Ross Video Limited

Maintenance Guide

Software Issue: 18

ROSS

Live Production Technology™

Synergy Series • Maintenance Guide

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Important Regulatory and Safety Notices to Service Personnel

Before using this product and any associated equipment, refer to the "**Important Safety Instructions**" listed below to avoid personnel injury and to prevent product damage.

Product may require specific equipment, and/or installation procedures to be carried out to satisfy certain regulatory compliance requirements. Notices have been included in this publication to call attention to these specific requirements.

Symbol Meanings

⏚	**Protective Earth**	This symbol identifies a Protective Earth (PE) terminal, which is provided for connection of the supply system's protective earth (green or green/yellow) conductor.
⚠		This symbol on the equipment refers you to important operating and maintenance (servicing) instructions within the Product Manual Documentation. Failure to heed this information may present a major risk of damage or injury to persons or equipment.
⚠	**Warning**	The symbol with the word **"Warning"** within the equipment manual indicates a potentially hazardous situation, which if not avoided, could result in death or serious injury
⚠	**Caution**	The symbol with the word "**Caution**" within the equipment manual indicates a potentially hazardous situation, which if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.
⚠	**Notice**	The symbol with the word "**Notice**" within the equipment manual indicates a situation, which if not avoided, may result in major or minor equipment damage or a situation, which could place the equipment in a non-compliant operating state.
⚡	**Warning Hazardous Voltages**	This symbol is intended to alert the user to the presence of uninsulated "dangerous voltage" within the product enclosure that may be of sufficient magnitude to constitute a risk of shock to persons.
⚠	**ESD Susceptibility**	This symbol is used to alert the user that an electrical or electronic device or assembly is susceptible to damage from an ESD event.

Important Safety Instructions

⚠ **Warning**

1) Read these instructions.

2) Keep these instructions.

3) Heed all warnings.

4) Follow all instructions.

5) Do not use this apparatus near water.

6) Clean only with a dry cloth.

7) Do not block any ventilation openings. Install in accordance with manufacturer's instructions.

8) Do not install near heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.

9) Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding type plug has two blades and a third grounding prong. The third prong is provided for your safety. If the provided plug does not fit in to your outlet, consult an electrician for replacement of the obsolete outlet.

10) Protect the power cord from being walked on or pinched, particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.

11) Only use attachments/accessories specified by the manufacturer.

12) Unplug this apparatus during lightning storms or when unused for long periods of time.

13) Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as when the power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.

14) Do not expose this apparatus to dripping or splashing, and ensure that no objects filled with liquids, such as vases, are placed on the apparatus.

15) To completely disconnect this apparatus from the AC Mains, disconnect the power supply cord plug from the AC receptacle.

16) The mains plug of the power supply cord shall remain readily operable.

17) The SD (Video Production Switcher) chassis is to be rack mounted only.

Warning

18) **Indoor Use**: **WARNING**: To reduce the risk of fire or electric shock, do not expose this apparatus to rain or moisture.

19) The safe operation of this product requires that a protective earth connection be provided. A grounding conductor in the equipment's supply cord provides this protective earth. To reduce the risk of electrical shock to the operator and service personnel, this ground conductor must be connected to an earthed ground.

20) **WARNING**: This apparatus, when equipped with multiple power supplies, can generate high leakage currents. To reduce the risk of electric shock, ensure that each individual supply cord is connected to its own separate branch circuit with an earth connection.

21) **CAUTION**: These service instructions are for use by qualified service personnel only. To reduce the risk of electric shock, do not perform any servicing other than that contained in the operating instructions unless you are qualified to do so. (Installation Guide only.)

Caution

22) This apparatus contains a Lithium battery, which if replaced incorrectly, or with an incorrect type, may cause an explosion. Replace only with the same type. Dispose of used batteries according to the manufacturer's instruction..

23) Service barriers within this product are intended to protect the operator and service personnel from hazardous voltages. For continued safety, replace all barriers after servicing.

24) Certain parts of this equipment still present a safety hazard with the power switch in the OFF position. To avoid electrical shock, disconnect all A/C power cords from the chassis' rear appliance connectors before servicing.

25) This product contains safety critical parts, which, if incorrectly replaced, may present a risk of fire or electrical shock. Components contained within the product's power supplies and power supply area are not intended to be customer-serviced and should be returned to the factory for repair.

26) To reduce the risk of fire, replacement fuses must be the same type and rating.

27) Use only power cords specified for this product and certified for the country of use. Refer to the Product Power Cord Requirement section that follows.

28) The safe operation of this equipment requires that the User heed and adhere to all installation and servicing instruction contained within the equipment's manuals.

Product Power Cord Requirements

⚠ **Caution**

North American Line Voltages 100 - 120 Volt

This product is supplied with certified 10A/125V SVT type supply cords. Conductors are color coded white (neutral), black (line) and green or green/yellow (ground).

Operation of this equipment at line voltages exceeding 130V requires that alternative supply cords with appropriate voltage and current ratings be used.

International Line Voltages 200 - 240 Volts

This product has been designed for use with certified IEC 320- C13 10A/250V - **H03 VV-F3G 1.00mm^2** type line cord.

International product orders are supplied with a certified 10A/250V line cords, utilizing a molded 3-pin IEC 320-C13 type connector at one end and stripped conductors on the other. One line cord is provided. Conductors are CEE color coded; blue (neutral), brown (line), and green/yellow (ground).

Installation by a qualified electrician, of an appropriately approved A/C wall plug certified for the country of use, is required.

Alternatively, other IEC 320 C-13 type power cords may be used, provided that they meet the necessary safety certification requirements for the country in which they are to be used. Refer to the correctly specified line cord above.

EMC Notices

United States of America

FCC Part 15

This equipment has been tested and found to comply with the limits for a class A Digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

⚠ **Notice**

Changes or modifications to this equipment not expressly approved by Ross Video Limited could void the user's authority to operate this equipment.

CANADA

This Class "A" digital apparatus complies with Canadian ICES-003.

Cet appariel numerique de la classe "A" est conforme a la norme NMB-003 du Canada.

EUROPE

This equipment is in compliance with the essential requirements and other relevant provisions of **CE Directive 93/68/EEC**.

INTERNATIONAL

This equipment has been tested to **CISPR 22:1997** along with amendments **A1:2000** and **A2:2002**, and found to comply with the limits for a Class A Digital device.

Notice | This is a Class A product. In domestic environments, this product may cause radio interference, in which case the user may have to take adequate measures.

General Handling Guidelines

- Careful handling, using proper ESD precautions, must be observed.
- Power down the system before PCB removal.

A Word About Static Discharge

Throughout the many procedures in this guide, observe all static discharge precautions.

ESD Susceptibility | Avoid handling the switcher circuit boards in high static environments such as carpeted areas, and when synthetic fiber clothing is worn. Touch the frame to dissipate static charge before removing boards from the frame, and exercise proper grounding precautions when working on circuit boards.

Warranty and Repair Policy

Ross Video Limited (Ross) warrants its switchers and related options, to be free from defects under normal use and service for a period of THREE YEARS from the date of shipment. Fader handle assemblies are warranted for the life of the product. If an item becomes defective within the warranty period, Ross will repair or replace the defective item, as determined solely by Ross.

Warranty repairs will be conducted at Ross, with all shipping FOB Ross dock. If repairs are conducted at the customer site, reasonable out-of-pocket charges will apply. At the discretion of Ross, and on a temporary loan basis, plug in circuit boards or other replacement parts may be supplied free of charge while defective items undergo repair. Return packing, shipping, and special handling costs are the responsibility of the customer.

Software upgrades for switchers may occur from time to time, and are determined by Ross Video. The upgrades are posted on the Ross Video website, and are free of charge for the life of the switcher.

This warranty is void if products are subjected to misuse, neglect, accident, improper installation or application, or unauthorized modification.

In no event shall Ross Video Limited be liable for direct, indirect, special, incidental, or consequential damages (including loss of profit). Implied warranties, including that of merchantability and fitness for a particular purpose, are expressly limited to the duration of this warranty.

This warranty is TRANSFERABLE to subsequent owners, subject to Ross' notification of change of ownership.

Environmental Information

The equipment that you purchased required the extraction and use of natural resources for its production. It may contain hazardous substances that could impact health and the environment.

To avoid the potential release of those substances into the environment and to diminish the need for the extraction of natural resources, Ross Video encourages you to use the appropriate take-back systems. These systems will reuse or recycle most of the materials from your end-of-life equipment in an environmentally friendly and health conscious manner.

The crossed-out wheeled bin symbol invites you to use these systems.

If you need more information on the collection, reuse, and recycling systems, please contact your local or regional waste administration.

You can also contact Ross Video for more information on the environmental performances of our products.

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Introduction

A Word of Thanks

Congratulations on choosing the Ross Synergy SD Series digital video production switchers. You have purchased the power and versatility of a digital Multi-Level Effects (MLE) switcher that is ready to take on all creative challenges in today's competitive broadcast environment. You will be pleased at how easily your Synergy switcher fits into your overall working environment.

About This Guide

As a useful tool for the field engineer, this guide takes you through the switcher's block diagram, the main boards and components, and the procedures required to install various options in the Synergy frame and control panel. This guide provides information regarding the theory and maintenance of the following Synergy switchers:

- **Synergy 2** (2 MLE)
- **Synergy 3** (3 MLE)
- **Synergy 4** (4 MLE)

The following chapters are included:

- The **Front Matter** of this guide includes information on the warranty and repair policy, and all regulatory and safety notices and compliance issues.

- **Chapter 1** — "**Introduction**" summarizes the guide and lists important terms, conventions and abbreviations.

- **Chapter 2** — "**System Architecture**" provides a block diagram of the switcher workflow, and explains how video flows through the unit.

- **Chapter 3** — "**Software Upgrades**" provides instructions for upgrading the Synergy switcher software from a storage device.

- **Chapter 4** — "**Input Boards**" provides information about the Input/Crosspoint Board, the Re-Entry Board, and the Input Carrier Board.

- **Chapter 5** — "**MLE Carrier Board**" provides basic information about the MLE Carrier Board.

- **Chapter 6** — "**MLE Board and Options**" provides details on the MLE Board and its optional boards, the Dual Border Generator, and the Squeeze & Tease Boards.

- **Chapter 7** — "**Frame CPU and Aux Bus Carrier**" provides details on the Frame CPU and Aux Bus Carrier Boards. The Timed Aux Bus and Preview Overlay options are also discussed.

- **Chapter 8** — "**Working with Installed Options**" discusses the system menus that allow you to install serial numbers and software options, and to verify the installed options of your Synergy switcher.

- **Chapter 9** — "**DVE Send Option**" provides instructions to install and test the DVE Send Option.

- **Chapter 10** — "**Power Supplies**" provides information about redundant power, and the procedures for changing power supplies of the Synergy switcher in the field.

- **Chapter 11** — "**Calibration and Diagnostics**" provides instructions about calibrating the Synergy switcher, and running a variety of diagnostic tests.

- **Chapter 12** — "**Control Panel Boards**" provides details about the Panel CPU Board layout for your Synergy switcher.

- **Chapter 13** — "**Control Panel Maintenance**" provides instructions for Synergy control panel maintenance, such as changing lamps and buttons.

- **Chapter 14** — "**Control Panel Options**" provides instructions for installing a variety of device interface options.

- **Chapter 15** — "**Control Panel Hardware Options**" provides instructions for installing a variety of hardware options, including Extended Tallies, Mnemonics, and the USB Removable Media Drive option.

- **Chapter 16** — "**Miscellaneous Options**" provides instructions for installing several miscellaneous Synergy options such as the Extender Board.

- An **Index** is also provided for your reference.

If, at any time, you have a question pertaining to your Synergy switcher, contact us at the numbers listed in the front of this guide. Our technical staff are always available for consultation, training, or service.

Documentation Conventions

The following conventions are used throughout this guide:

- Rear panel connectors are indicated in bold-faced upper case letters. For example:

  The **AUX 1** connector is ...

- Control Panel buttons are indicated in bold-faced upper case letters, using a sans-serif font. For example:

  Press **WIPE** to ...

- Menu names on the integral display panel are indicated in bold-faced upper and lower case text. For example:

  The **Aux Bus Setup Menu** allows you to ...

- Soft key labels on the integral display are indicated in bold-faced upper and lower case letters, using a sans-serif font. They are *not* indicated by the function key below the display that you press. For example:

  Press **Accept New Name** to register ...

Documentation Terms

The following terms are used throughout this guide:

- A "**1+0 DVE**" has a video connection *only* going from Synergy to the DVE. Both key and fill signals are connected from the DVE to Synergy.

- A "**1+1 DVE**" has both a video (fill) and a key (alpha) connection going from Synergy to the DVE. Both key and fill signals are connected from the DVE to Synergy.

- "**Crosspoint**" is synonymous with "**Button**". Both refer to the switcher crosspoint or buttons on the Synergy control panel.

- "**Frame**" and "**Electronics Frame**" both refer to the Synergy switcher's electronics chassis.

- "**Input #**" refers to the "**BNC Input #**" on the rear of the Synergy frame.

- "**Operator**" and "**User**" refer to the person who uses the Synergy production switcher.

- "**Panel**" and "**Control Panel**" both refer to the Synergy switcher's large multi-button control panel.

- "**Primary DVE**" refers to the *one* DVE (either single or multi-channel) that is connected to a Synergy switcher via RS-422 serial control. This type of connection allows you to run the DVE using *custom control* buttons. You can also load DVE effects from the panel using the **Recall DVE** button in the **Global Memory System** group.

- "**SDI**" refers to Serial Digital Interface, a digital video signal that is distributed via a single coaxial cable with BNC connectors.

- "**Secondary DVE**" refers to any number of DVEs that are connected to the switcher using video and key connections only — with *no* RS-422 control. A secondary DVE *must* be controlled from its own local control panel, or via GPI output pulses from the Synergy switcher.

- "**Storage device**" refers to a standard 1.44 MB high-density floppy disk or a USB key. Either type of storage device can be used to save and recall configurations, setups and certain files to the Synergy switcher.

- "**System**" refers to the entire Synergy system, consisting of its electronics frame and control panel.

- "**Video system**" refers to the mix of interconnected digital equipment (including the edit controller, VTRs, and DVEs) in which the Synergy system is included.

Abbreviations

The following abbreviations are used throughout this guide:

Abbreviations

Abbreviation	Definition
A-D	Analog-to-Digital
BKGD	Background Bus
AUX	Auxiliary
CG	Character Generator
D-A	Digital-to-Analog
DA	Distribution Amplifier
DDR	Digital Disk Recorder
DSK	Downstream Keyer
DVE	Digital Video Effects
DVR	Digital Video Recorder
ID	Identification
MLE	Multi-level Effects
PGM	Program Bus
PST	Preset Bus
PST PATT	Preset Pattern
PV	Preview
RU	Rack Unit
SMPTE	Society of Motion Picture and Television Engineers/Engineering
TD	Technical Director
VCR	Video Cassette Recorder
VDCP	Video Disk Communications Protocol
VTR	Video Tape Recorder

Related Publications

For a complete installation and operational overview of the Synergy Series product line, refer to the following publications:

- *Synergy Series Installation Guide Volume I* — Ross Part Number: **4000D-002**
- *Synergy Series Installation Guide Volume II* — Ross Part Number: **4000D-002A**
- *Synergy Series Operation Guide Volume I* — Ross Part Number: **4000D-003**
- *Synergy Series Operation Guide Volume II* — Ross Part Number: **4000D-003A**

A Word About Static Discharge

Throughout the many procedures in this *Maintenance Guide*, observe all static discharge precautions.

Caution

Avoid handling the switcher circuit boards in high static environments such as carpeted areas, and when synthetic fiber clothing is worn. Touch the frame to dissipate static charge before removing boards from the frame, and exercise proper grounding precautions when working on circuit boards.

A Word about Technical Support

At **Ross Video**, we take pride in the quality of our products, but if problems occur, help is as close as the nearest telephone.

Our 24 Hour Hot Line service ensures you have access to technical expertise around the clock. After-sales service and technical support is provided directly by Ross personnel. During business hours (eastern standard time), technical support personnel are available by telephone any time. After hours and on weekends, a direct emergency technical support phone line is available. If the technical support personnel who is on call does not answer this line immediately, a voice message can be left and the call will be returned shortly. These people are available to react to any problem and to do whatever is necessary to ensure customer satisfaction.

For **Technical Support**, call (+1) 613-652-4886 and, for **After Hours Emergency**, dial (+1) 613-349-0006.

System Architecture

In This Chapter

This chapter describes the boards in the Synergy frame, the overall system block diagram, and provides an explanation of how video flows through the unit.

The following topics are discussed:

- Block Diagram
- Synergy Series Frame – Front View
- Synergy Series Frame – Rear View
- Primary System Boards
- Inputs
- Re-Entry
- Buses and Video Routing
- CPU Structure
- CPU Structure
- Power-Up Sequence
- Board Labeling

Block Diagram

Use the following block diagram for reference throughout this chapter.
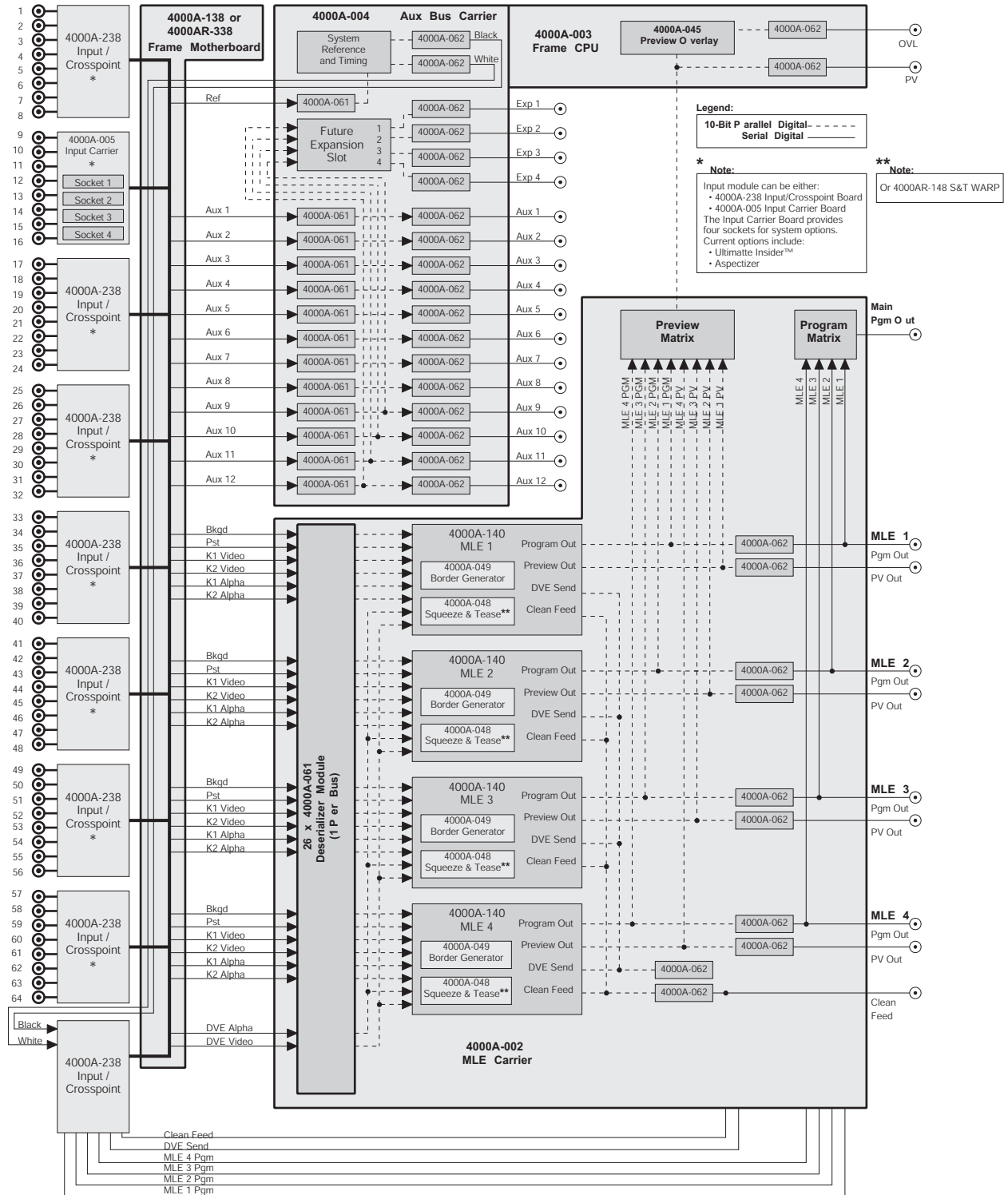
Block Diagram

Note the following important points regarding the previous diagram:

- The 64 external inputs are routed into eight (8) input modules. These modules can either be the standard half-length **Input/Crosspoint Board** (4000A-238), or the optional **Input Carrier Board** (4000A-005).

- The ninth board can be a **Re-Entry Board** (4000A-145) or an **Input/Crosspoint Board** (4000A-238), which take eight internal signals back into the crosspoint matrix: Black, White, Clean Feed, DVE Send, and the program out from MLE 1, 2, 3, and 4.

