.
Chroma Gain Nonlinearity	+/- 1.0%
Chroma Phase Nonlinearity	+/- 0.6deg.
Chroma-Luma Delay Error	+/- 1 nS

Table 7: Analog Multiformat Slave Output Card

Chroma-Luma Gain Error	+/- 0.6%	(composite out)
Output Level Error	+/- 1%	(luma/green out, on board trim)
Channel to Channel Matching	+/- 1%	(referenced to luma/green, trim affects all 3 channels)
Luma Bandwidth	5.0MHz	(+/- 0.2dB, -1dB ~5.75MHz, wideband mode)
Chroma Bandwidth (applies to composite and component outs)	narrow medium wide widest	650KHz (-3dB) 1.0MHz (-3dB) 1.3MHz (-3dB) 2.0MHz (-3dB)
Timing Range	+/- 2uS	(from Analog Multiformat Master, 37nS steps)
Subcarrier Phase Range	360deg	(1.4deg. steps)

D1 Slave Output Card(34-210)

Here are the features of the D1 slave output card:

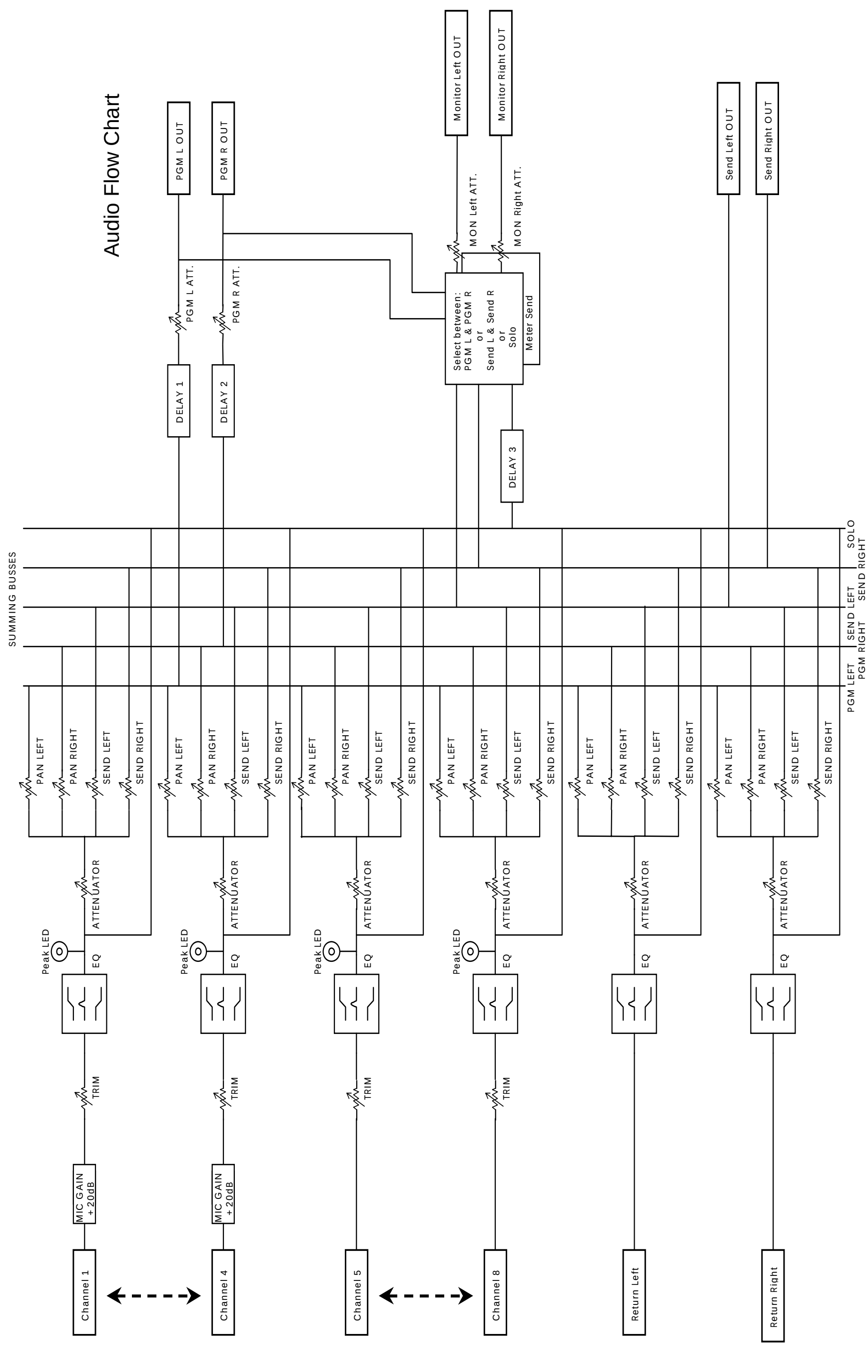
Features

- Four SMPTE 259M SDI program outputs (270Mbps)
- Can output program alpha (key) signal (all four outputs switch together)
- Key out is 256 steps in 10 bit data range
- Built in fade to black function
- Upgradable to full 10 bit
- Meets SMPTE 259M jitter spec. when used with 34-208 Analog Multiformat Master Encoder

Base Audio Mixer

The Base Audio Subsystem (BAS) is an 8 input audio mixer with 3-band parametric equalizer on each channel. It is timeline controlled in Preditor for automated mixing during linear and nonlinear editing functions. There are two separate models of the BAS, one with unbalanced RCA connectors, and one with balanced (XLR) connectors.