- Each input board provides its own crosspoints plus 40 outputs:
  - ~ 4 x Background (MLE 1-4)
  - ~ 4 x Preset (MLE 1-4)
  - ~ 4 x Key 1 Video (MLE 1-4)
  - ~ 4 x Key 2 Video (MLE 1-4)
  - ~ 4 x Key 1 Alpha (MLE 1-4)
  - ~ 4 x Key 2 Alpha (MLE 1-4)
  - ~ 12 x Aux (Aux Buses 1-12)
  - ~ 1 x DVE Alpha
  - ~ 1 x DVE Video
  - ~ 1 x Reference
  - ~ 1 x Spare

- Each output is routed through a **Deserializer Module** (4000A-061) from which the signals feed the MLEs.

- Aux Buses 1 through 12 are routed through **Deserializer Modules**, through blanking circuitry (not shown), re-serialized in **Serializer Modules** (4000A-062), and out through BNC connectors.

- Each MLE is self-contained, with provisions for optional modules per MLE: **Dual Border Generator** (4000A-049), **Squeeze & Tease 2D** (4000A-048), and **Squeeze & Tease 3D/WARP** (4000A-148). Each MLE outputs four signals:
  - ~ Program
  - ~ Preview
  - ~ DVE Send
  - ~ Clean Feed

- All MLE Clean Feed outputs are tied together. The signal is routed through a **Serializer Module**, and distributed to the output BNC connector and back to the **Re-Entry Module**.

- All MLE DVE Send outputs are tied together. The signal is routed through a **Serializer Module** then back to the **Re-Entry Module** and **Input Crosspoint Module**.

- All MLE Preview outputs are routed individually to the Preview Matrix, and also through **Serializer Modules** to their respective output BNCs.

- All MLE Program outputs are also routed individually to the Preview Matrix, and through **Serializer Modules** to both their respective output BNCs and back to the **Re-Entry Module**.

- From the Preview Matrix, the parallel signal is routed to the **Aux Bus Carrier**, where it splits. One path is routed to a **Serializer Module** that feeds the main Preview output. The other path feeds the optional **Preview Overlay Module** (4000A-045), and then through a **Serializer Module** to the overlay output.

- Aux Buses 9 through 12 are also routed through the **Serializer Modules**, and on to individual expansion outputs (labeled **EXP** on the back of the Synergy frame). These outputs are currently not implemented.

Note | The following two sections provide diagrams of the front and rear frame of the Synergy switcher. For more detailed descriptions of the components listed in the diagrams, refer to the section "**Equipment Overview**" of the *Synergy Series Installation Guide*.

This concludes the discussion on the Block Diagram for the Synergy switcher.

Synergy Series Frame – Front View

The figure below illustrates the front of the Synergy Series frame, with the door removed.

MLE Carrier (part # 4000A-002) only in this slot

Frame Processor Module (part # 4000A-003) only in this slot
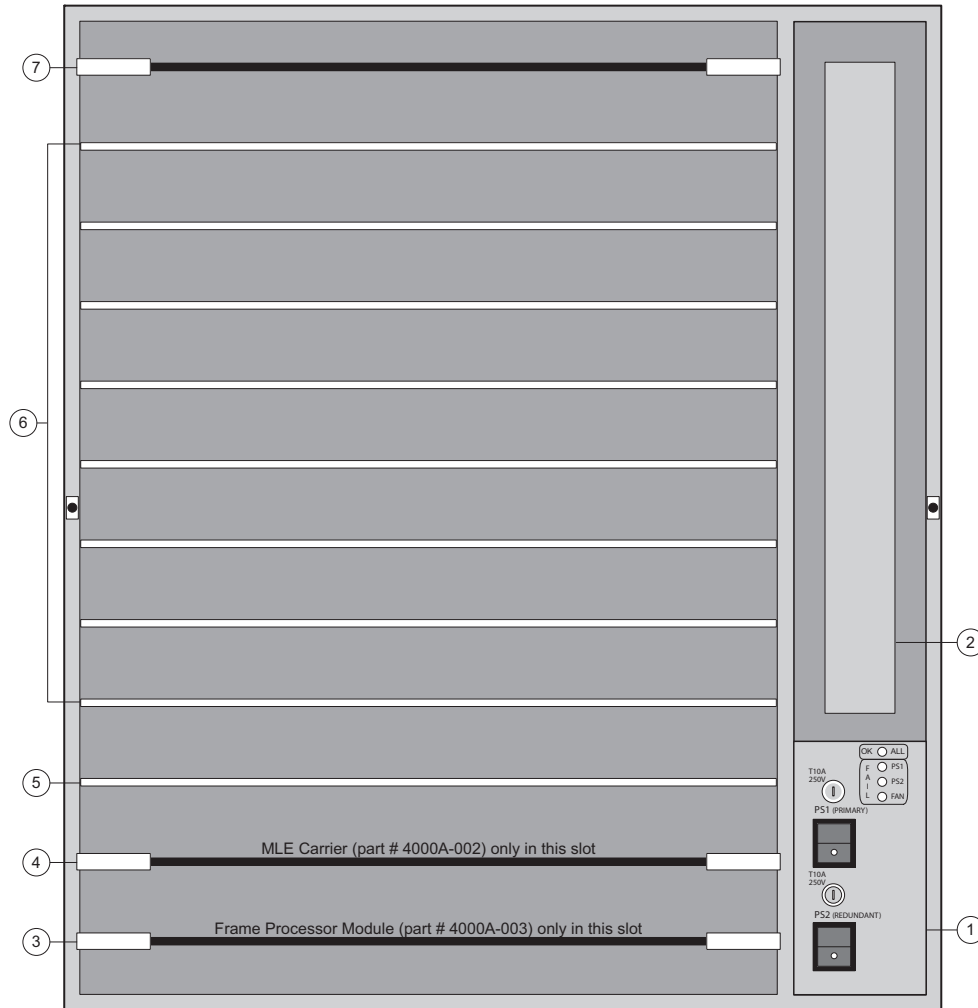
Synergy Series Frame — Front View

1) Power Controls and Indicators	4) MLE Carrier Board	7) Extender Board
2) Power Supply Tray Handle	5) Re-entry Board	
3) Frame CPU Board / Aux Bus Board	6) Input Crosspoint Board Slots	

Board layout is identical for all Synergy switchers. Each component is discussed in the following section.

1. **Power Controls and Indicators**

   A panel is provided for power supply controls and LED indicators. Note that a cutout in the front door allows these controls to be accessed with the door closed.

   - The **PRIMARY POWER** switch turns on the primary power supply.

   - The **REDUNDANT POWER** switch turns on the redundant power supply, if installed. Note that this switch is always installed, whether or not you have the **Redundant Power Supply** option mounted inside the chassis. Electronically, the redundant power supply is identical to the primary.

   - If a failure occurs and the redundant power supply takes over, the switch is *seamless* and *automatic*, with no glitches visible in the video.

   - Four LEDs indicate the condition of the primary and redundant power supplies.

     ~ **ALL OK** — This green LED should be lit during normal operation. It indicates that there are no error conditions in the fans or power supplies. This LED is off if any of the other three LEDs are lit.

     ~ **PRIMARY FAIL** — This LED indicates that the primary power supply has failed or is not connected properly.

     ~ **SECONDARY FAIL** — This LED indicates that the redundant power supply has failed or is not connected properly.

     ~ **FAN FAIL** — This LED indicates that one of the three fans is drawing too much current, or has stopped turning.

   - Note that two important **POWER FAIL** indicator LEDs on the Synergy control panel mirror the condition of the four chassis LEDs and the power supply for the control panel.

   POWER FAIL
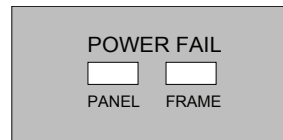
   PANEL   FRAME

   Synergy Control Panel — Power Fail LEDs

     ~ **PANEL** — This LED indicates that there is a fault with the primary or secondary power supply of the Synergy control panel.

     ~ **FRAME** — This LED indicates that there is a fault with the primary supply, secondary supply, or fans of the Synergy frame.

2. **Power Supply Tray Handle**

   Warning | Do *not* insert your fingers into the power supply slot when the unit is plugged in! |

   A large handle is provided to assist in removing and inserting the power supply tray. The tray houses the primary and redundant power supplies, power supply fans, frame fans, and air filter.

   - For Synergy frame cooling, air flows in from the right side of the frame, across the circuit boards, and out the left side of the frame.

   - For power supply cooling, a separate compartment is provided on the tray, so that power supply air does not flow across the circuit boards. A separate air intake is

provided on the bottom of the tray, and air flows from the bottom to the top of the compartment.

- Note that an air filter is mounted on the back of the tray, behind the fans. This filter should be cleaned periodically.

Warning When the power supply tray is inserted into the Synergy frame, it mates with male power pins that carry *live voltage* if the frame is plugged in. All power *must* be disconnected before servicing

3. Frame CPU Board / Aux Bus Board

At the bottom of the Synergy frame, the **Frame CPU Board** and **Aux Bus Board** connect together, and are housed in the bottom slot.

- If the **Timed Aux Bus** option is installed in the field, the **Serializer Module** and **De-serializer Module** install on the **Aux Bus Board**.

Warning The **Frame CPU Board,** labeled **Frame Processor Module 4000A-003** on the card front edge, *must be installed only in slot 4* of the Synergy frame, as illustrated in the figure, "**Synergy Series Frame — Front View**" on page 2–5. Otherwise damage to the card and Synergy frame will occur.

4. MLE Carrier Board

This board houses up to four identical "daughter" boards — one for each MLE installed in your Synergy switcher.

Warning The **MLE Carrier Board,** labeled **MLE Carrier 4000A-002** on the card front edge, *must be installed only in slot 5* of the frame, as illustrated in the figure, "**Synergy Series Frame — Front View**" on page 2–5. Otherwise damage to the card and Synergy frame will occur.

- Each **MLE Board** has positions for two additional option cards:
  - ~ A **Squeeze & Tease 2D** or **3D/WARP** card can be installed on the *right* side of the **MLE Board**.
  - ~ A **Dual Border Generator** card can be installed on the *left* side of the **MLE Board**.

5. Re-entry Board

The **Re-entry Board** is a half-depth board that controls the re-entry pathways of the Synergy switcher.

Note In the event of the failure of a **Re-entry Board**, an **Input Crosspoint Board** can be used in place of the failed **Re-entry Board** in an emergency.

6. **Input Crosspoint Board Slots**

   Eight slots are provided for 8-input digital video crosspoint boards — for a maximum of 64 digital inputs. Each crosspoint board is *identical*, and any crosspoint board can be installed in *any slot*. Configuration of each input is performed through the menu system.

   ✎ **Note** | In certain configurations, an optional **Input Carrier Board** can be installed in place of an **Input Crosspoint Board**. Each **Input Carrier Board** is a full-length board that provides a standard matrix for eight digital inputs, but also provides slots for up to four hardware options, such as the **Dual Aspectizer** or the **Ultimatte Insider**.

7. **Extender Board (Optional)**

   At the top of the Synergy frame is a slot that houses the optional **Extender Board**. When not in use, always keep the **Extender Board** in this slot.

Synergy Series Frame – Rear View

The figure below illustrates the rear connector panel of the Synergy Series frame.
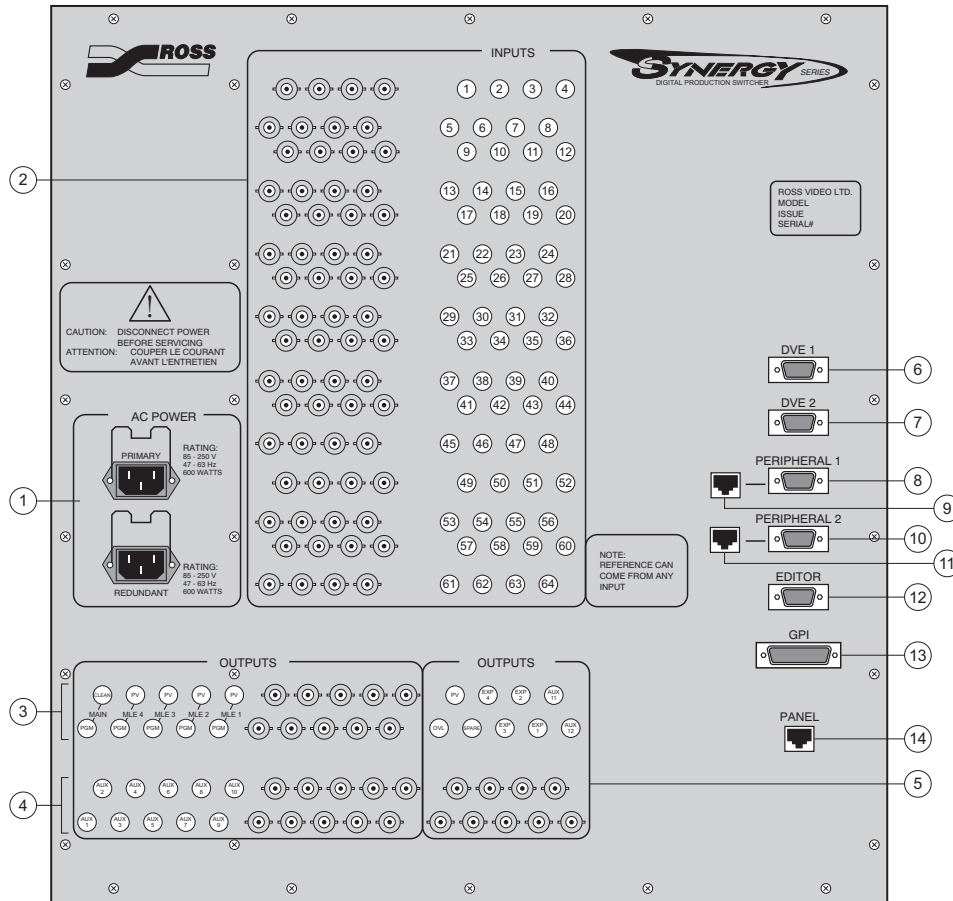
Synergy Series Frame — Rear View

1) Power Connectors	6) DVE 1 Connector	11) Peripheral 2 Connector B
2) Input Section	7) DVE 2 Connector	12) Editor Connector
3) Main Output Section	8) Peripheral 1 Connector A	13) GPI Input/Output Connector
4) Aux Output Special Output Section	9) Peripheral 1 Connector B	14) Control Panel Connector
5) Special Output Section	10) Peripheral 2 Connector A	

Connector layout is identical for all Synergy switchers. Each component is discussed in the following section.

1. Power Connectors

Two AC connectors are provided for Synergy frame power.

- Connect primary power to the connector labeled **PRIMARY**.

- If installed, connect backup power to the connector labeled **REDUNDANT**. Note that this connector is always installed, whether or not you have the **Redundant Power Supply** option mounted inside the Synergy frame.

2. **Input Section**

Sixty-four BNC connectors are provided for up to 64 digital video inputs. Each input is identified in the label array to the right of the connectors. The following sets of inputs are standard, but each Synergy switcher can be expanded to the maximum 64 inputs (in groups of 8 inputs each).

*   The **Synergy 2** has 16 serial digital inputs.

*   The **Synergy 3** has 24 serial digital inputs.

*   The **Synergy 4** has 32 serial digital inputs.

Even though an input is *physically* connected to a numbered input connector, you can electronically place that input anywhere on the MLE bus row of the Synergy control panel. All input configuration is performed through the Synergy menu system.

3. **Main Output Section**

Ten BNCs are provided for the main outputs of the Synergy switcher, including the **CLEAN** feed output.

*   One program (**PGM**) and one preview (**PV**) output are provided for each MLE. The left-most program output provides a *second output* for the highest-numbered MLE in your switcher:

    ~   **Synergy 2** — provides a second MLE 2 output.

    ~   **Synergy 3** — provides a second MLE 3 output.

    ~   **Synergy 4** — provides a second MLE 4 output.

*   Each output is identified in the label array to the *left* of the connectors.

The following table summarizes the active program and preview outputs on each Synergy switcher.

Active Program and Preview Outputs

Switcher	Output					
	MLE 1 PGM / PV	MLE 2 PGM / PV	MLE 3 PGM / PV	MLE 4 PGM / PV	Main PGM	CLEAN
Synergy 2	Active	Active			Active, MLE 2	Active
Synergy 3	Active	Active	Active		Active, MLE 3	Active
Synergy 4	Active	Active	Active	Active	Active, MLE 4	Active

If DAs are required to provide additional outputs for a particular signal, contact Ross Video or your Ross Video dealer for details.

4. **Aux Output Section**

Ten BNC connectors are provided for the first ten standard auxiliary bus outputs of the Synergy switcher. Outputs 11 and 12 are located in the **Special Output Section**. Each auxiliary output is identified in the label array to the left of the connectors. Aux outputs can be *timed* or *untimed*, depending upon the number of **Timed Aux Bus** options installed.

✎ **Note** Any of the 12 Aux Bus outputs can be used for the primary DVE (the DVE that can be controlled via serial control from the Synergy control panel). Refer to the section "**Output Connection**" in the *Synergy Series Installation Guide* for additional information.

5. **Special Output Section**

   Nine BNC connectors are provided for the special outputs of the Synergy switcher, including the two remaining Aux outputs. Each output is identified in the label array above the connectors.

   - **PV** — This section provides the main output of the preview matrix. Using this output, in conjunction with the **Preview Bus Group** on the Synergy control panel, you can switch any one of the individual MLE **PGM** and **PV** outputs. The number of available outputs depends on the Synergy switcher model.

     ~ The **Synergy 2** has 4 outputs.

     ~ The **Synergy 3** has 6 outputs.

     ~ The **Synergy 4** has 8 outputs.

   - **OVL** — This section provides the identical output as the **PV** connector, but includes the selected overlay content. You must have the **Preview Overlay** option installed. The overlay is switched from the **Preview Overlay Group** on the Synergy control panel. When the **PV** output switches, the **OVL** output tracks in sync.

   Note
   > The **OVL** output is the recommended one to feed the main preview monitor. The **Preview Overlay** option must be installed, otherwise there is *no signal* on the **OVL** output connector.

   - **SPARE** — The output is currently not implemented.

   - **EXP 1**, **2**, **3**, **4** — The outputs are currently not implemented.

   - **AUX 11** — This section provides the output for Aux Bus 11.

   - **AUX 12** — This section provides the output for Aux Bus 12.

6. **DVE 1 Connector**

   One 9-pin, D-Type, connector labeled **DVE 1** is provided for connection to the primary external DVE. The connection is designed for control purposes.

   - The **DVE 1** port can also be used to connect to the *first channel* of a DVE that requires one serial port per channel.

   - The **DVE 1** port can be configured for additional serial control purposes through the Synergy menu system.

7. **DVE 2 Connector**

   One 9-pin, D-Type, connector labeled **DVE 2** is provided for serial control purposes.

   - The **DVE 2** port is primarily designed to connect to the *second channel* of a DVE that requires one serial port per channel.

   - The **DVE 2** port can be configured for additional serial control purposes through the Synergy menu system.

   - The **DVE 2** port can be configured as RS-422 or RS-232 through the Synergy menu system.

8. **Peripheral 1 Connector A**

   One 9-pin, D-Type, connector labeled **PERIPHERAL 1** is provided for connection to a primary peripheral device. The connection is for control purposes. The

PERIPHERAL 1 port can be configured for additional serial control purposes through the Synergy menu system.

9. **Peripheral 1 Connector B**

   One 8-pin shielded Telco connector is provided for future peripheral control requirements, such as control panel networking.

	Note	The port shares the same internal circuitry as **Peripheral 1 Connector A**. Only *one* of the two ports can be used at a time.

10. **Peripheral 2 Connector A**

    One 9-pin, D-Type, connector labeled **PERIPHERAL 2** is provided for connection to a secondary peripheral device. The connection is for control purposes. The **PERIPHERAL 2** port can be configured for additional serial control purposes through the Synergy menu system.

11. **Peripheral 2 Connector B**

    One 8-pin shielded Telco connector is provided for future peripheral control requirements, such as control panel networking.

	Note	The port shares the same internal circuitry as **Peripheral 2 Connector A**. Only *one* of the two ports can be used at a time.

12. **Editor Connector**

    One 9-pin, D-Type, connector labeled **EDITOR** is provided for connection to an external edit controller. The connection allows the Synergy switcher to be controlled by the editor. This port can be configured as RS-422 or RS-232 through the Synergy menu system.

13. **GPI Input/Output Connector**

    One 25-pin, D-Type connector labeled **GPI I/O** is provided for GPI input and output ports. As standard, the connector provides one common ground, 12 GPI outputs, and 12 GPI inputs.

14. **Control Panel Connector**

    One 8-pin shielded Telco connector labeled **PANEL** is provided for communications between the Synergy frame and the Synergy control panel.

	Important	The cable connecting the Synergy control panel to the Synergy frame is not wired as a standard CAT5 ethernet cable. If you need a cable of a specific length, contact your Ross Video Representative for ordering information.

Primary System Boards

The following primary system boards are referred to throughout this chapter:

- **Input/Crosspoint Board (4000A-238)**

    Each half length board supports eight digital video inputs, which are configured and assigned through the menu system. Each crosspoint board is identical, and any crosspoint board can be installed in any available crosspoint slot or the Re-Entry Board slot.