The following is a block diagram of the Base Audio Mixer's audio flow (this diagram does not apply to the Graham-Patten audio mixer):


Audio Flow Chart
PGM L OUT
PGM R OUT
Monitor Left OUT
Monitor Right OUT
Send Left OUT
Send Right OUT
PGM L ATT.
PGM R ATT.
MON Left ATT.
MON Right ATT.
Select between:
PGM L & PGM R
or
Send L & Send R
or
Solo
Meter Send
DELAY 1
DELAY 2
DELAY 3
SUMMING BUSSES
SOLO
SEND RIGHT
SEND LEFT
PGM RIGHT
PGM LEFT
PAN LEFT
PAN RIGHT
SEND LEFT
SEND RIGHT
ATTENUATOR
Peak LED
EQ
TRIM
MIC GAIN
+20dB
Channel 1
Channel 4
Channel 5
Channel 8
Return Left
Return Right

Typical Specs

Here are the typical specs for the Trinity base audio mixer:

Table 8: Base Audio Mixer

Nominal Operating Level (NOL)	-10 dBu	line mode, trim @ 0 dB (unbalanced option)
	+4 dBu	line mode, trim @ 0 dB (balanced option)
Coupling	Input	AC
	Ouput	DC
Input Impedance	>10 kΩ (unbalanced option)	
	>24 kΩ (balanced option)	
Output Impedance	<500 Ω (unbalanced option)	
	<60 Ω (balanced option)	
Input Gain Adjustment Range	Trim Control	0 dB to +38.75 dB from nominal in1.25 dB steps
	Mic/Line Switch	+20 dB additional for microphone input (channels 1 through 4)
Input Common Mode Rejection	>85 dB @ 20 kHz	
Headroom	+20 dB above NOL (maximum level)	
Sample Rate	48 kHz	
Quantization and Accuracy	16 Bits input	A/D converter
	24 Bits output	D/A converter
	32 Bits Internal DSP Accuracy	
	80 Bits DSP Calculation Accuracy	

Table 8: Base Audio Mixer

S/(THD+N) @ Nominal Operating Level	At NOL At NOL +20 dB	>68 dB (A-weighted) >85 dB (A-weighted)
Input Crosstalk	At NOL +20 dB	<-90 dB@ 1 kHz
Frequency Response	20 Hz to 20 kHz (-0.1 to +0.2 dB)	

The typical specs for the Graham-Patten audio module:

Nominal Operating Level (NOL)	• -10dBu for 0dBVU; line mode, trim @ 0dB (unbalanced option) • +4dBu for 0dBVU; line mode, trim @ 0dB (balanced option)
Coupling	• Input: AC • Output: AC
Input Impedance	• >10kΩ (unbalanced option) • >24kΩ (balanced option)
Output Impedance	• <500Ω (unbalanced option) • <60Ω (balanced option)
Input Gain Adjustment Range	• Trim control: -6dB to +16.5dB from nominal in 1.5dB steps • Mic/line switch: +20dB additional for microphone input
Input Common Mode Rejection	>85dB @ 20kHz
Headroom	20dB @ NOL
Sample Rate	48kHz

Quantization and Accuracy	• 16-bit input/output • 24-bit internal DSP accuracy • 56-bit DSP calculation accuracy
S/(THD+N) @ Nominal Operating Level	• At NOL: >60dB (A-weighted) • At NOL +20dB: >73dB (A-weighted)
Input Crosstalk	At NOL +20dB: <-75dB @ 1kHz
Frequency Response	20Hz to 20kHz (-0.1 to +0.2dB)

Appendix 1: Trinity Technical Support

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If you should ever need technical support for your Trinity, you should contact your Trinity dealer. We understand that you cannot afford any downtime with your Trinity, so we have empowered the Trinity Dealer Network to directly provide you with rapid service for any problem that may occur.

Each Trinity dealer has been through extensive training on all aspects of Trinity, and has at his or her disposal a wealth of resources to quickly handle all your technical support requirements.

Reaching Play Technical Support

Should you find it necessary to contact Play directly, there are several methods at your disposal.

- Via the Internet

  For updates on Trinity documentation and software, point your browser to:

www.play.com/products/trinity/updates

  For answers to FAQ's (frequently asked questions) or to contact the Trinity technical wizards via e-mail, go to the following web page:

www.play.com/cgi-bin/rightnow

- By Phone:(916) 636-2444

  Trinity technical experts are on hand from 7:00AM to 6:00PM Pacific Time, Monday thru Friday, excluding major national holidays.

- By Mail or Fax

  Play Incorporated
  Attn: Trinity Support
  2890 Kilgore Road
  Rancho Cordova, CA 95670-6133
  Fax: (916) 853-9831

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