- **Input Carrier Board (4000A-005)**

    Each full length card provides the identical input routing capability of the **Input Crosspoint Board**, with the additional ability to support four optional hardware boards. The routing matrix on the **Input Carrier Board** is expanded to allow the eight outputs from the option cards (two per card) to be routed in addition to the eight original inputs. Currently available options are:

    ~   Ultimatte Insider™

    ~   Dual Aspectizer™

- **Re-Entry Board (4000A-145)**

    The **Re-Entry Board** controls the re-entry pathways of the Synergy switcher. In the event of the failure of a **Re-Entry Board**, an **Input Crosspoint Board** can be used in its place as an emergency measure, if a spare **Re-Entry Board** is unavailable.

- **Frame Motherboard (4000A-138, 4000A-338)**

    Also called the backplane, this non-removable board provides the interconnects between the primary system boards, power supply and external connections. This includes routing of the 40 video buses plus other control signals. The board has no active components.

- **Frame CPU (4000A-003)**

    The **Frame CPU** resides in the bottom slot of the Synergy frame and is permanently connected to the **Aux Bus Carrier**. This board contains the main system microprocessor which handles high-level control functions and all of the remote serial communication for the Synergy frame. It also provides connectors for mounting of the optional **Preview Overlay Board** (4000A-045).

- **Aux Bus Carrier (4000A-004)**

    The **Aux Bus Carrier** is permanently connected to the **Frame CPU** and provides the circuitry for the Aux Bus outputs of the Synergy switcher. If the Timed **Aux Bus option** is installed, the **Serializer Modules** and **De-serializer Modules** must install on the **Aux Bus Carrier**.

- **MLE Carrier Board (4000A-002)**

    This board houses up to four identical MLE "daughter" boards (4000A-140), one for each MLE installed in the Synergy switcher. Each MLE daughter board, in turn, has connectors for the optional **Squeeze & Tease Boards**, the optional **Squeeze & Tease WARP Board**, and the optional **Dual Border Generator Board** (4000A-049).

Inputs

Each Synergy switcher supports a maximum of 64 primary inputs that are organized in groups of eight inputs per **Input/Crosspoint Board** (4000A-238). You can install up to a maximum of eight **Input/Crosspoint Boards**. An **Input/Crosspoint Board** can be installed in any available crosspoint slot or the Re-Entry Board slot.

The following is a simplified block diagram plus an illustration of the **Input Board**.
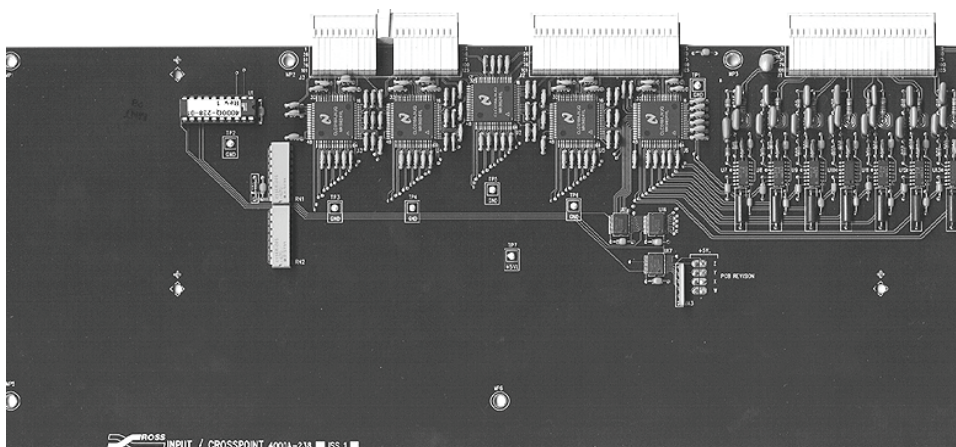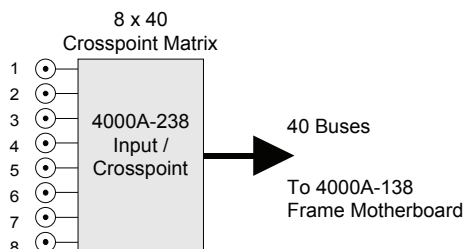
Input/Crosspoint Board

Each board is a crosspoint matrix that supports eight external inputs and 40 bus outputs (8 x 40). Any input can be routed to any output, or the input can be turned off, without feeding any bus - thus allowing another input from another card to feed the bus. The inputs, in effect, are "tri-state" — they can be driven high, driven low, or disconnected entirely.

For example, suppose you have two input cards in the system:

- **Input 1** (on crosspoint card 1) is feeding **MLE 1 Program**.
- **Input 12** (on crosspoint card 2) is feeding **MLE 2 Preset**.

In this situation, because only one input can ever feed any given bus at a time, Input 1 is completely turned off for MLE 2 Preset, and is only routed to MLE 1 program.

✎	**Note**	Any **Input/Crosspoint Board** can be replaced by an **Input Carrier Board** (4000A-005). The Input Carrier Board provides the same input matrix functionality as the Input/Crosspoint Board, but it also provides slots for up to four optional boards, such as the Ultimatte Insider and Dual Aspectizer.

Re-Entry

A simplified block diagram plus an illustration of the **Re-Entry Board** is included in this section.
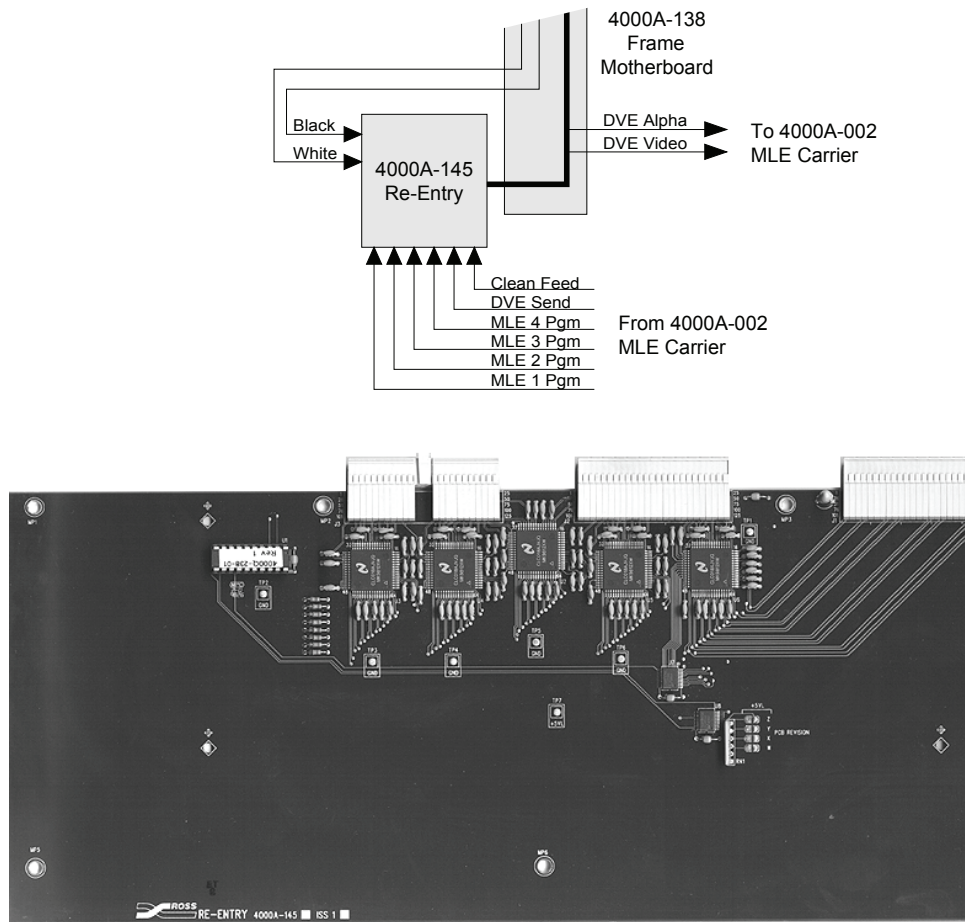
Re-Entry Board

The **Re-Entry Board** behaves just like an **Input/Crosspoint Board**, except that it gets its inputs from the MLEs themselves (along the backplane) rather than from BNC input connectors on the chassis. The inputs, in turn, can then feed any of the 40 switcher buses. Because of this functionality, the board looks almost identical to an **Input/Crosspoint Board**.

✓ **Operating Tip**

> In an emergency, an **Input/Crosspoint Board** may be used in place of the **Re-Entry Board**. However, since the Re-Entry board lacks the electronics to properly interface to an external video signal, it may not be used in place of an **Input/Crosspoint Board**.

Buses and Video Routing

The full crosspoint matrix of the Synergy switcher is 72 x 40 as follows:

- 64 external inputs as 8 x 8 **Input/Crosspoint Boards**

- 8 internal inputs as 8 x 1 **Re-Entry Board** or **Input/Crosspoint Board**

Each **Input Board** accepts eight inputs and routes 40 outputs to the **Frame Motherboard** (4000A-138 or 4000A-338), which in turn distributes them throughout the system (across the backplane). The backplane, in effect, functions as a large 72 x 40 XY routing switcher. Any input can be routed to one or all of the 40 bus outputs.

The 40 buses (crosspoint outputs) from each **Input Board** are as follows:

- 4 x Background (MLEs 1 to 4)

- 4 x Preset (MLEs 1 to 4)

- 4 x Key 1 Video (MLEs 1 to 4)

- 4 x Key 2 Video (MLEs 1 to 4)

- 4 x Key 1 Alpha (MLEs 1 to 4)

- 4 x Key 2 Alpha (MLEs 1 to 4)

- 12 x Aux (Aux Buses 1 to 12)

- 1 x DVE Alpha

- 1 x DVE Video

- 1 x Reference

- 1 x Spare

Each of the first 24 outputs plus the two DVE outputs are distributed only to the **MLE Carrier Boards**. The 12 Aux buses plus reference are distributed only to the **Aux Bus Carrier Board**. The spare output is currently not used.

MLE Outputs

Looking closer at each MLE, each one receives six dedicated buses in addition to the two shared buses (DVE return Video and Alpha) as follows:
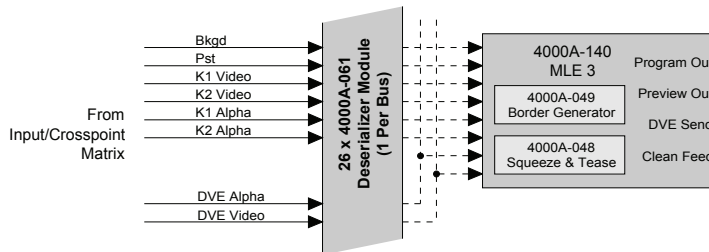
MLE Outputs — Dedicated and Shared Buses

Each MLE includes the following:

- 1 x Background
- 1 x Preset
- 1 x Key 1 Video
- 1 x Key 2 Video
- 1 x Key 1 Alpha
- 1 x Key 2 Alpha
- 1 x DVE Video
- 1 x DVE Alpha

Only *one* MLE can use the DVE return buses at once, even though they are distributed to each MLE.
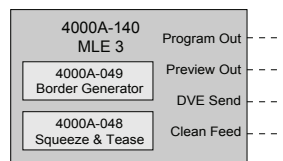
MLE Outputs

Each MLE includes the following outputs:

- **Program** — This output is routed to a rear-frame BNC output connector, to the Preview Matrix, and also back into the crosspoint matrix through the Re-Entry Board. In some instances, an **Input/Crosspoint Board** can be in place of the **Re-Entry Board**.

- **Preview** — This output is routed to a rear-frame BNC output connector and to the Preview Matrix.

- **DVE Send** — This output is routed back into the crosspoint matrix through the **Re-Entry Board**. In some instances, an **Input/Crosspoint Board** can be in place of the **Re-Entry Board**.

- **Clean Feed** — This output is routed to a rear-frame BNC output connector and also back into the crosspoint matrix through the **Re-Entry Board**. In some instances, an **Input/Crosspoint Board** can be in place of the **Re-Entry Board**.

Remember that the **DVE Send** and **Clean Feed** outputs are shared between the four MLEs. Only one MLE can route a signal to that output at a time. For example, MLE 1 can drive DVE Send, while MLE 4 drives Clean Feed; it does not have to be the same MLE.

Serializer Modules

Program, **Preview**, **DVE Send** and **Clean Feed** video each come out of the MLE as parallel 10-bit data. These signals are then routed through small **Serializer Modules** (4000A-062) as shown below.
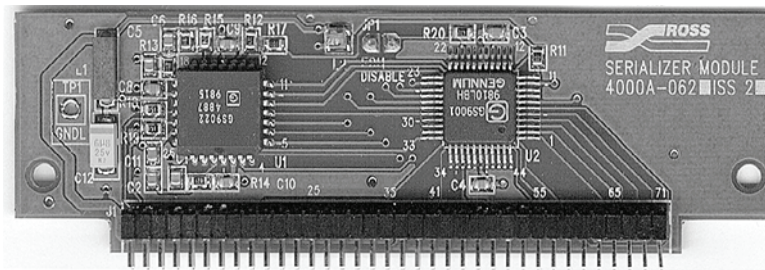
Serializer Module

Serializer Modules convert the parallel digital video data into the serial format, which can then be routed via coax cables through your facility, or used internally in the Synergy switcher crosspoint matrix. The crosspoint matrix requires that everything must be in the serial format. Thus any signal that is routed to the crosspoint matrix must go through a **Serializer Module**, from any given output.

The **Preview Matrix**, on the other hand, functions in the 10-bit parallel format, thus the feeds to the Preview Matrix are taken prior to the Serializer Module's input — retaining the signal in parallel format.

The output of the **Preview Matrix** is routed to the **Aux Bus Carrier Board**, where it is split. One branch feeds the Preview BNC through a **Serializer Module**, and the other branch feeds the optional **Preview Overlay Module** (4000A-045) — which in turn feeds the OVL BNC through a **Serializer Module**.

	Note	**Clean Feed** has a dedicated BNC output, just like Program and Preview, but **DVE Send** is only available by routing it back into the crosspoint matrix (through the **Re-Entry Board**), and then out via an Aux Bus. There is no DVE Send BNC output.

Aux Buses

A portion of the Synergy Aux Bus system is illustrated below:
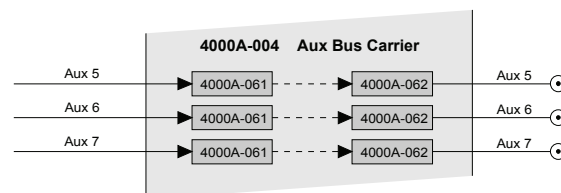
Aux Bus Carrier (4000A-004)

The inputs to the Aux Buses have access to all 72 inputs of the crosspoint matrix, and dedicated BNC outputs are provided for each.

Each Aux Bus can be configured for either "timed" or "untimed" operation. On the board itself, an array of jumpers are used to determine the timing, as illustrated in the expanded view below:

Aux Bus Jumpers
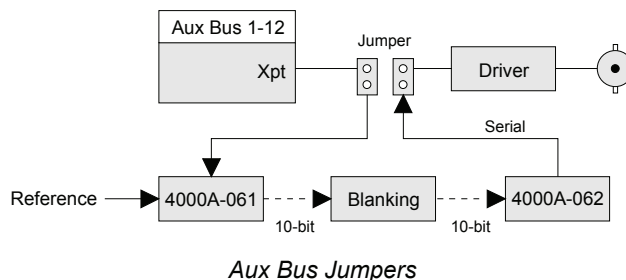
- **Untimed Aux Bus** — For untimed Aux Bus operation, the upper circuit is used — going directly from crosspoint to the driver, and then to the output BNC connector. No other processing is required. Regarding timing, there is very little delay on the untimed Aux Bus outputs.

- **Timed Aux Bus** — For timed Aux Bus operation, the lower circuit is used — going first through a small **Deserializer Module** (4000A-061). The timed Aux Bus outputs, however, are delayed such that they are later than all other outputs on the switcher. All timed Aux Bus output have a fixed timing together, which in fact is the same timing as the Preview Bus output.

Note | Any combination of timed and untimed Aux Buses is permitted on the Synergy switcher.

Once the Serializer and Deserializer boards are installed and the jumpers are properly set, no other setup is required in order to configure a timed Aux Bus output. The system adapts automatically.

Deserializer Module

The **Deserializer Module** converts the signal from serial data to 10-bit parallel data, but it also handles the timing of the inputs by auto-timing the signal to reference.
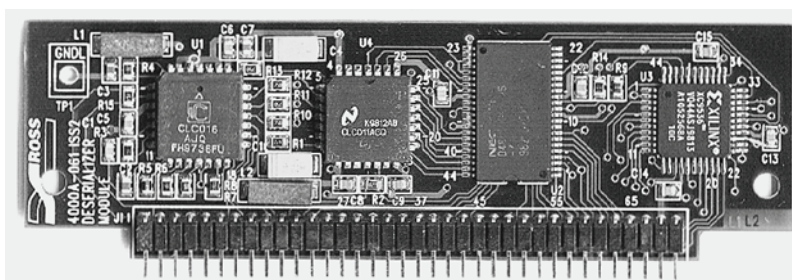
Deserializer Module

The signal is then routed through circuitry that performs blanking insertion and signal clean-up. Note that the blanking does not affect the imbedded ancillary data in the vertical interval.

As the last step, the signal is routed through a **Serializer Module**, converted from parallel to serial, then through a driver to the output BNC connector.

Preview Matrix

The **Preview Matrix** is independent of the crosspoint matrix. While the crosspoint matrix functions in serial format, the Preview Matrix processes video in parallel format — retaining the 10-bit format internally.
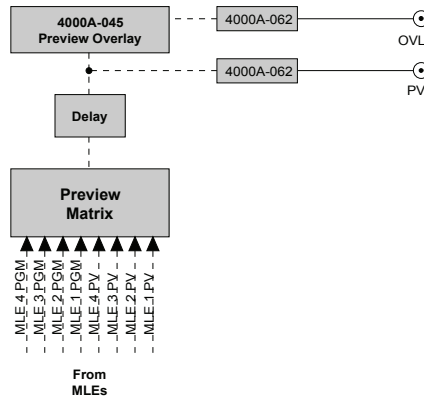
Preview Matrix

The Preview Matrix receives its eight inputs from the MLEs — one Program input and one Preview input from each. A single 10-bit output feeds an adjustable delay module, that ensures that no matter which MLE is feeding Preview, the Preview timing remains constant and stable. The timing of this output is also adjusted to match the timing of the Aux Buses.

From the delay module, the bus is routed to the Aux Bus Carrier, where it splits.

- One 10-bit line goes to the optional **Preview Overlay** (4000A-045) module, and then through a **Serializer Module** to the Overlay output.

- The other 10-bit output is routed through a **Serializer Module**, then directly to the main Preview Output BNC connector.

	Note	If you place the **MLE Carrier Board** (4000A-002) or the **Frame CPU Board** (4000A-003) on the **Extender Board**, the main Preview Bus and Preview Overlay outputs may exhibit bit errors. You may also find that video equalization performance is degraded when an input board is placed on the extender.

	Note	The **Preview** output is in time with the timed Aux Bus outputs. The Overlay output is 74ns later.

Phase Lock Loop and Sync Pulse Generator

The **Phase Lock Loop** (PLL) and **Sync Pulse Generator** (SPG) circuitry takes the reference video signal from the crosspoint matrix (in serial form) and creates a clean clock, plus various other sync pulses for the system.
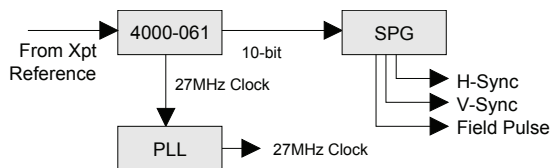
Phase Lock Loop and Sync Pulse Generator

Within the PLL and SPG circuitry, there are two modes in which the **Deserializer Module** (4000A-061) can work:

- The simplest mode is when the Deserializer is used for the reference. The microprocessor tells the module to add a delay of [n] clocks. The signal comes in — it is then delayed and fed out.

- On all other buses, such as MLEs and Aux Buses, system software requests a delay of [n] clocks from the reference. The reference sends a sync pulse, then the module looks at incoming video and adjusts the delay dynamically - delaying video by [n] from the reference signal.

System delay is adjusted using the **Reference Menu**. Refer to the section, "**Reference Delay Adjustment**" in the *Synergy Series Installation Guide*, for more information.

Reference Menu

The output of the **Deserializer Module** is routed to the SPG, that in turn generates Horizontal Sync, Vertical Sync, and Field Pulse.

Another output from the **Deserializer Module** is a 27 MHz clock, which is routed to the PLL. Within the PLL is a stable oscillator that regenerates the 27 MHz clock, filtering out all jitter and generating the stable (clean) 27 MHz signal that clocks the entire system. The net result is that if you have a jittery reference signal, the switcher's output will not be adversely affected on its outputs.

Note The PLL loop bandwidth is 300 Hz. Therefore, low frequency jitter below 300 Hz will not be filtered out by the PLL.

If the reference is not present (or is lost), the PLL and SPG still continue to run. In this condition however, the Synergy switcher can default to 625-line mode and the clock rate is not guaranteed. Furthermore, the Synergy switcher may lose lock with the video.

System Timing and Non-Sync Detectors

Non-sync detection is based in the **Deserializer Module** (4000A-061). As discussed earlier, a simple delay can be used, or the module can look at the reference signal and then determine an offset.

The only information that the **Deserializer Module** has about the reference is **Horizontal Sync**. The module itself guarantees that the video will be locked horizontally - after video passes through it.

Additionally, the module's vertical sync output is examined, and compared to that of the reference. If the two signals do not match vertically, the system considers the video to be non-synchronous — and the **N/S** (Non-Sync) LED lights on the panel (on the bus on which the source was chosen). In this non-sync situation, the selected video may be stable, but it will be shifted vertically.

If you have an input signal that is out of the timing window (too far out of time horizontally), the signal may lock to the next (or to the previous) Horizontal Sync pulse. This situation, however, can introduce a one-line offset, either up or down — and the **N/S** light will again come on.

The Synergy switcher "auto-times" around the entire switcher — on the inputs. Synergy specifications allow a ¼ line tolerance with regard to timing. If your input is ¼ line early or ¼ line late, relative to the reference, the system can time it properly and make it lock exactly. If the signal is greater than the allowed tolerance, the system can not guarantee that it will lock to the correct "H". It may possibly lock to the previous H, or to the next H.

Notes on System Timing and Non-Sync Detectors

Note the following:

- In order for the Synergy switcher to properly auto-time late signals (with respect to the reference), the reference delay of the switcher must be set to at least the amount of time that the incoming signal is late.

  For example, if a video source arrives 1 microsecond later than the reference, the reference delay must be set to at least 1 microsecond for the Synergy switcher to properly auto-time the source. Refer to the section, "**Reference Delay Adjustment**" in the *Synergy Series Installation Guide*, for details on setting the reference delay.

- The Synergy switcher has one non-sync detector per bus (including the Aux Bus).

- The non-sync detection circuitry itself resides on the Aux Bus Carrier and MLE boards. However, the detection circuitry uses the V Sync pulse from the **Deserializer Module** to determine sync status.

- The **N/S** LED lights only when a non-synchronous input is selected on a given bus. Thus if three non-sync sources are chosen on MLE 1 Program, MLE 2 Program and MLE 3 PST, each **N/S** LED will light on the respective buses.

- The Aux Buses are timed to different locations than the MLEs, thus, a source may be synchronous in the MLEs — but non-sync in the Aux Buses (and vice-versa).

CPU Structure

This section describes the Synergy CPU structure, in terms of which areas are controlled by which specific microprocessors. Effectively, the Synergy CPU structure functions as a master/slave multi-processor system, where the master processor controls high level functionality, and delegates other tasks to slave processors.

In a fully loaded Synergy switcher, you can have up to six microprocessors in the frame, plus one in the Synergy control panel. Each microprocessor is a 50 MHz floating point DSP (a TMS-320-C32 manufactured by Texas Instruments), and each is identical - running at the same clock rate.

Processor Distribution

Processor distribution and functionality is as follows:

- One "**Frame Processor**" on the **Frame CPU Board** is responsible for performing high level functions, and issuing commands to the remaining microprocessors. This processor manages all serial channels to and from the Synergy frame, manages communications with the Synergy control panel, and manages communications with all other peripheral devices connected to the frame.

- The **Frame Processor** also controls non-MLE functions, including all Aux Bus functions, all crosspoint switching on the Input/Crosspoint and Input Carrier modules, and the switching of the **Preview Matrix** on the **MLE Carrier Board**. It does not control the Preview Overlay module, but it does issue commands to that module, in terms of what text and graphics to display.

- One "**Preview Overlay Processor**" on the **Preview Overlay Board** is essentially a "graphics mover". It receives commands from the **Frame Processor**, and generates the fonts, lines, and graphics required to provide the necessary overlay image.

- One "**MLE Processor**" on each MLE Board, up to 4 total, processes high-level information from the **Frame Processor** that pertains to the current state and specific commands issued on each MLE.

  This high level information includes which functions are enabled or disabled, and what configurations have been set up by the user on the Synergy control panel. The MLE Processor translates that information, and sets the required bits in the hardware to complete the command request.

  Following are several examples:

  ~ If you press **WIPE** in an MLE and select the circle wipe in the **Pattern Control Group**, that information goes to the **Frame Processor** — which in turn tells the selected MLE Processor that a circle wipe has been requested. The **MLE Processor** then draws the proper tables required to make the image.

  ~ If you pull the **Fader** from Program to Preset, the **Frame Processor** receives that information and analyses how it affects the high level structures within the switcher. For example, which buses are moving, what type of effect has been requested, such as Dissolve, Wipe, and DVE Send. The **Frame Processor** then passes the current state of a particular field to the **MLE Processor,** which then writes the specific values of the effect to the video processing circuitry.

  ~ If you press the **AUTO TRANS** button, that command goes from the Synergy control panel to the **Frame Processor**, which in turn keeps track of which state the transition is in. Commands are then issued to the **MLE Processor** to perform the

transition at, for example, 4% in one field, 8% in the next field — until complete. The **MLE Processor** in turn does not process the video itself, but rather issues commands to the hardware on the **MLE Board** to set the mixer to the requested ratio and manipulate the pixels accordingly.

The MLE Processor also controls the MLE options, such as **Squeeze & Tease**, and the **Border Generator** option. Each option lives as a daughter board on the **MLE Board** itself.

- One "**Control Panel Processor**", within the Synergy control panel, oversees the large User Display, the small MLE displays, and also translates button presses into serial protocol that is sent to the Synergy frame to indicate which buttons have been selected. The processor also tracks which functions have been selected in which MLEs, and at a very high level, provides the Synergy frame with specific information that removes the need for the frame to know precisely what the panel looks like.

For example, the Synergy control panel does not say that button **32** has been pressed, rather, it says that there is a request to select a circle wipe on MLE 2, Pattern Generator 2. The Synergy frame processes the command and sets the new state of the MLE and pattern generator. In the case of a knob or the Positioner, the Synergy control panel alerts the frame that the control is increasing or decreasing in value. Floppy disk or USB key storage and recall information is also handled by the panel processor, but the data is stored in the Synergy frame.

Note   For system efficiency, the data on the floppy disk or USB key (such as that contained in software upgrades and memory registers), is written in a proprietary binary compressed format. Compressed data is sent to the frame where it is decompressed and processed. Customers can not read the Synergy files on a floppy disk or USB key.

The system continues to function as long as the **Frame Processor** is working. If an **MLE Processor** stops functioning, the Synergy switcher will continue to work, and the other functioning MLEs are not affected. For example, if you lose MLE 1, you can continue to switch on MLE 3.

Note   The **Frame Processor** and the **Control Panel Processor** are single points of failure.

A Note About CPU Architecture

Virtually all of the lookup tables and all of the bits that are used to configure the hardware and map the crosspoints are set every single field. The system is in effect performing a complete memory recall operation every single field, always guaranteeing that the control panel is set properly. In terms of the architecture, there is no difference between a requested memory recall operation and the way that the Synergy switcher updates the control panel normally for every field.

In addition to increasing the Synergy switcher reliability tremendously, this functionality also allows you to return to the exact state of the control panel, should a power failure occur.

Power-Up Sequence

In a Power-Up sequence on the Synergy control panel, the system first accesses the control panel EPROM, and determines if a software upgrade has been requested.

- If an upgrade has been requested, the system goes into the Software Upgrade mode.

- If the contents of the Flash memory of the Synergy control panel fail a checksum test, the system goes into Upgrade mode.

- If an upgrade has not been requested, the system goes to flash memory and copies the contents of the CPU program from flash to RAM. Within the flash memory are located FPGA files, which are uploaded into the FPGAs of the Synergy control panel.

The Synergy control panel next goes to RAM, executes the operating program from RAM, and waits for commands from the Synergy frame. If the control panel receives no information from the Synergy frame, the panel waits in the **Diagnostic Mode** as illustrated in the provided example.
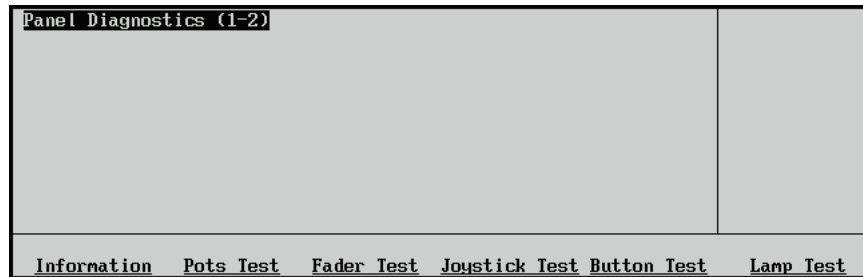
Panel Diagnostic Menu 1-2

In addition, if communication is lost to the Synergy frame, the Synergy control panel enters into **Diagnostic Mode**, and the control panel goes dark.

When power is applied to the Synergy frame, the **Frame Processor** also goes to EPROM and determines whether or not a software upgrade has been requested, based on the Software Upgrade Jumper (**JP11**).

> **Note** With both the Synergy frame and control panel EPROMs, each contains a small amount of code that is sufficient to boot the system or handle a request for a software upgrade.

- If an upgrade has been requested, the Synergy frame sends that information to the control panel in the form of a break character. The Synergy frame then waits for upgrade data to come from the control panel.

- If the contents of the frame's flash memory fail a checksum test, the system goes into **Upgrade Mode**.

- If an upgrade has not been requested, the Synergy frame goes to Flash, and loads up its RAM with code for the Frame CPU. The Frame CPU then performs the following functions:

  ~ Uploads its FPGA and the Preview Overlay FPGA (if installed) with the necessary configuration files.

  ~ Loads the CPU code to the MLE CPUs and their FPGAs because the MLE CPUs only have RAM and not Flash.

~ Loads all option cards that may be present on the MLE, and the FPGAs of all the option cards.

~ Uploads any FPGAs that may be present on the Input Carrier Boards.

~ Uploads the RAM for the Preview Overlay CPU.

Once everything has been uploaded, there is a controlled system "start." During the controlled start, the system looks at non-volatile RAM, which contains a record of any possible system state - prior to the power down. The system then determines if the power up was due to a power failure, shutting power off normally, or a hard system reset.

• If a hard reset was the cause, the system state is cleared, data is sent to the Synergy control panel and the system begins operating.

• If there was a power down or a power failure, the contents of non-volatile memory are checked. If they are in error, a reset is performed. If they are correct, it uses that data as the current system state for the boot configuration, informs the Synergy control panel, and boots the system in the same state (as prior to the power down).

Note that during power up, the system also checks for new option boards that may have been installed. All option boards have "version and level" read-back circuitry installed, which is read by the Synergy frame. This allows the Synergy frame to load the appropriate code and software into a newly-installed board.

Note Each auto-timing **Deserializer Module** (4000A-061) includes Flash-based FPGA. This allows the module to be upgraded through the upgrade process via the Synergy Frame CPU.

Note that the following situations cause a software upgrade.

• If the Synergy frame is powered on with the Software Upgrade Jumper in the **UP** position.

• During the power up sequence, the system performs a check sum on the Flash. If the check sum is invalid, the system alerts you on the display, and gives you the option to boot or upgrade.

A Note About Memory Registers

Switcher memory registers are stored in the Flash memories of the Synergy frame, along with the FPGA configuration files and the microprocessor code files. Memory registers are recalled directly from Flash. The non-volatile memory registers only record the current system state in them. They are low power RAMs which are battery backed with the battery rating is 5 to 10 years.

A Note About the Software Upgrade Process

If a software upgrade has been requested, the Synergy control panel reads the upgrade file from a floppy disk or USB key, and then searches for the "boot loader" file. This special file controls the steps required in the upgrade. The boot loader reads the control panel file off the floppy disk or USB key, decompresses it and upgrades the Flash. It also loads the frame upgrade file off the floppy disk or USB key, sends it via serial communications to the frame microprocessor where it is decompressed and uploaded to the Flash of the Synergy frame.

	Note	If the software upgrade process is interrupted, the Flash is not touched. Flash is not uploaded until all upgrade information has been transferred.

Once the entire process is complete, you can then power down the Synergy frame and control panel, and place the Software Upgrade Jumper (**JP11**) back to the **DOWN** position.

Notes on Using a USB Key

You may receive a "**USB Upgrade Failed**" error message when the Synergy control panel is powered on. If you receive this error message, contact Ross Video Technical Support for instructions on how to correct the error.

Board Labeling

The figure below is an example of a Ross Video circuit board label.
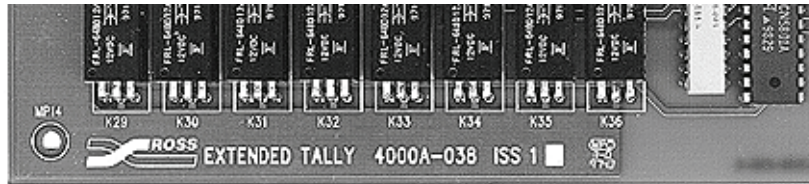
Circuit Board Labeling Scheme

The following data is included for all system circuit boards:

- Ross Video Logo

- Board name

- Board number

- Board revision (ISS = Issue)

Where a white square is present in the label string, letters may be written within the square to indicate a minor variation on the board itself.

Software Upgrades

In This Chapter

This chapter provides instructions for performing software upgrades.

The following topics are discussed:

- Jumpers and Switches
- Switcher Reset Notes
- Software Upgrade

ESD Susceptibility | Static discharge can cause serious damage to sensitive semiconductor devices. Avoid handling the switcher circuit boards in high static environments such as carpeted areas and when synthetic fiber clothing is worn. Touch the frame to dissipate static charge before removing boards from the frame and exercise proper grounding precautions when working on circuit boards.

Jumpers and Switches

This section provides important information about system jumpers and switches. The following topics are discussed:

- Jumper Positions

- Control Panel Jumpers and Switches

- Frame Jumpers and Switches

⚠️ **Caution**
| All product servicing should be carried out by qualified service personnel.

To gain access to the jumpers in the Synergy control panel, as outlined in the the section "**Control Panel Jumpers and Switches**" on page 3–3, it will be necessary to remove the safety barrier from the inside of the tub. The equipment still presents a safety hazard with the power switches in the **OFF** position. To avoid electrical shock, disconnect all A/C power cords from the rear of the panel before removal of this barrier.

Service barriers within this product are intended to protect the operator and service personnel from hazardous voltages. For continued safety, replace all barriers after servicing.

Jumper Positions

The following legend indicates the jumper positions used in the following two sections.

Jumper Positions
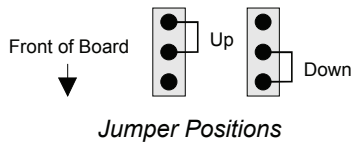
- **Up** — Jumper is away from the front of the board.

- **Down** — Jumper is towards the front of the board.

Control Panel Jumpers and Switches

For all Synergy switchers, except the Synergy 100 SD switcher, the following figure illustrates the location of jumpers and switches on the front edge of the **Control Panel CPU Board**:

⚠	**Caution**	All product servicing should be carried out by qualified service personnel.
		To gain access to the jumpers on the Synergy control panel, as outlined in the the section "**Jumper Positions**" on page 3–2, it will be necessary to remove the safety barrier from the inside of the tub. The equipment still presents a safety hazard with the power switches in the **OFF** position. To avoid electrical shock, disconnect all A/C power cords from the rear of the panel before removal of this barrier.
		Service barriers within this product are intended to protect the operator and service personnel from hazardous voltages. For continued safety, replace all barriers after servicing.

Control Panel Jumpers and Switches
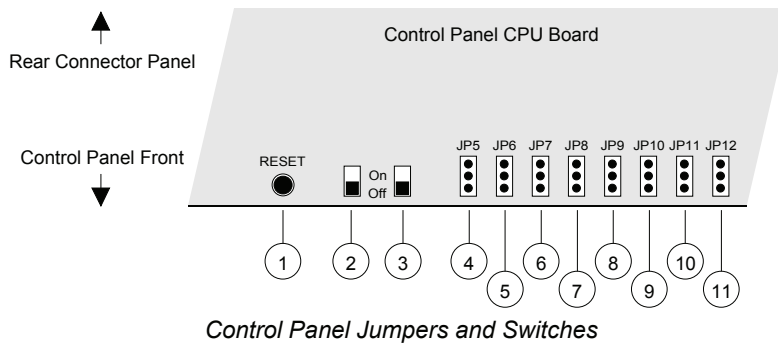
1) Reset Button	5) JP6, Panel Type	9) JP10, Reserved
2) Configuration Switch 1	6) JP7, Reserved	10) JP11, Reserved
3) Configuration Switch 2	7) JP8, Reserved	11) JP12, Panel Redundant Power
4) JP5, Panel Type	8) JP9, Reserved	

The components are discussed in the following section.

1. Reset Button

Press the red **RESET** button in the Synergy control panel tub to initiate a *full system* reset. When the reset is initiated from the Synergy control panel, the frame reset is initiated via a software message that is passed along the control cable. In the unlikely event that the frame has crashed, it may be necessary to *manually* reset the frame. Refer to the section "**Switcher Reset Notes**" on page 3–7 for details on the system reset function.

2. Configuration Switch 1

This switch is reserved for future use and must be left in the default **Off** position as labeled on the switch.

3. Configuration Switch 2

This switch is reserved for future use and must be left in the default **Off** position as labeled on the switch.

4. **JP5, Panel Type**

   Jumper **JP5** works in conjunction with **JP6** to set the type of Synergy control panel. Refer to the table "**Setting the Control Panel by Jumper Type**" for details.

5. **JP6, Panel Type**

   Jumper **JP6** works in conjunction with **JP5** to set the type of control panel. Refer to the table "**Setting the Control Panel by Jumper Type**" for details.

Setting the Control Panel by Jumper Type

Jumper	Synergy 2	Synergy 3	Synergy 4
JP5	Up	Down	Up
JP6	Down	Up	Up

6. **JP7, Reserved**

   Jumper **JP7** is reserved for future use and must be left in the default **Down** position.

7. **JP8, Reserved**

   Jumper **JP8** is reserved for future use and must be left in the default **Down** position.

8. **JP9, Reserved**

   Jumper **JP9** is reserved for future use and must be left in the default **Down** position.

9. **JP10, Reserved**

   Jumper **JP10** is reserved for future use and must be left in the default **Down** position.

10. **JP11, Reserved**

    Jumper **JP11** is reserved for future use and must be left in the default **Down** position.

11. **JP12, Panel Redundant Power**

    Jumper **JP12** indicates whether or not redundant power has been installed in the Synergy control panel.

    • **Up** — This position indicates that redundant power is installed. The red **POWER FAIL** indicator on the Synergy control panel will light in the event of a power supply failure in the control panel.

    • **Down** — This position indicates that redundant power is not installed. The red **POWER FAIL** indicator will not light.

Frame Jumpers and Switches

For all Synergy switchers, the following figure illustrates the location of jumpers and switches on the front edge of the **Frame CPU Board**.


Frame Jumpers and Switches
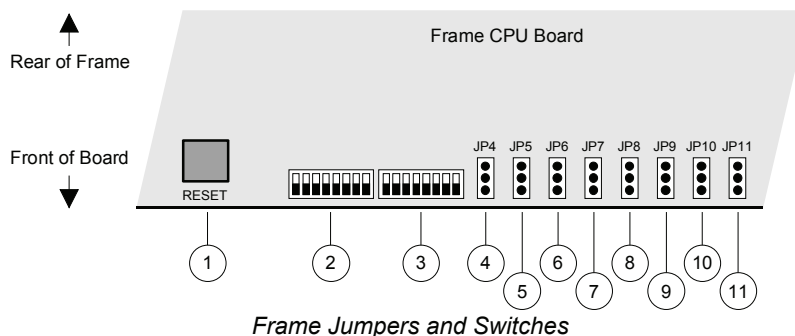
1) Reset Button	5) JP5, Reserved	9) JP9, Reserved
2) DIP Switch 2, Power Supply	6) JP6, Reserved	10) JP10, Installation Enable
3) DIP Switch 1, S&T 3D Upgrade	7) JP7, Reserved	11) JP11, Software Upgrade
4) JP4, Reserved	8) JP8, Reserved	

Each component is discussed in the following section.

1. Reset Button

Press the red **RESET** button in the Synergy frame to initiate a *full system* reset. When the reset is initiated from the Synergy frame, the control panel reset is initiated via a software message that is passed along the control cable. In the unlikely event that the Synergy control panel has crashed, it may be necessary to *manually* reset the control panel. Refer to the section "**Switcher Reset Notes**" on page 3–7 for additional important information about the system reset function.

2. DIP Switch 2, Power Supply

This 8-position DIP switch identifies the power supply(s) in the Synergy frame. If a single power supply is used, set **SW1** (leftmost) to the **Up** position. If a redundant (second) power supply is also used, set **SW1** to the **Down** position.

3. DIP Switch 1, Squeeze & Tease 3D Upgrade

This 8-position DIP switch is adjusted only when upgrading Squeeze & Tease 3D software. When upgrading, set **SW8** (rightmost) in the **Up** position to enable Squeeze & Tease 3D software upgrades from a storage device. Refer to Chapter 2, "**Installation and Setup**" in the *Squeeze & Tease 3D/WARP Owner's Guide* for details.

If no Squeeze & Tease 3D software upgrades are being performed, leave all switches in the default **Down** position, as labeled on the switch.

4. JP4, Reserved

Jumper **JP4** is reserved for future use and must be left in the default **Down** position.

5. JP5, Reserved

Jumper **JP5** is reserved for future use and must be left in the default **Down** position.

6. **JP6, Reserved**

    Jumper **JP6** is reserved for future use and must be left in the default **Down** position.

7. **JP7, Reserved**

    Jumper **JP7** is reserved for future use and must be left in the default **Down** position.

8. **JP8, Reserved**

    Jumper **JP8** is reserved for future use and must be left in the default **Down** position.

9. **JP9, Reserved**

   Jumper **JP9** is reserved for future use and must be left in the default **Down** position.

10. **JP10, Installation Enable**

    Jumper **JP10** determines the installation status of the Synergy switcher as follows:

    *   **Up** — If the jumper is set to this position, access to installation features is restricted. When you enter the **Installation Menu**, a message alerts you that "**Installation Settings are Locked**." However, you *are* permitted to view the menus as usual. Upon exiting the installation menus, the "**Installation Settings are Locked**" menu once again alerts you that any changes will be *ignored* upon exiting the installation tree.

        The installation **Load/Save to Disk** menus do not appear in the menu tree.

    *   **Down** — If the jumper is set to this position, all installation settings can be changed without restriction. However, upon exiting the menus, an "**Installation Warning**" alerts you that settings are about to be changed as seen in the following example.
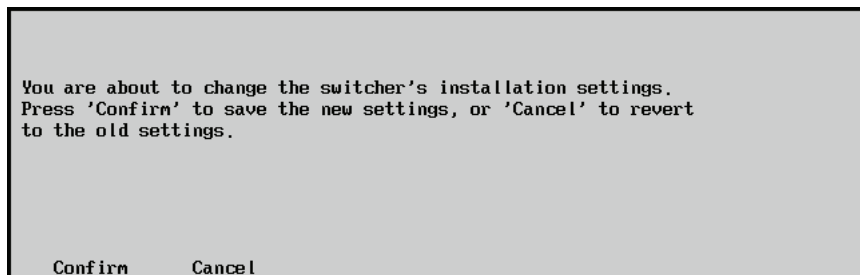
    ```
    You are about to change the switcher's installation settings.
    Press 'Confirm' to save the new settings, or 'Cancel' to revert
    to the old settings.




       Confirm      Cancel
    ```

    Installation Change Confirmation Menu

    Note   Place the jumper in the **Up** position when you want to restrict access to installation menus. For certain facilities, this setting is recommended once installation is complete.

11. **JP11, Software Upgrade**

    Jumper **JP11** controls the ability to upgrade software from a storage device as follows:

    *   **Up** — If the jumper is set to this position, software can be upgraded from a storage device. Refer to the the section "**Software Upgrade**" on page 3–11 for instructions.

    *   **Down** — If the jumper is set to this position, software cannot be upgraded from a storage device. This is the default position.

Switcher Reset Notes

Note the following important points regarding the switcher reset function:

- Turning power on and off in either the Synergy control panel or the frame causes *that device* to reset — but *not* the other device. This feature ensures that the program video will not be adversely affected if the Synergy control panel loses power.

- If the Synergy frame *only* is turned off, the control panel indicates a frame power failure on the **POWER FAIL** indicator LEDs. In addition, the control panel menu displays the Splash Screen.

  ~ **Synergy 4** — On a Synergy 4 switcher, when frame power is restored, the power failure status indicator clears, and the panel returns to the main menu with all control panel settings in the "reset" state — even though the panel was not physically reset.

  ~ **Synergy 2, 3** — On Synergy 2 and Synergy 3 switchers, when frame power is restored, the power failure status indicator clears, and the panel returns to the main menu with all control panel settings in the state they were in before the frame power fail occurred — even though the panel was not physically reset.

	Note	The Synergy frame stores all installation, personality, custom control macros, memories, and the current video state. The Synergy control panel keeps track of the current menu and the settings of all buttons. Resetting the frame changes the current video state. Turning the control panel on and off will *not* reset the video state, because a frame reset has not been initiated.

Power Fail Indicators

Note that two important **POWER FAIL** indicator LEDs on the Synergy control panel mirror the condition of the four frame "Power" LEDs and the power supply of the panel.
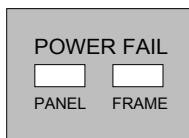
POWER FAIL
PANEL   FRAME

- **PANEL** — This LED indicates that there is a fault with the primary or secondary power supply of the Synergy control panel. Refer to the section "**Replacing a Control Panel Power Supply** " on page 10–3 for more information on verifying the power supply status for the Synergy control panel.

- **FRAME** — This LED indicates that there is a fault with the primary supply, secondary supply, or fans of the Synergy frame. Refer to the section "**Replacing a Frame Power Supply**" on page 10–8 for more information on verifying the power supply status for the Synergy frame.

Power Failure Recovery

The Synergy power failure recovery feature protects the *entire panel setup* in situations in which power is lost. When power is restored after a failure, all MLE setups return *exactly* as they were, immediately before the power failure.

- A loss of Synergy control panel power *only* has no effect on the frame, because the frame stores the current video state. When control panel power is restored, your setups will return to their previous state. Similarly, resetting the control panel *only* has no effect on the frame.

  Remember that resetting the frame *does* change the current video state, returning the frame and control panel to the default "reset" state on a Synergy 4 control panel.

  On Synergy 2 and 3 control panels, when frame power is restored, the power failure status indicator clears and the panel returns to the main menu with all control panel settings in the state they were in before the frame power fail occurred even though the panel was not physically reset.

Software Upgrade

This section provides step-by-step instructions for upgrading the Synergy switcher software from a storage device. You can obtain a copy of the software, or of any previous version, by logging on to the Ross Video website:

http://www.rossvideo.com

Use the following procedures to perform a software upgrade from a storage device:

- Hardware Confirmation
- System Backup
- Software Upgrade
- Restoring Disk Registers

Hardware Confirmation

⚠️ **Important** | If you are upgrading your Synergy switcher to a software version of **15**, or higher, you must ensure that your **Control Panel CPU Board** is of **Issue 10** or higher.

Use the following procedure to check the version of the **Control Panel CPU Board**:

1. Navigate to the **Installed Options Menu** as follows:

    - Press **HOME** (to display the **Main Menu 1-2**).
    - **MORE** (to display the **Main Menu 2-2**).
    - **Setup** (to display the **Setup Menu**).
    - **Installed Options** (to display the **Installed Options Menu 1-2**).

2. Press **Panel Boards** to display the **Panel Boards Menu**.

```
Installed Options (1-2)
Frame Serial Number:0000000

Board                      Rev  FPGA Rev
4000-033 Panel CPU         10a  4000x033.bit 1998/12/01 09:49:35    Use Knob 2
4530-130 Upper XPT Bus     2                                        to scroll
4530-131 Lower XPT Bus     3a                                       list.
4530-032 Global Memory     2
4530-034 Key Switch        2
4530-035 Trans Switch      3

   Software        Panel         Frame        Option      Enter Serial
   Options         Boards        Boards       Boards        Number
```

Installed Options — Panel Boards Menu

3. Locate the **4000-033 Panel CPU** in the **Board** column.

4. Confirm that the **Rev** number is **10** or higher (in the example menu shown above the **Control Panel CPU Board** is a Revision 10a).

⚠️ **Important** | If the **Panel CPU** is of a Revision lower than **10** you will NOT be able to upgrade to version **15**, or higher, without upgrading your Synergy control panel.

If your hardware meets the requirements of the software upgrade, proceed to with the next procedure and backup your system.

System Backup

	Important	Because the software upgrade process *automatically* returns the switcher to *default* values, it is important that you back up all switcher elements to a storage device, such as a floppy disk or USB key, at this point.

Use the following procedure to save your setup configurations to a storage device:

1. Navigate to the **Disk Menu** as follows:

   • Press **HOME** (to display the **Main Menu 1-2)**

   • **DISK** (to display the **Disk Menu**)

2. Insert a storage device as follows:

   • Insert a pre-formatted 1.44 MB high-density floppy disk into the floppy disk drive of the Synergy Switcher.

	Note	If the floppy disk is not formatted (or if you wish to completely erase all data from the disk), press **Format**. Follow the instructions on the display to format the floppy disk.

   OR

   • Insert a USB key into the USB port of the Synergy Switcher. You must wait 5 seconds after inserting the USB key into the USB port before you can save setup configurations to it.

	Note	You must have the **USB Removable Media Drive** option installed in order to use a USB key for saving and recalling setup configurations.

3. Press **Store** to display the **Disk Store Menu**.

4. Press **All** to store *all categories* of registers to your storage device.

	Caution	Do NOT remove the floppy disk or USB key from the switcher before the LED on the disk drive or USB port goes out. Doing so may destroy the data on your floppy disk or USB key, as well as the data on the next one you insert into the switcher..

5. Remove the storage device from the Synergy switcher.

This completes the procedure for saving your setups to a storage device. Next you will upgrade the software for your Synergy switcher.

Software Upgrade

This section outlines how to initiate the software upgrade from floppy disks or a USB key. Both methods are discussed.

Using Floppy Disks

Use the following procedure to initiate the software upgrade from floppy disks:

1. Ensure that you backup your switcher by saving your setups to a floppy disk. Refer to the the section "**System Backup**" on page 3–10 for more information.

2. Power off the Synergy frame.

3. Power off the Synergy control panel.

4. Move the **Software Upgrade** jumper (**JP11** on the **Frame CPU Board**) to the **Up** position. Use the following figure for reference.

Frame CPU Board — Software Upgrade Jumper
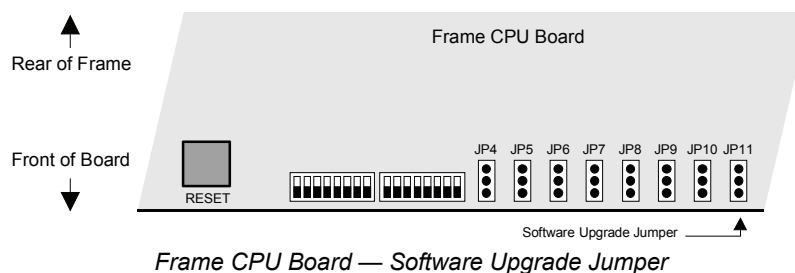
5. Power on the Synergy frame first.

6. Power on the Synergy control panel second.

7. Insert the **S234 Software Upgrade Disk #1** in the floppy drive.

Note | If you receive an error message informing you that you must have a **Control Panel CPU Board** issue **8** or higher, you will have to abort the software upgrade. This will require you to power off the Synergy frame and set the jumper back to the **DOWN** position and power on the frame and control panel *without* the floppy disk in the disk drive.

8. When prompted, remove **Disk#1**, insert **Disk #2**, press **Continue**, and wait for the upgrade process to complete. The software is complete when the menu buttons flash in a "marquee" fashion.

9. Power off the Synergy frame

10. Power off the Synergy control panel.

11. Move the jumper on **JP11** on the **Frame CPU Board** to the **Down** position.

12. Power on the Synergy frame and the control panel — in any order.

This completes the procedure for upgrading system software. Next you will restoring your saved registers as outlined in the section "**Restoring Disk Registers**" on page 3–13.

Using a USB Key

Use the following procedure to initiate the software upgrade from a USB key:

1. Ensure that you have saved your setups to a USB key. Refer to the section "**System Backup**" on page 3–10 for more information.

2. Power off the Synergy frame.

3. Power off the Synergy control panel.

4. Move the **Software Upgrade** jumper (**JP11** on the **Frame CPU Board**) to the **Up** position. Use the following figure for reference.

Frame CPU Board — Software Upgrade Jumper
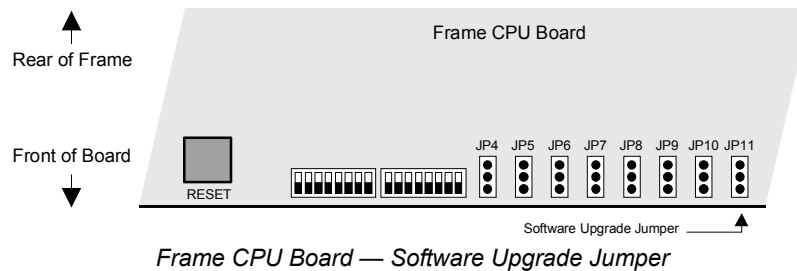
5. Power on the Synergy frame first.

6. Power on the Synergy control panel second.

7. Insert the **USB key** with the upgrade system software into the USB port of the Synergy switcher. The software is complete when the menu buttons flash in "marquee" fashion.

> **Note** — If you receive an error message informing you that you must have **Control Panel CPU Board** issue **8** or higher, you will have to abort the software upgrade. This will require you to power off the Synergy frame and set the jumper back to the **DOWN** position and power on the frame and control panel without the USB key in the USB port.

8. Power off the Synergy frame

9. Power off the Synergy control panel.

10. Move the jumper on **JP11** on the **Frame CPU Board** to the **Down** position.

11. Power on the Synergy frame and the control panel — in any order.

> **Important** — After restoring power to the control panel, you may receive the error message, "**USB Upgrade Failed**". Contact Ross Video Technical Support for more information on correcting the error.

This completes the procedure for upgrading system software using a USB key. Next you will restore your saved registers.

Restoring Disk Registers

Use the following procedure to restore your disk registers to on-line memory:

1. Ensure that the new Synergy software version is properly installed. If not, refer to the section "**Software Upgrade**" on page 3–11.

2. Locate the "backup" storage device that you made in the section "**System Backup**" on page 3–10.

✓ **Operating Tip**
> You must wait 5 seconds after inserting the USB key into the USB port before you can read its contents

3. Read the entire contents of the storage device into switcher memory as follows:

   • Press **HOME** to display the **Main Menu 1-2**.

   • Press **DISK** to display the **Disk Menu**.

   • Insert the backup storage device into its drive on the Synergy switcher.

   • Press **Recall** to display the **Disk Recall Menu**.

   • Press **All** to recall *all categories* of registers from the backup storage device.

⚠ **Caution**
> Do NOT remove the floppy disk or USB key from the switcher before the LED on the disk drive or USB port goes out. Doing so may destroy the data on your floppy disk or USB key, as well as the data on the next one you insert into the switcher.

4. Remove the storage device from the Synergy switcher.

This completes the procedure for restoring your disk registers.

Input Boards

In This Chapter

This chapter provides basic information about the **Input Crosspoint Board**, the **Re-Entry Board**, and the **Input Carrier Board** (plus its options).

The following topics are discussed:

- Input Crosspoint Board
- Re-Entry Board
- Input Carrier Board
- Dual Aspectizer™ Installation
- Ultimatte Insider™ Board

ESD Susceptibility | Static discharge can cause serious damage to sensitive semiconductor devices. Avoid handling the switcher circuit boards in high static environments such as carpeted areas and when synthetic fiber clothing is worn. Touch the frame to dissipate static charge before removing boards from the frame and exercise proper grounding precautions when working on circuit boards.

Input Crosspoint Board

The figure below illustrates the **Input Crosspoint Board** (4000A-238), with three sections highlighted. This *half-length* board can be installed in any of the top eight slots in the Synergy frame, below the Extender Board slot, and all Input/Crosspoint boards within your system are identical.
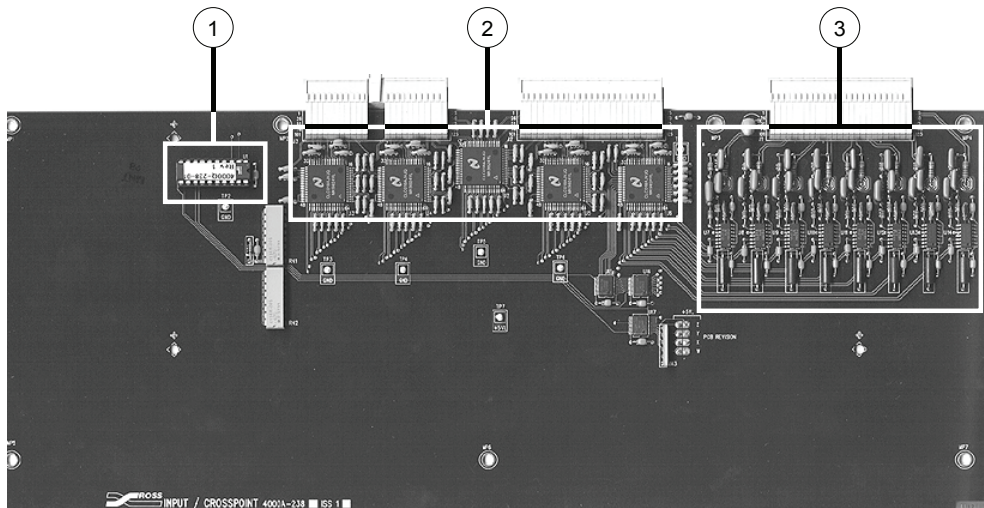
Input/Crosspoint Board

1) PLD	2) Crosspoint Section	3) Input Equalizer Section

Each component is discussed in the following section.

1. PLD

The **PLD** handles board control issues on the **Input Crosspoint Board**.

2. Crosspoint Section

The **Crosspoint Section** includes five chips that provide the 72 x 40 input/output matrix.

3. Input Equalizer Section

The **Input Equalizer Section** includes equalizer circuits for each of the eight inputs of the **Input Crosspoint Board**.

Note

> There are no DIP switches, jumpers, LEDs, or user serviceable areas on the **Input Crosspoint Board**.

Removing or Installing an Input Crosspoint Board

Use the following procedure to remove or install an **Input Crosspoint Board**:

1. Power down the Synergy frame.

2. Grasp the front edge of the board, and pull gently to unseat it.

3. Slide the board out and set it on a clean, flat, static-free surface.

4. Re-install the board as follows:

   • Align the board with the guide rails.

   • Push the board in until it stops sliding.

   • Push firmly to seat the board.

5. Power on the Synergy frame.

This completes the procedure to remove or install an **Input Crosspoint Board**.

Re-Entry Board

The figure below illustrates the **Re-Entry Board** (4000A-145), with two sections highlighted. This *half-length* board controls the re-entry pathways of the Synergy switcher. This board installs in the ninth slot from the top in the Synergy frame.
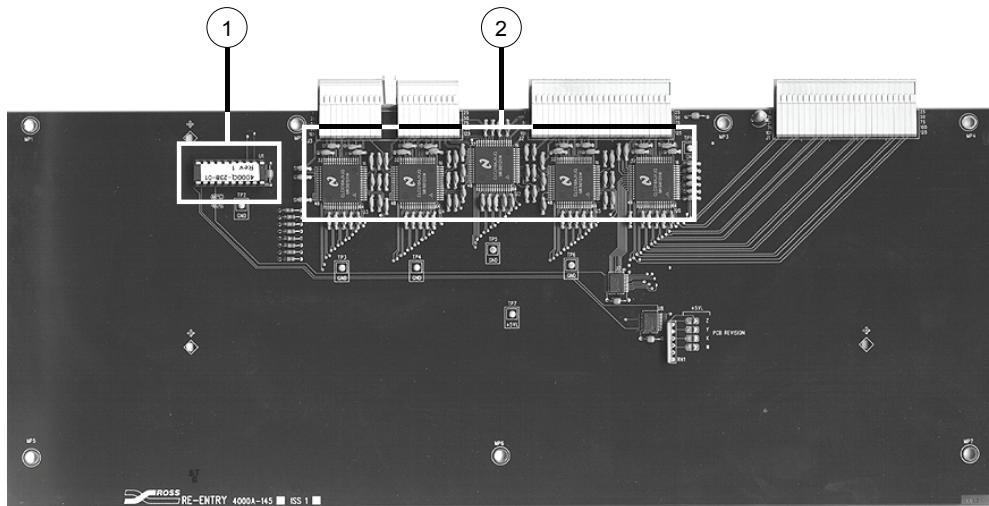
Re-Entry Board

1) PLD	2) Crosspoint Section

The board is virtually identical to the **Input/Crosspoint Board**, except that it does not have input equalizers — as the inputs come directly from the backplane. Each component is discussed in the following section.

1. **PLD**

   The **PLD** handles board control issues on the **Re-Entry Board**.

2. **Crosspoint Section**

   The **Crosspoint Section** includes five chips that provide the 72 x 40 input/output matrix.

Note
There are no DIP switches, jumpers, LEDs, or user serviceable areas on the **Re-Entry Board**. An Input/Crosspoint Board can be used in place of the Re-Entry Board, but the Re-Entry Board can not be used in place of an Input/Crosspoint Board.

Removing or Installing the Re-Entry Board

Use the following procedure to remove or install an **Re-Entry Board**:

1. Power down the Synergy frame.

2. Grasp the front edge of the board, and pull gently to unseat it.

3. Slide the board out and set it on a clean, flat, static-free surface.

4. Re-install the board as follows:

   • Align the board with the guide rails.

   • Push the board in until it stops sliding.

   • Push firmly to seat the board.

5. Power on the Synergy frame.

This completes the procedure to remove or install an **Re-Entry Board**.

Input Carrier Board

The figure below illustrates the optional **Input Carrier Board** (4000A-005, Issue 6) with five sections highlighted. This *full-length* board can replace any standard input board (4000A-238), providing eight external inputs and the associated switching crosspoints.

✎	**Note**	There are no DIP switches, LEDs, or user-configurable jumpers on the **Input Carrier Board**.
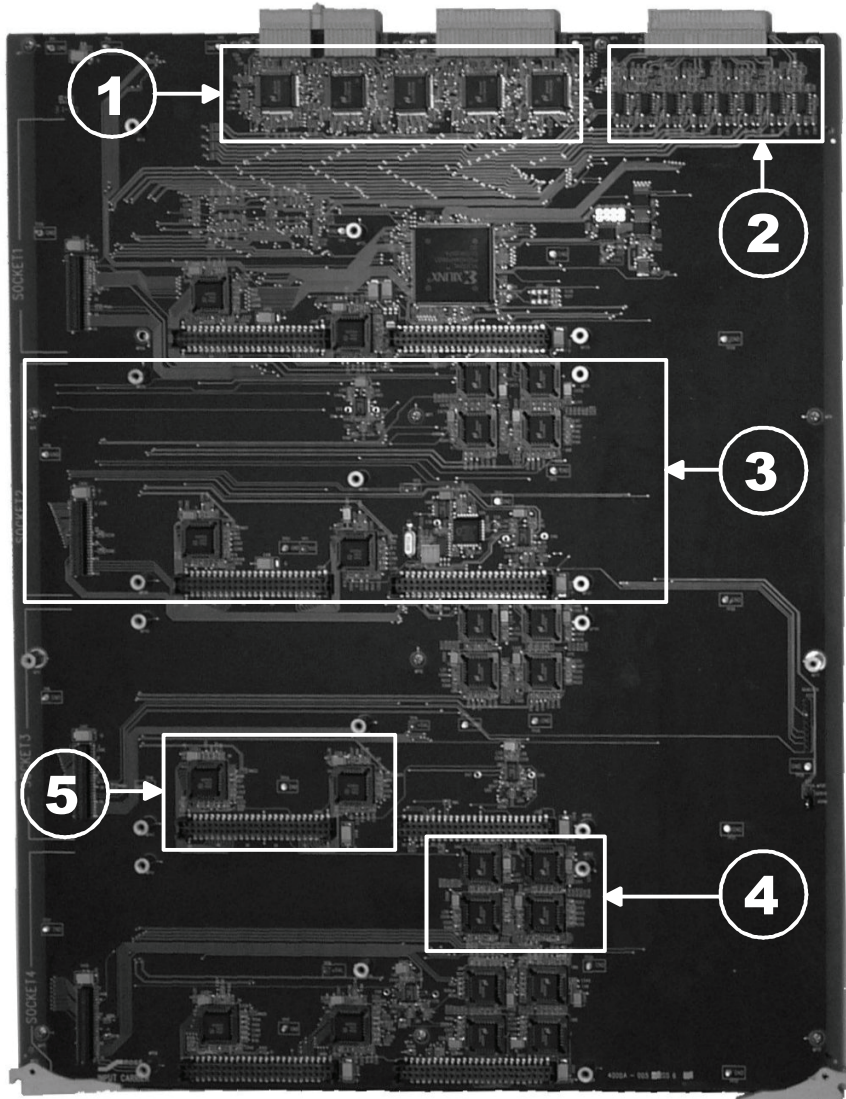
Input Carrier Board

1) Crosspoint Section	3) Option Socket	5) Option Socket
2) Input Equalizer Section	4) Deserializers	

1. **Crosspoint Section**

   The **Crosspoint Section** includes five chips that provide the 72 x 40 input/output matrix.

2. **Input Equalizer Section**

   The **Input Equalizer Section** includes equalizer circuits for each of the eight inputs of the **Input Carrier Board**.

3. **Option Socket**

   In addition to the standard Input/Crosspoint functions, each **Input Carrier Board** contains four **Option Sockets**. Each socket accepts a variety of option boards that provide various video processing functions, such as the Ultimatte Insider. Each socket, in turn, accepts up to two video inputs and provides up to two video outputs.

   The **Input Carrier Board** has an *additional* set of crosspoints that are installed on the underside of the board. These crosspoints route any of the eight external inputs to the four option boards, and similarly route the boards' outputs to any of the switcher buses.

   As outlined on the figure "**Input Carrier Board**" on page 4–6, each Option Socket includes three connectors and associated standoffs, which mate with the option boards. The arrangement for each socket is identical.

4. **Deserializers**

   Two **Deserializers** are associated with each option socket.

5. **Serializers**

   Two **Serializers** are associated with each option socket.

Installing the Input Carrier Board

The **Input Carrier Boards** *must* be installed in the eight input slots in the Synergy frame in one of the two following configurations. Other configurations *may* be possible. If the following suggestions do not meet your requirements, please contact Ross Video Technical Support.

- *Configuration 1* — The **Input Carrier Board** is installed in the top slot of the frame followed below by all Input/Crosspoint Boards, without leaving any open slots between.

- *Configuration 2* — Install all Input/Crosspoint Boards above all **Input Carrier Boards**, without leaving any open slots between. In this case, there is a maximum of four Input Carrier Boards allowed in the Synergy frame. As well, there can be no **Input Carrier Board** in the bottom slot (slot 8).

Notes on Installing the Input Carrier Board

Note the following when installing the Input Carrier Board in *Configuration 2*:

- The **Input Carrier Board** should *not* be installed in the Re-entry Slot.

- Only two of the three connectors are used to mate with the **Ultimatte Insider Board**.

Removing or Installing an Input Carrier Board

As required for a system update, upgrade or the installation of an Option Board, use the following procedure to remove or install an **Input Carrier Board**:

ESD Susceptibility	Static discharge can cause serious damage to sensitive semiconductor devices. Avoid handling the switcher circuit boards in high static environments such as carpeted areas and when synthetic fiber clothing is worn. Touch the frame to dissipate static charge before removing boards from the frame and exercise proper grounding precautions when working on circuit boards.

1. Power down the Synergy frame.

2. Remove the board as follows:

   • Pull the ejector tabs to unseat the **Input Carrier Board**

   • Slide the board out.

   • Set the board on a clean, flat, static free surface.

3. Perform the required update, upgrade or installation procedure(s). Refer to Appendix C of the *Synergy Series Installation Guide* for complete instructions for installing the Input Carrier Board and the Ultimatte Insider Board.

4. When complete, re-install the board as follows:

   • Align the board with the guide rails and push the board in.

   • When the board stops sliding, push firmly to seat the board.

   • Secure the board with the ejector tabs.

5. Power on the Synergy frame.

This completes the procedure to remove or install an **Input Carrier Board**.

Extender Board Use

The **Input Carrier Board** may be installed on an **Extender Board** (4000A-139).

Note, however, that although the board will function on the extender, there will be a noticeable degradation of the video in the Synergy switcher. For this reason, running the **Input Carrier Board** on an extender is not recommended.

Input Carrier Board Block Diagram

For your reference, the figure below illustrates a block diagram of the **Input Carrier Board**.
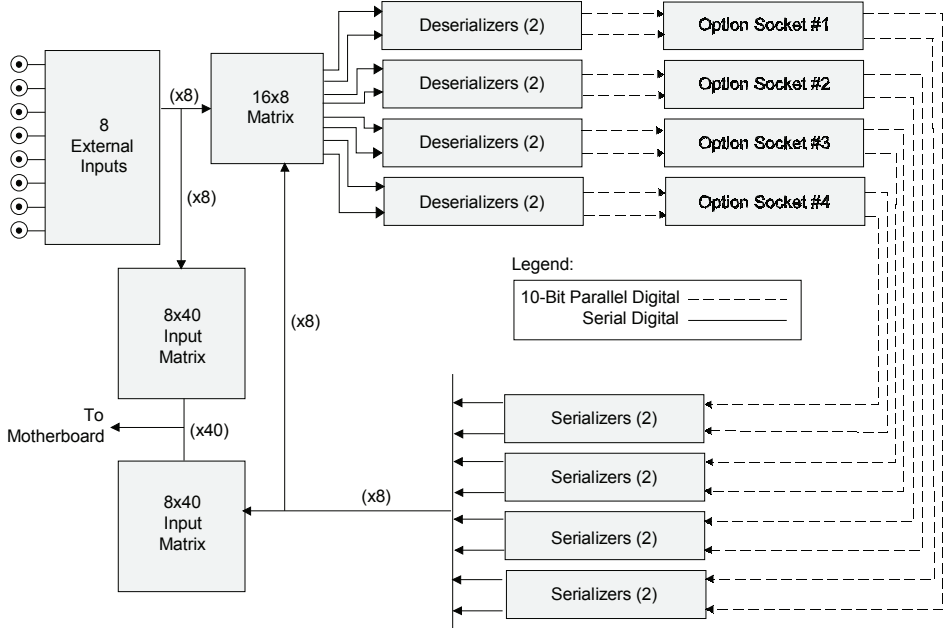
Input Carrier Board Block Diagram

Dual Aspectizer™ Installation

This section provides instructions for installing a **Dual Aspectizer Board** on the host **Input Carrier Board**, and upgrading the Dual Aspectizer software.

Dual Aspectizer is a hardware option that allows the user to perform live, dual aspect ratio, DTV production from a Synergy Series control panel. The **Aspectizer**, as it is more commonly referred to, dynamically converts the aspect ratio of a video signal in real time, *within* the Synergy switcher itself. Conversions can occur from 4:3 to 16:9 and vice versa.

Notes on Installing the Dual Aspectizer

Note the following important points:

- As a prerequisite, one or more, up to a maximum of eight, **Input Carrier Boards** (4000A-005) must be installed in the Synergy switcher — replacing the standard **Input Board** (4000A-238) for a selected set of eight BNC inputs. Please note:

    ~ Each **Input Carrier Board** is a *full-length* card; the standard **Input Boards** are *half-length* cards.

    ~ Each **Input Carrier Board** provides four slots or **sockets** for hardware options, any of which will accept a **Dual Aspectizer Board** (4000A-050).

- The **Dual Aspectizer Board** is a **two-channel** board capable of aspectizing either two independent BNC inputs or a "bus-pair", for example BKGD and PST bus, on the same MLE.

- Any two of the eight physical BNC inputs on the associated **Input Carrier Board** can be defined as an input into the **Dual Aspectizer Board**.

Refer to Appendix C, "**Hardware Options**" in the *Synergy Series Installation Guide*, for mode operation details.

Installing a Dual Aspectizer Board

Use the following procedure to install a **Dual Aspectizer** board:

ESD Susceptibility | Static discharge can cause serious damage to sensitive semiconductor devices. Avoid handling the switcher circuit boards in high static environments such as carpeted areas and when synthetic fiber clothing is worn. Touch the frame to dissipate static charge before removing boards from the frame and exercise proper grounding precautions when working on circuit boards.

1. Ensure that the Synergy switcher is powered down.

2. If you have not already done so, carefully remove the **Input Carrier Board** on which you want to install one or more **Dual Aspectizer Boards**, and set it on a clean, flat, static free surface. Note that four sockets are available for installing optional boards.

3. Unpack the new **Dual Aspectizer Board**. Note that it has two 50-pin dual row connectors. Note also that there are no jumpers, LEDs, or other adjustments present on the board.

4. Identify the socket(s) on the **Input Carrier Board** in which you want to install the **Dual Aspectizer Board(s)**. For ease of accessibility, it is recommended that you use the sockets *closest* to the front edge of the **Input Carrier Board**.

5. Install the **Dual Aspectizer Board** as follows:

   • Carefully align the board over the host socket. Ensure that the components of the **Dual Aspectizer Board** are facing up.

   • Use your fingers to "feel" for the proper pin-to-socket alignment.

   • While applying downward pressure, slowly rock the board until it is fully seated. Avoid flexing the board so as not to bend the pins.

   • After installation, "sight" down the board at the connector level, to make sure that there are no exposed pins. It is recommended that you rotate the board 360 degrees to check all planes.

Caution | Failure to install a board with a precise 1:1 pin-to-socket orientation will damage the Synergy **Input Carrier Board**, the **Dual Aspectizer Board** — or both! Double-check your work!

6. When you have finished installing the **Dual Aspectizer Board(s)** on the **Input Carrier Board**, reinstall the **Input Carrier Board** using the instructions in the section "**Installing the Input Carrier Board**" on page 4–7.

This completes the procedure to install a **Dual Aspectizer Board**. You must repeat the procedure for each **Dual Aspectizer Board** that you wish to install.

Preparing the Dual Aspectizer Board for Upgrade

Use the following procedure to prepare the **Dual Aspectizer Boards** for the software upgrade:

ESD Susceptibility | Static discharge can cause serious damage to sensitive semiconductor devices. Avoid handling the switcher circuit boards in high static environments such as carpeted areas and when synthetic fiber clothing is worn. Touch the frame to dissipate static charge before removing boards from the frame and exercise proper grounding precautions when working on circuit boards.

Note | The software upgrade procedure will allow you to upgrade a maximum of two **Dual Aspectizer Boards**. If you have additional boards you want to upgrade you will have to repeat the procedure for the preparation and upgrade for each set.

1. Power **Off** the Synergy frame and control panel.

2. Identify the location of your **Dual Aspectizer Boards** on the **Input Carrier Boards**.

3. Remove all **Input Carrier Boards** that have **Dual Aspectizer Boards** installed on them and place them on a clean, flat, static free surface.

4. Remove any **Input Carrier Boards** or **Input Crosspoint Boards** that are installed in Input Slot One (the second slot from the top) of the Synergy frame.

✎ **Note** | There can be a *maximum* of two **Dual Aspectizer Boards** on the **Input Carrier Board** in order to perform the upgrade. If there are more than two Dual Aspectizer Boards on the Input Carrier Board, you will have to remove the excess Dual Aspectizer Boards.

5. If necessary, remove and install a **Dual Aspectizer Board** as follows:

   • Carefully remove the **Dual Aspectizer Board** from the current location on the **Input Carrier Board** by applying upward pressure and slowly rocking the board until it is fully unseated. Avoid flexing the board so as not to bend the pins.

   • Identify the socket on the **Input Carrier Board** in which you want to install the **Dual Aspectizer Board**.

   • Carefully align the **Dual Aspectizer Board** over the host socket. Ensure that the component side of the **Dual Aspectizer Board** is facing up.

   • Use your fingers to feel for the proper pin-to-socket alignment.

   • While applying downward pressure, slowly rock the **Dual Aspectizer Board** until it is fully seated. Avoid flexing the board so as not to bend the pins.

   • After installation, sight down the board at the connector level to make sure that there are no exposed pins. It is recommended that you rotate the board 360 degrees to check all angles.

⚠ **Caution** | Failure to install a board with a precise 1:1 pin-to-socket orientation will damage the **Input Carrier Board**, the **Dual Aspectizer Board** — or both! Double-check your work!

6. Install the **Input Carrier Board**, with the **Dual Aspectizer Boards**, into Input Slot One (the second slot from the top) of the Synergy frame.

✳ **Important** | Any **Dual Aspectizer Boards** installed on **Input Carrier Boards** not in Input Slots One and Two must be removed for the upgrade or they will have their current software deleted.

This completes the procedure to prepare the **Dual Aspectizer Boards** for the software upgrade. Now that the **Dual Aspectizer Boards** are prepared, you can proceed to install the software.

Upgrading the Dual Aspectizer Software

Use the following procedure to upgrade the Dual Aspectizer Software:

✎ **Note** | The software upgrade process takes approximately 10 minutes per **Dual Aspectizer Board**, so this could take 20 minutes if you are upgrading both boards. You can chose to perform the upgrade at a later time, if you wish.
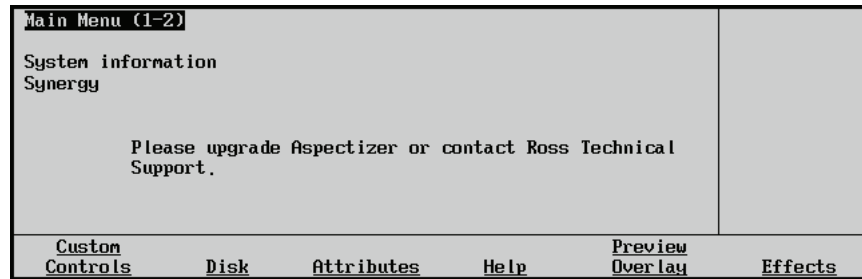
1. Power on the Synergy frame.

2. Power on the Synergy control panel.

<table>
<tr><td>⚠
✴</td><td>**Important**</td><td>After restoring power to the control panel, you may receive the error message, "USB Upgrade Failed", if you have the **USB Removable Media Drive** option installed. Contact Ross Video Technical Support for more information on correcting the error.</td></tr>
</table>

The control panel display will indicate that the Aspectizer should be upgraded.

```
Main Menu (1-2)

System information
Synergy


        Please upgrade Aspectizer or contact Ross Technical
        Support.



    Custom                                        Preview
    Controls        Disk      Attributes    Help  Overlay      Effects
```

Main Menu — Aspectizer Upgrade Required

3. Access the Aspectizer Upgrade software as follows:

   • Insert the **Aspectizer Upgrade Floppy Disk** into the floppy drive on the Synergy control panel.

   OR

   • Insert the USB key with the **Aspectizer Upgrade Software** into the USB port on the Synergy control panel.You must wait 5 seconds after inserting the USB key into the USB port before you can access the upgrade software.

<table>
<tr><td>✎</td><td>**Note**</td><td>You must have the **USB Removable Media Drive** option installed in order to use a USB key.</td></tr>
</table>

4. Navigate to the **Option Cards Menu** as follows:

   • Press **HOME** (to display the **Main Menu 1-2**).

   • **MORE** (to display the **Main Menu 2-2**).

   • **Setup** (to display the **Setup Menu**).

   • **Installation** (to display the **Installation Menu 1-2**).

   • **MORE** (to display the **Installation Menu 2-2**).

   • **Option Cards** (to display the **Option Cards Menu**).

```
Option Cards







                                                          Upgrade
    Ultimatte   Aspectizer                                Aspectizers
```

Option Cards Menu

5. Press **Upgrade Aspectizer** to start the upgrade process.

⚠️ **Caution** | Do NOT remove the floppy disk or USB key from the switcher before the LED on the disk drive or USB port goes out. Doing so may destroy the data on your floppy disk or USB key, as well as the data on the next one you insert into the switcher.

6. If you have additional **Dual Aspectizer Boards** that you wish to upgrade, you will have to repeat the Preparation and Software Upgrade procedures for each set of two before proceeding to the last step.

7. If you have relocated **Dual Aspectizer Boards** for the upgrade process, you can now return the newly upgraded cards to their original locations.

This completes the procedures for upgrading your Dual Aspectizer Board and software.

Finishing the Dual Aspectizer Setup

The following steps are required before the **Dual Aspectizer** option can function properly:

•   Connect and verify the physical switcher inputs, including reference, video, and alpha. Refer to the section, "**Connecting and Verifying Inputs**" in the *Synergy Series Installation Guide*, for instructions.

•   Set up the physical BNC connector with an input type. Refer to the section, "**Setting Up BNC Types**" in the *Synergy Series Installation Guide*, for instructions.

•   Map each BNC connector to a physical button on the Synergy control panel. Refer to the section, "**Setting Up Panel Buttons**" in the *Synergy Series Installation Guide*, for instructions.

•   Set up the *native aspect ratios* of a BNC input and an MLE output. Refer to the section, "**Aspect Ratio**" in the *Synergy Series Installation Guide*, for instructions.

Refer to the section, "**Dual Aspectizer Setup**" in the *Synergy Series Installation Guide* for more information on configuring your Aspectizer.
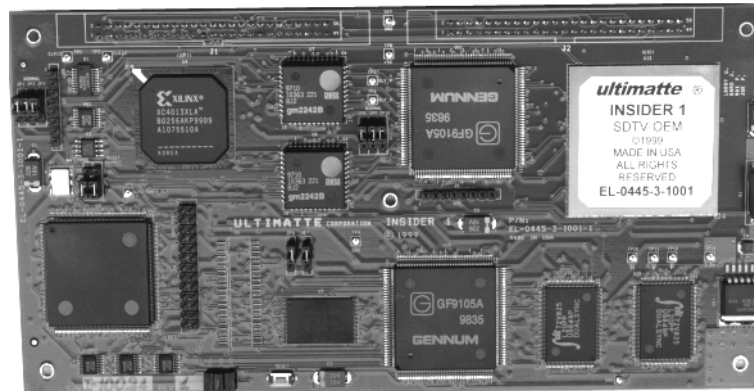
Ultimatte Insider™ Board

The figure below illustrates the **Ultimatte Insider Board** — an option card for the Synergy switcher that is manufactured by the Ultimatte Corporation.

Ultimatte Insider Board

The **Ultimatte Insider** Board accepts a single video input, via the **Input Carrier Board**, and generates one processed video (foreground) and one alpha (or matte) output using the exclusive Ultimatte process. When installed and properly configured, the "Ultimatte Key" can be assigned to a selected MLE keyer, replacing the Synergy's standard chroma key. A complete array of user menus are fully integrated with the option. Refer to Appendix C, "**Hardware Options**" of the *Synergy Series Installation Guide* for Ultimatte operation details.

Using the Ultimatte's matte signal in conjunction with a full linear mixer, the Synergy switcher can composite any background video source with the processed foreground. Up to four Ultimatte Insider boards can be installed on the **Input Carrier Board**, in any slot desired.

Note   There are no DIP switches on the **Ultimatte Insider Board**.

As a prerequisite, one or more **Input Carrier Boards** (4000A-005) must be installed in the Synergy switcher — replacing the standard **Input Board** for a selected set of eight BNC inputs.

- Each **Input Carrier Board** is a *full-length* card; the standard **Input Boards** are *half-length* cards.

- Each board provides four slots for hardware options, any of which can be assigned to the **Ultimatte Insider**.

- Each board has 8 inputs and 16 outputs. The 16 outputs are comprised of the 8 *original* inputs, plus 8 modified outputs that are generated from the installed option boards (two outputs per option board).

- Each **Ultimatte Insider** board generates two signals: a processed fill and a processed alpha signal.

Ultimatte Insider Board Installation

This section provides instructions for installing an **Ultimatte Insider Board** in the Synergy frame. A host **Input Carrier Board** is required. For information on installing the **Input Carrier Board**, refer to the section "**Input Carrier Board**" on page 4–6.

Use the following procedure to install the **Ultimatte Insider Board**:

ESD Susceptibility	Static discharge can cause serious damage to sensitive semiconductor devices. Avoid handling the switcher circuit boards in high static environments such as carpeted areas and when synthetic fiber clothing is worn. Touch the frame to dissipate static charge before removing boards from the frame and exercise proper grounding precautions when working on circuit boards.

1. Ensure that the Synergy frame is powered off.

Important	Ensure that the **MLE Carrier Board** is Issue 5 or higher. Otherwise, the **Ultimatte Insider Board** will generate invalid output.

2. If you have not already done so, remove the **Input Carrier Board** on which you want to install one or more **Ultimatte Insider** options, and set it on a clean, flat, static-free surface. Note that four sockets are available for installing option boards.

3. Unpack the new **Ultimatte Insider Board**. Note that it has two 50-pin dual row connectors.

4. Identify the socket(s) on the **Input Carrier Board** in which you want to install the **Ultimatte Insider Board**(s). For ease of accessibility, it is recommended that you use the sockets *closest* to the front edge of the **Input Carrier Board**.

5. Use the following table for Ultimatte Insider Board locations:

Ultimatte Insider Board Locations

For an Ultimatte Insider Board installed in:	Align Ultimatte Insider Sockets J1 and J2 with the following positions on the Input Carrier Board:
Socket 1	J103, J104
Socket 2	J203, J204
Socket 3	J303, J304
Socket 4	J403, J404

6. Install the **Ultimatte Insider Board** as follows:

- Align the board with the two 50-pin sockets towards the front of the board. Note that the text markings on the **Ultimatte Insider Board** will be upside down in relation to the front of the **Input Carrier Board**.

- Use your fingers to "feel" for the proper pin-to-socket alignment.

- While applying downward pressure, slowly rock the board until it is fully seated. Avoid flexing the board so as not to bend the pins.

- Once the board has been properly aligned, firmly press down on either side of the two Ultimatte Insider Board connectors.

Note | The connectors on the **Input Carrier Board** are shrouded to eliminate any misalignment problems. However, these connectors are quite stiff and do require a fair bit of force to properly seat the board.

7. Secure the board in five locations (one on each corner and one in the center) using quarter-inch 4-40 screws.

Note | When installing an Ultimatte Insider Board in **Socket 1** of the **Input Carrier Board**, note that it does *not* have a screw in the upper right hand corner.

8. Repeat for each **Ultimatte Insider Board** that you wish to install.

9. Carefully replace each **Input Carrier Board** in the chassis, and secure each one with the outer latches on the board edges.

10. Power on the Synergy frame.

This completes the procedure to install the Ultimatte Insider Board. Next you will verify that each Ultimatte Insider Board is properly installed.

Verifying the Ultimatte Insider Board

Use the following procedure to verify that each installed **Ultimatte Insider Board** is properly recognized by the Synergy switcher:

1. Navigate to the **Option Boards Menu** as follows:

- Press **HOME** (to display the **Main Menu 1-2**).

- **MORE** (to display the **Main Menu 2-2**).

- **Setup** (to display the **Setup Menu**).

- **Installed Options** (to display the **Installed Options Menu 1-2**).

2. Press **Option Boards** to display the **Option Boards Menu**.

```
Installed Options (1-2)
Frame Serial Number:F123456789

Board                      Rev  FPGA Rev                          Use Knob 2
Preview Overlay             2   4000-045.bit 1999/08/20 16:24:33  to scroll
DVE SEND SIMM (return)          Installed (No Rev Readback)       list.
MLE1                        5d  4000S140.bit 2004/10/21 13:33:47
                            5d  4000x140.bit 2002/06/27 18:07:03
 Squeeze & Tease                Not Purchased
 Border card                3a  4000-049.bit 2002/05/07 13:41:17

   Software      Panel        Frame      Option    Enter Serial
   Options       Boards       Boards     Boards       Number
```

Installed Options — Option Boards Menu

3. Use the middle knob to scroll the list to verify the Ultimatte Insider Board is recognized by the Synergy switcher.

This completes the procedure to verify that each new **Ultimatte Insider Board** is properly recognized by the system. For information on setting up the Ultimatte Insider Board for Bus Mode or Carrier Mode, refer to Appendix C, "**Hardware Options**" of the *Synergy Series Installation Guide*.

Ultimatte Insider Board Jumpers

There are ten factory-preset jumpers on the **Ultimatte Insider Board**. Leave the jumpers in their factory-preset, default positions.

Ultimatte Insider Board LEDs

There are three LEDs on the **Ultimatte Insider Board** — one red LED and two green LEDs. During bootup, the three LEDs indicate a particular status of the unit as follows:

- The red LED should be off after the board boots up. If it is not, a problem exists with the unit.

- The center green LED is the communications status indicator. It lights when communication is taking place between the host and the board.

- The right green LED is the board's heartbeat. Whenever a video signal exists at the input of the board and the microprocessor is running, the LED toggles every 120 fields.

MLE Carrier Board

In This Chapter

This chapter provides basic information about the **MLE Carrier Board**.

The following topics are discussed:

- MLE Carrier Board Components
- Removing or Installing the MLE Carrier Board
- Deserializer Module
- Serializer Module
- Serializer/Deserializer Module Installation Table
- Serializer/Deserializer Module Installation

MLE Carrier Board Components

The **MLE Carrier Board** (4000A-002) is a *full-length* board that can be built up (via options) to as many as three levels of circuit boards. The board houses up to four identical MLE "daughter" boards (4000A-140), one for each installed MLE. Each daughter board, in turn, has connectors for the optional **Squeeze & Tease Boards**, and the optional **Dual Border Generator Board** (4000A-049).

The figure below illustrates the **MLE Carrier Board**, with eight sections highlighted.
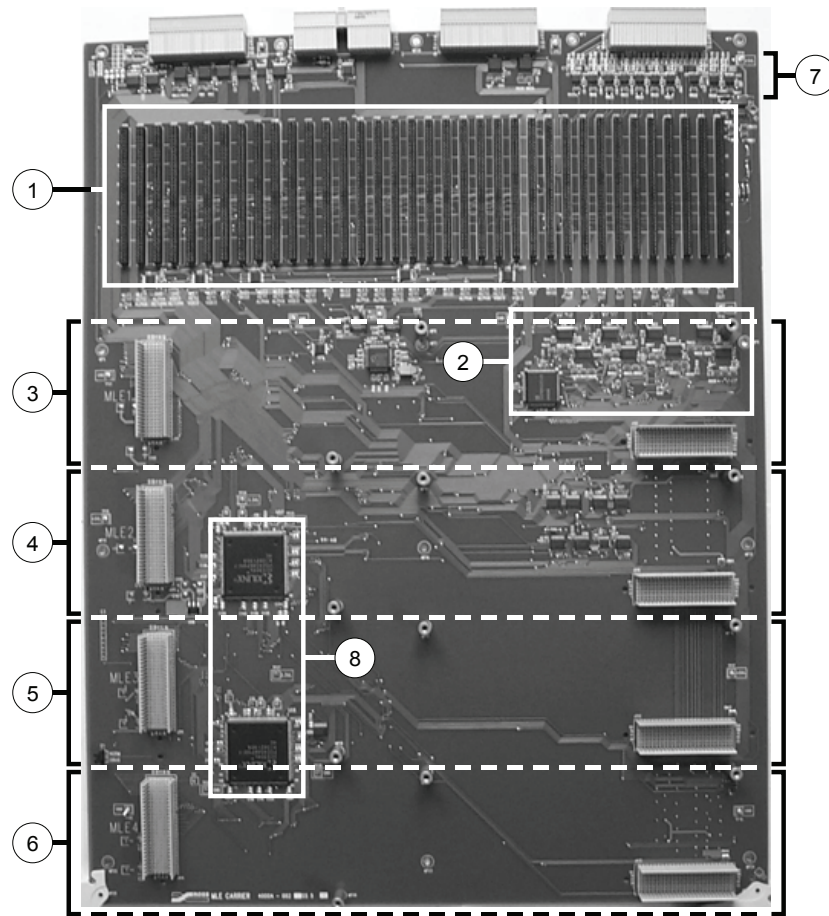
MLE Carrier Board

1) Serializer/Deserializer Section	4) MLE 2 Section	7) Output Drivers
2) Preview Matrix	5) MLE 3 Section	8) Key Processing
3) MLE 1 Section	6) MLE 4 Section	

1. **Serializer/Deserializer Section**

   The Serializer/Deserializer section includes individual sockets for 26 **Deserializer Modules** (4000A-061) and 10 **Serializer Modules** (4000A-062). Each slot is labeled as to the MLE and function for each module. Refer to the section, "**Deserializer Module**" on page 5–4 and the section, "**Serializer Module**" on page 5–5 for details on slot assignments and module functionality.

2. **Preview Matrix**

   The **Preview Matrix** section contains the circuitry for the standard Preview Matrix. Program and Preset signals from each MLE are routed to the matrix, which feeds the main Preview output and the **Preview Overlay** option, on the **Frame CPU Board**. Refer to the section, "**Preview Matrix**" on page 2–20 for additional details.

3. **MLE 1 Section**

   The MLE 1 section houses the **MLE 1** "daughter" **Board**. A label on the board identifies the section. Two multi-pin connectors are used to mount the MLE Board, which in turn can house the optional **Dual Border Generator** and **Squeeze & Tease** boards. All MLE boards are interchangeable, regardless of the switcher model. If an MLE is installed, its associated **Serializer** and **Deserializer** modules must also be installed in the **Serializer/Deserializer Section**. Refer to the section, "**Deserializer Module**" on page 5–5 for details.

4. **MLE 2 Section**

   The MLE 2 section houses the **MLE 2** "daughter" **Board.** This section is identical to the MLE 1 section in functionality and connectors.

5. **MLE 3 Section**

   The MLE 3 Section houses the **MLE 3** "daughter" **Board**. This section is identical to the MLE 1 section in functionality and connectors.

6. **MLE 4 Section**

   The MLE 4 Section houses the **MLE 4** "daughter" **Board**. This section is identical to the MLE 1 section in functionality and connectors.

7. **Output Drivers**

   The Output Driver chips are always installed for all four MLEs, regardless of whether or not the individual MLE modules are installed.

8. **Key Processing**

   The two components in the **Key Processing** section enhance the quality of additive (shaped) keys.

> **Note** There are no DIP switches, jumpers, or LEDs on the **MLE Carrier Board**.

Removing or Installing the MLE Carrier Board

As required for a system update or upgrade, use the following procedure to remove or install the **MLE Carrier Board**:

⚠️	**Caution**	Static discharge can cause serious damage to sensitive semiconductor devices. Avoid handling the switcher circuit boards in high static environments such as carpeted areas and when synthetic fiber clothing is worn. Touch the frame to dissipate static charge before removing boards from the frame and exercise proper grounding precautions when working on circuit boards.

1. Power down the Synergy frame.

2. Carefully remove the **MLE Carrier Board** from the Synergy frame, and set it on a clean, flat, static-free surface.

3. Perform the required update or upgrade procedure(s).

4. Re-install the board as follows:

   • Align the board with the guide rails and push the board in.

   • When the board stops sliding, push firmly to seat the board.

   • Secure the board with the ejector tabs.

5. Power on the Synergy frame.

This completes the procedure to remove or install the **MLE Carrier Board.**
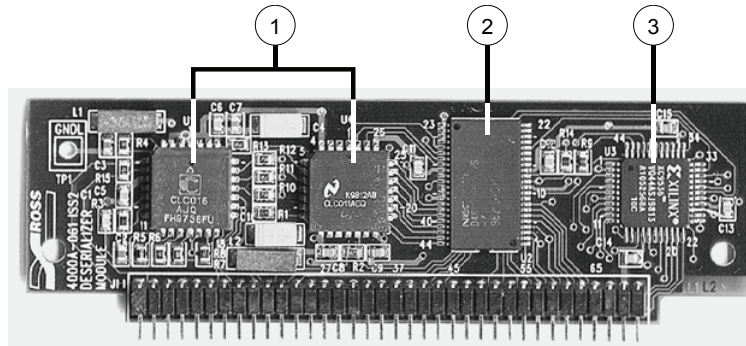
Deserializer Module

The **Deserializer Module** (4000A-061) receive serial data and output parallel data, in preparation for processing video within the MLE. A single module processes one bus.

The figure below illustrates a simplified block diagram, as the input buses are routed through a *bank* of Deserializer Modules. Refer to the section, "**Block Diagram**" on page 2–2 for an expanded view.
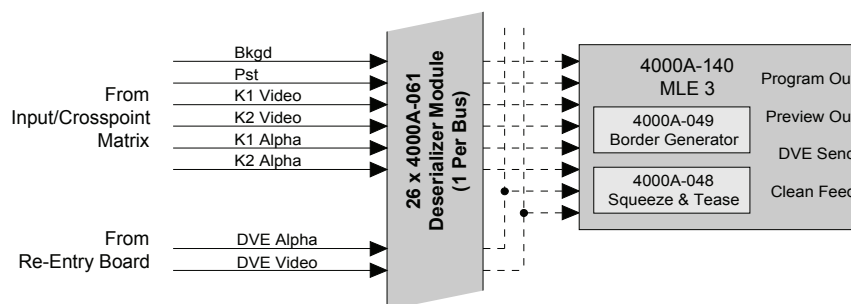
Deserializer Module — Input Buses

The figure "**Deserializer Module**" on page 5–5 illustrates a **Deserializer Module**, with four chips highlighted.

Deserializer Module

| 1) Serial/Parallel Translation Chips | 2) Delay Memory | 3) FPGA |

The components are explained in the following section.

1. **Serial/Parallel Translation Chips**

   These chips provide the translation functionality from serial data to parallel data.

2. **Delay Memory**

   This chip provides the delay memory required to handle auto timing.

3. **FPGA**

   This chip is the flash-based FPGA that controls the deserializing process and auto-timing requirements.

| | **Note** | All **Deserializer Modules** are identical. If a critical module fails (such as Background), you can swap a module from a non-critical location (such as an unused timed Aux Bus slot) in order to continue production. You can *not* hot-swap modules. |

Serializer Module

The **Serializer Module** (4000A-062) receive parallel data and output serial data, in preparation for routing video to the Program Matrix, to the individual MLE outputs, and back to the **Re-Entry Board**. A single module processes one bus.

The figure below illustrates a simplified block diagram, as the MLE output buses are routed through individual Serializer Modules. Refer to the section, "**Block Diagram**" on page 2–2 for an expanded view.
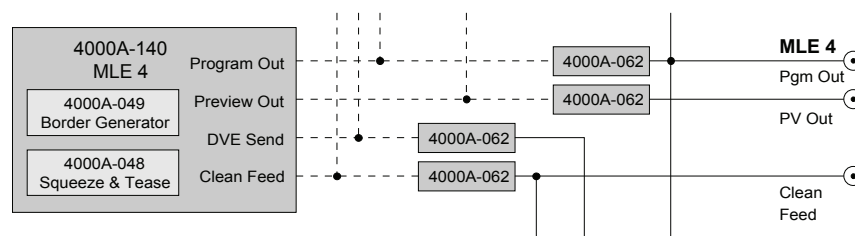
Serializer Module — MLE Output Buses

The figure below illustrates a **Serializer Module**, with two chips highlighted.
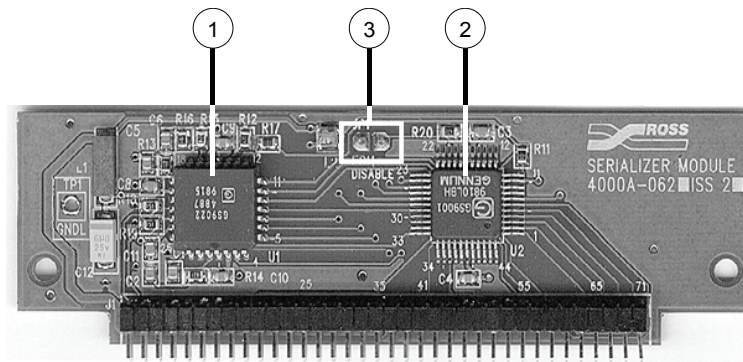
Serializer Module

1) Parallel/Serial Translation Chip	2) EDH Inserter	3) EDH Disable Jumper

Each component is discussed in the following section.

1. Parallel/Serial Translation Chip

This chip provides the translation functionality from parallel data to serial data.

2. EDH Inserter

This chip provides EDH (Error Detection Handling) and check sum functionality.

3. EDH Disable Jumper

This jumper disables the normal insertion of EDH checkwords into the output video stream.

To disable EDH insertion, simply short this jumper with a wire or solder dot. Note that doing this will often result in EDH checksum errors on the switcher output. Since the switcher manipulates the video, the resultant image's EDH checksum will no longer match that of the original input video, and may be flagged as an error by downstream equipment.

Note All **Serializer Modules** are the same. In case of failure of a critical module, such as Program, you can swap a module from a non-critical location, such as an MLE Preview slot, in order to continue production. You can *not* hot-swap modules.

Serializer/Deserializer Module Installation Table

The following table lists which specific **Serializer Modules** and **Deserializer Modules** must be installed on the **MLE Carrier Board** — when you add an MLE or the DVE Send option to your Synergy switcher. Note the following when consulting the table:

- **Module Name** (Column 1) — This column lists all 36 modules (26 x Deserializer, 10 x Serializer), as they appear on the **MLE Carrier Board** from left to right. The silk screen labels on the board are identical to the labels listed below.

  The first 26 sockets (starting from the left) are inputs to the MLEs, and are reserved for **Deserializer** modules. The next 10 sockets are outputs from the MLEs, and are reserved for **Serializer** modules.

- Column 2 — This column lists the "**J**" number for each module.

- Columns 3 through 8 — These columns list each MLE and option. An "**X**" indicates a module that must be installed in the socket.

  Note that the **DVE Alpha** and **DVE Video** returns are "nested" in the middle of the Deserializer slots of MLE 1. These two Deserializers are global, and shared between all MLEs.

✎ **Note** The function of each **Serializer** and **Deserializer** module is labeled on the **MLE Carrier Board**, directly below the socket.

Serializer/Deserializer Module Installation

Module Name (Label)	J #	MLE 1	MLE 2	MLE 3	MLE 4	Clean Feed	DVE Send
Input Deserializer Modules							
MLE 1 Key 1 Alpha	J106	X					
MLE 1 Key 2 Alpha	J108	X					
DVE Alpha Return	J502						X
DVE Video Return	J501						X
MLE 1 Key 2 Video	J107	X					
MLE 1 Key 1 Video	J105	X					
MLE 1 Preset	J104	X					
MLE 1 Background	J103	X					
MLE 2 Key 1 Alpha	J206		X				
MLE 2 Key 2 Alpha	J208		X				
MLE 2 Key 2 Video	J207		X				
MLE 2 Key 1 Video	J205		X				
MLE 2 Preset	J204		X				
MLE 2 Background	J203		X				
MLE 3 Key 1 Alpha	J306			X			
MLE 3 Key 2 Alpha	J308			X			
MLE 3 Key 2 Video	J307			X			
MLE 3 Key 1 Video	J305			X			

Module Name (Label)	J #	MLE 1	MLE 2	MLE 3	MLE 4	Clean Feed	DVE Send
MLE 3 Preset	J304			X			
MLE 3 Background	J303			X			
MLE 4 Key 1 Alpha	J406				X		
MLE 4 Key 2 Alpha	J408				X		
MLE 4 Key 2 Video	J407				X		
MLE 4 Key 1 Video	J405				X		
MLE 4 Preset	J404				X		
MLE 4 Background	J403				X		
Output Serializer Modules							
MLE 1 Pgm Out	J109	X					
MLE 1 Pvw Out	J110	X					
MLE 2 Pgm Out	J209		X				
MLE 2 Pvw Out	J210		X				
MLE 3 Pgm Out	J309			X			
MLE 3 Pvw Out	J310			X			
MLE 4 Pgm Out	J409				X		
DVE Send	J503						X
Clean Feed	J601					X	
MLE 4 Pvw Out	J410				X		

Serializer/Deserializer Module Installation

Installing Serializer and Deserializer modules should only be required when you add an MLE in the field, or in the event of an upgrade or a component failure.

- An indication that a Deserializer needs replacing would be if all inputs do not work on a particular bus. For example, if you get noise and static when you select crosspoints.

- An indication that a Serializer needs replacing would be if you do not get an output from an MLE, or you do not get a re-entry signal.

Notes on Installing the Modules

Note the following important points regarding Serializer/Deserializer Module installation:

- Do not install or remove the modules with the **MLE Carrier Board** on an extender. Perform the procedure with the **MLE Carrier Board** removed, and placed on a flat, stable surface.

- Modules must be installed with their components facing to the left side of the board, when viewed from the front.

- As you install a module, all the of pins on the module must line up properly with the socket. If not, damage can result.

Removing or Installing a Module

Use the following procedure to remove or install a Serializer or Deserializer Module:

Caution | Static discharge can cause serious damage to sensitive semiconductor devices. Avoid handling the switcher circuit boards in high static environments such as carpeted areas and when synthetic fiber clothing is worn. Touch the frame to dissipate static charge before removing boards from the frame and exercise proper grounding precautions when working on circuit boards.

1. Ensure that the Synergy switcher is powered down.

2. Ensure the **MLE Carrier Board** is removed and placed on a clean, flat, static-free surface.

3. Locate the desired Serializer or Deserializer Module(s) on the **MLE Carrier PCB**. Refer to the table, "**Serializer/Deserializer Module Installation**" on page 5–7 for reference as required.

4. Remove a module as follows:

   • Hold the module firmly.

   • While applying upward pressure, *slowly* rock the module horizontally (from side to side), until the module pulls out of the socket. Avoid pulling the board out too quickly — so as not to bend the pins.

5. Install a new module as follows:

   • Carefully align the module over the socket.

   • Ensure that the board components are facing to the left.

   • Use your fingers to "feel" for the proper pin-to-socket alignment.

   • While applying downward pressure, slowly rock the module vertically (top to bottom), until the module is fully seated. Avoid flexing the board — so as not to bend the pins.

6. After installation, "sight" down the board at the connector level, to make sure that there are no exposed pins.

Caution | Failure to reinstall a module with a precise 1:1 pin-to-socket orientation will damage the **MLE Carrier PCB**, the selected module — or both! Double check your work!

This completes the procedure to remove or install a Serializer or Deserializer Module.

MLE Board and Options

In This Chapter

This chapter provides basic information about the **MLE Board** and the optional boards (and other hardware options) that install on it.

The following topics are discussed:

- MLE Board
- Removing or Installing the MLE Board
- MLE Board Jumpers
- Optional Boards
- Squeeze & Tease 2D Board
- Removing or Installing the Squeeze & Tease 2D Option
- Squeeze & Tease 2D Board Jumpers
- Squeeze & Tease 3D/WARP Board
- Removing or Installing the Squeeze & Tease 3D/WARP Board
- Installing the Squeeze & Tease 3D Fan Assembly
- Installing DataLink/Fan and DataLink Cables
- Squeeze & Tease 3D/WARP Software Upgrade
- Dual Border Generator
- Removing or Installing the Dual Border Generator

MLE Board

Up to four **MLE** "daughter" **Boards** (4000A-140) can be installed on the **MLE Carrier Board**, as shown in the figure below. Each board has two 125-pin connectors (set at right angles to each other), and three holes that align with permanent standoffs on the **MLE Carrier Board**.

The **MLE Board** can actually be considered as an option, because you can *add* MLEs to your system in the field. For example, if you purchased a Synergy 4 control panel with only three MLEs installed, you could add an MLE as your production needs grow. The figure below illustrates a top view of the **MLE Board**.
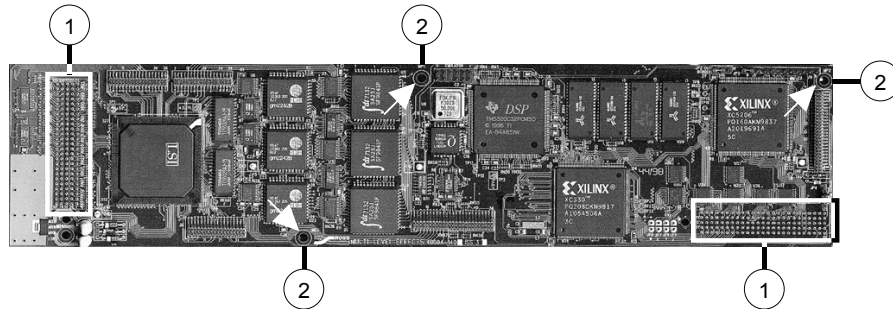
MLE Board

1) 125-Pin Connectors	2) Standoff Holes

Each MLE Board is identical, and any **MLE Board** can be installed in any location on the **MLE Carrier Board** — per the requirements of your system.

Note   The board above is shown *without* the optional **Dual Border Generator** or **Squeeze & Tease** boards installed.

Removing or Installing the MLE Board

Use the following procedure to remove or install an **MLE Board**:

Caution   Static discharge can cause serious damage to sensitive semiconductor devices. Avoid handling the switcher circuit boards in high static environments such as carpeted areas and when synthetic fiber clothing is worn. Touch the frame to dissipate static charge before removing boards from the frame and exercise proper grounding precautions when working on circuit boards.

1. Power down the Synergy frame.

2. Carefully remove the **MLE Carrier Board** from the Synergy frame, and set it on a clean, flat, static-free surface.

3. If the optional **Dual Border Generator** or **Squeeze & Tease Boards** are installed on the **MLE Board**, these must both be removed *first*, before you can remove the **MLE Board**. Refer to the appropriate section for removal instructions.

4. Remove a **MLE Board** as follows:

- Locate the **MLE Board** that you wish to remove.

- Loosen and remove the screw-in standoffs located at **MP1**, **MP2** and **MP3**, and set them aside in a safe place.

- While applying upward pressure, slowly rock each connector out of its socket, being careful to avoid flexing the board too much — so as not to bend the pins. Flexing the board too much may cause damage to the board and the connector pins.

- Set the board aside on a clean, flat, static-free surface.

5. Install the new **MLE Board** as follows:

- If protective plastic shrouds are installed over the 125-pin connectors on the **MLE Carrier Board**, remove and store them.

- Carefully align the **MLE Board** over the left-hand *vertical* socket and the right-hand *horizontal* socket. Use your fingers to "feel" for the proper shroud-to-socket alignment.

- Once aligned, push down on either side of each connector, until the board is fully seated.

- Replace and tighten the screw-in standoffs to secure the board. Do not over tighten the screws.

⚠	**Caution**	Over-tightening the screw-in standoffs will result in the standoff being sheared off.

- If a Squeeze & Tease Board, or a Dual Border Generator was installed on top of the MLE board, refer to the appropriate section for replacement details.

✎	**Note**	If this is a *new* **MLE Board** that you are installing in your Synergy switcher (for example, when you are upgrading a Synergy 4 from a 3 MLE system to a 4 MLE system), the appropriate **Serializer** and **Deserializer** modules must also be installed. Refer to the section "**MLE Carrier Board Components**" on page 5–2 for detailed instructions.

This completes the procedure to remove or install an **MLE Board**.

MLE Board Jumpers

Three jumpers are located on the **MLE Board**, as shown below:
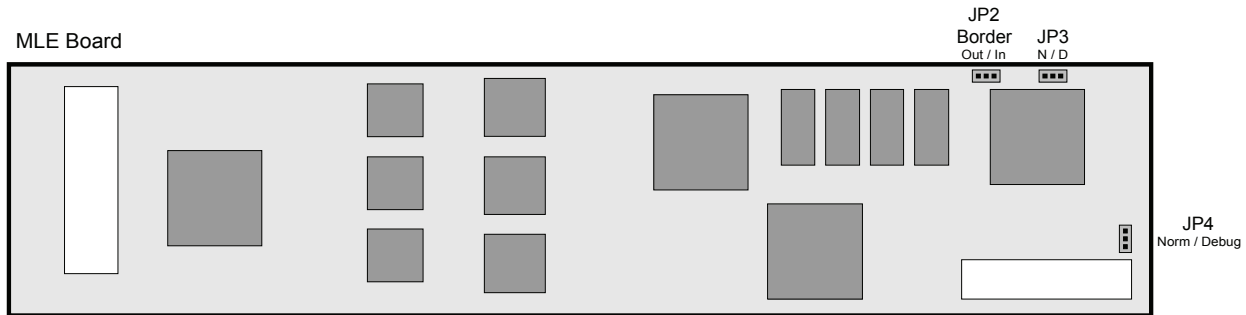
MLE Board — Location of Jumpers

Each component is described in the following section.

- **Border Jumper (JP2)**

  Border is a two-position jumper that controls the operation of the optional **Dual Border Generator** as follows:

  ~ Set **JP2** to the **IN** position if a **Dual Border Generator** is installed on this **MLE Board**.

  ~ Set **JP2** to the **OUT** position if a **Dual Border Generator** is not installed on this **MLE Board**.

  If the jumper is not set correctly, the option may not function properly.

- **N/D Jumper (JP3)**

  Leave the jumper in the **N** position.

- **Debug Jumper (JP4)**

  Leave the jumper in the **Norm** position.

Optional Boards

Three optional boards install on top of the **MLE Board**:

- Squeeze & Tease 2D Board
- Squeeze & Tease 3D/WARP Board
- Dual Border Generator

Note | All option boards are the same for all four MLEs. In case of failure of a critical option board, you can swap a board from a non-critical location in order to continue production. You can *not* hot-swap boards. When you move a board from one MLE to another, the system adapts accordingly.

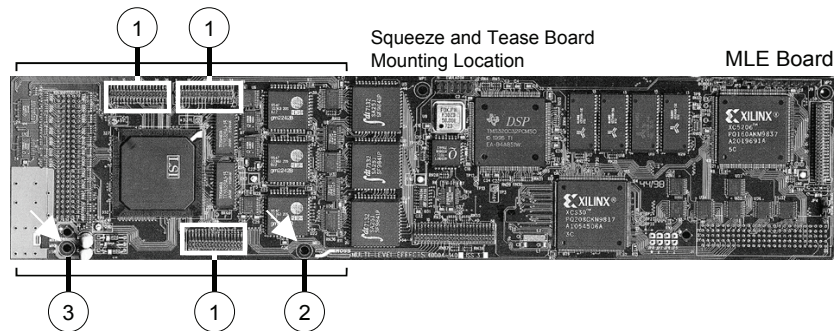Each option board is discussed in detail in the following sections.

Squeeze & Tease 2D Board

The figure below illustrates the **Squeeze & Tease 2D Board**.
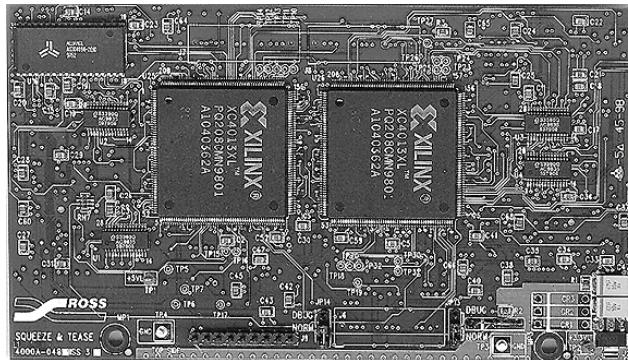
Squeeze & Tease 2D Board

The **Squeeze & Tease 2D Board** installs on the left side of the **MLE Board**, as indicated in the figure below. The board mates with three connectors as shown, plus two mounting standoffs.

Squeeze & Tease 2D Board Location and Mounting

1) Mounting Connectors	2) Standoff Location (Base Level)	3) Fixed Standoff Location

Note that the standoff location labeled (**2**) secures the base level **MLE Carrier Board** and continues up to the **Squeeze & Tease 2D Board**. The fixed standoff location labeled (**3**) is *only* secured to the **MLE Board** — it does not support the MLE Board from the base level **MLE Carrier Board**. This standoff does not need to be removed when you remove the **MLE Board**.

> **Note** This standoff and mounting hole may not be present on all MLE Boards.

Removing or Installing the Squeeze & Tease 2D Option

Use the following procedure to remove or install the optional **Squeeze & Tease 2D Option**:

	Caution	Static discharge can cause serious damage to sensitive semiconductor devices. Avoid handling the switcher circuit boards in high static environments such as carpeted areas and when synthetic fiber clothing is worn. Touch the frame to dissipate static charge before removing boards from the frame and exercise proper grounding precautions when working on circuit boards.

1. Power down the Synergy frame.

2. Carefully remove the **MLE Carrier Board** from the Synergy frame, and set it on a clean, flat, static-free surface.

3. To remove the **Squeeze & Tease 2D Board**:

    •   Locate the **Squeeze & Tease 2D Board** that you wish to remove.

    •   Loosen and remove the mounting screws from the holes and set them aside in a safe place.

    •   While applying upward pressure, slowly rock each connector out of its socket, being careful to avoid flexing the board too much so as not to bend the pins.

    •   Set the board aside on a clean, flat, static-free surface.

    •   If you need to remove the MLE Board below, remove the standoff (with integral screw base) at the location labeled (**2**) in the figure above. This standoff secures the **Squeeze & Tease 2D Board** to the **MLE Board**, but it also continues through to the base level **MLE Carrier Board**.

    •   Set the standoff aside in a safe place.

    •   If installed, the optional **Dual Border Generator** must *also* be removed. Refer to the section "**Removing or Installing the Dual Border Generator**" on page 6–22 for details.

        For additional **MLE Board** removal instructions, refer to the section "**Removing or Installing the MLE Board**" on page 6–2.

4. Install the **Squeeze & Tease 2D Board** as follows:

    •   If protective plastic shrouds are installed over the target connectors on the **MLE Board**, remove and store them.

    •   If the **MLE Board** that held the **Squeeze & Tease 2D Board** was removed, reinstall it first, and be sure to replace the standoff into the **MLE Board** at location (2) in the figure above. Refer to the section "**Removing or Installing the MLE Board**" on page 6–2 for additional **MLE Board** installation details.

        If there is a mounting hole at position (**3**) on the **MLE Board** and no standoff is installed, install a standoff at position (**3**) and secure it with a nut on the bottom of the **MLE Board**.

    •   Carefully align the **Squeeze & Tease 2D Board** over headers (**J6**, **J7** and **J8**) on the **MLE Board**.

    •   Use your fingers to "feel" for the proper shroud-to-socket alignment. In addition, check that the standoffs align with the mounting holes.

    •   Once aligned, push down on either side of each connector, until the board is fully seated.

- Replace and tighten the mounting screws to secure the board. Do not over tighten the screws.

- Double check the alignment of the **Squeeze & Tease 2D Board** by sighting down the connectors. No pins should be visible where the header meets the card.

This completes the procedure to remove or install the optional **Squeeze & Tease 2D Board**.

Squeeze & Tease 2D Board Jumpers

Two jumpers are located along the bottom edge of the **Squeeze & Tease 2D Board**, as shown below:
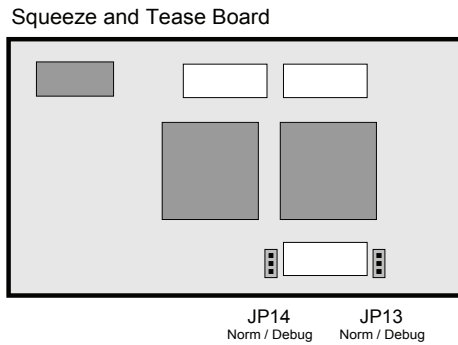
Squeeze & Tease 2D Board — Jumper Locations

- **JP13**

  Leave the jumper in the **Norm** position.

- **JP14**

  Leave the jumper in the **Norm** position.

Squeeze & Tease 3D/WARP Board

This section provides instructions for installing the **Squeeze & Tease 3D / WARP** option on the Synergy 2, 3, 4 MLE Board.

⚠	**Caution**	Make sure you have upgraded your switcher software to the same version as the **Squeeze & Tease 3D / WARP** software. The switcher software *must* be upgraded *before* attempting to install or upgrade **Squeeze & Tease 3D / WARP**. Refer to the section "**Software Upgrade**" on page 3–9 for details on upgrading your switcher software.

The **Squeeze & Tease 3D/WARP Board** installs on the left side of the **MLE Board**, as indicated in the figure below. The **Squeeze & Tease 3D/WARP Board** mates with three sockets (connectors) and two mounting standoffs, as shown below.
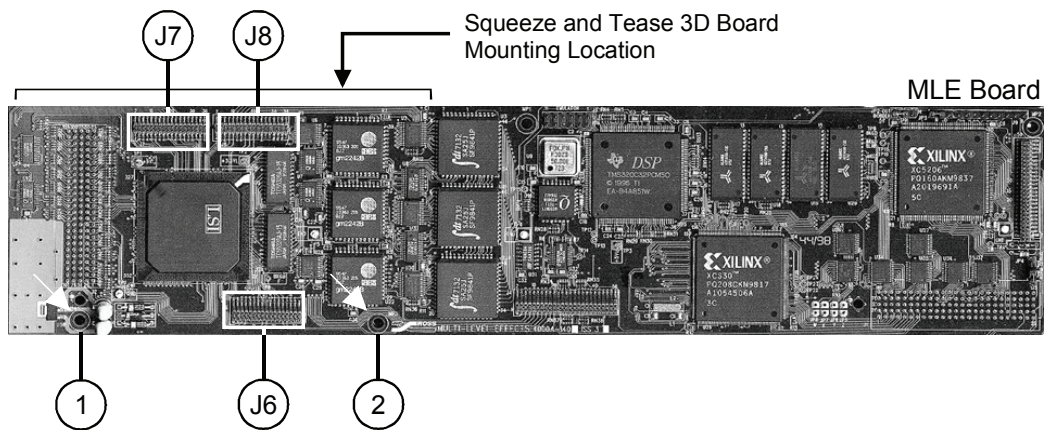
Squeeze & Tease 3D / WARP Board – Location and Mounting

Note that the standoff location labeled (**2**) secures the base level **MLE Carrier Board** and continues up to the **Squeeze & Tease 3D/WARP Board**. The fixed standoff location labeled (**1**) is *only* secured to the MLE Board — it does not support the **MLE Board** from the base level **MLE Carrier Board**. This standoff does not need to be removed when you remove the MLE Board.

✎	**Note**	This standoff and mounting hole may not be present on all **MLE** boards.

⚠	**Caution**	In order to provide adequate ventilation for the **Squeeze & Tease 3D/WARP** Board, the following instructions **must** be followed. 1. For all systems with a **Squeeze & Tease 3D/WARP** option installed, the ambient temperature maximum is 40° Celsius. 2. The fan inlet filter must be kept clean and free of obstructions.

Removing or Installing the Squeeze & Tease 3D/WARP Board

Use the following procedure to install the **Squeeze & Tease 3D/WARP** option:

	Caution	Static discharge can cause serious damage to sensitive semiconductor devices. Avoid handling the switcher circuit boards in high static environments such as carpeted areas and when synthetic fiber clothing is worn. Touch the frame to dissipate static charge before removing boards from the frame and exercise proper grounding precautions when working on circuit boards.

1. Power down the Synergy frame.

2. Carefully remove the **MLE Carrier Board** from the Synergy frame, and set it on a clean, flat, static-free surface.

3. To remove an existing **Squeeze & Tease Board**:

    *   Locate the **Squeeze & Tease Board** that you wish to remove.

    *   Loosen and remove the mounting screws from the holes and set them aside in a safe place.

    *   While applying upward pressure, slowly rock each connector out of its socket, being careful to avoid flexing the board too much — so as not to bend the pins.

    *   Set the board aside on a clean, flat, static-free surface.

4. If you need to remove the **MLE Board** that is underneath the **Squeeze & Tease 3D/WARP** Board, remove the standoff (with integral screw base) at the location labeled (2) in the figure above. This standoff secures the **Squeeze & Tease Board** to the **MLE** board, but it also continues through to the base level **MLE Carrier Board**. Set the standoff aside in a safe place.

5. If installed, the optional Dual Border Generator must *also* be removed. Refer to the section "**Removing or Installing the Dual Border Generator**" on page 6–22 for details. For additional **MLE Board** removal instructions, refer to the section "**Removing or Installing the MLE Board**" on page 6–2.

6. Install a **Squeeze & Tease 3D/WARP Board** as follows:

    *   If protective plastic shrouds are installed over the target connectors on the **MLE Board**, remove and store them.

    *   If the **MLE Board** that held the previous **Squeeze & Tease Board** was removed, reinstall it first, and be sure to replace the standoff into the **MLE Board** at location (**2**) in the figure above. Refer to the section "**Removing or Installing the MLE Board**" on page 6–2 for additional **MLE Board** installation details.

    *   If there is a mounting hole at position (**1**) on the **MLE Board** and no standoff is installed, install a standoff at position (**1**) and secure it with a nut on the bottom of the **MLE Board**.

    *   The three **MLE Board** sockets will mate with the three headers on the **Squeeze & Tease 3D/WARP Board**. The **Squeeze & Tease 3D/WARP** headers are labeled **J1**, **J2**, and **J3** (as displayed in the figure "**Squeeze & Tease 3D / WARP Board – Location and Mounting**" on page 6–8).

    *   The header-to-socket mating pattern is **J1 → J7**, **J2 → J6**, and **J3 → J8**.

    *   Carefully align the **Squeeze & Tease 3D/WARP Board** over sockets on the **MLE Board**. Use your fingers to "feel" for the proper header-to-socket alignment. In addition, check that the standoffs align with the mounting holes.

- Once aligned, push down on either side of each connector, until the board is fully seated.

7. Replace and tighten the mounting screws to secure the board. Do not over tighten the screws.

8. Double check the alignment of the **Squeeze & Tease 3D/WARP** Board by sighting down the connectors.

|	**Note**	The **J3** header on the **Squeeze & Tease 3D/WARP Board** is a 50-pin connector. It mates with a 36-pin socket (**J8**) on the **MLE Board**. Once the board is fully seated, there will be seven (7) pairs of pins on the **Squeeze & Tease 3D/WARP** Board's **J3** connector that are *not* mated. This is the correct configuration.
	Caution	Failure to install the **Squeeze & Tease 3D/WARP Board** with a precise 1:1 header-to-socket orientation (with the exception of the **J3** to **J8** connectors) will damage the **Synergy MLE Board**, the selected module — or both! Double-check your work!

9. When complete, carefully replace the **Synergy MLE Board** into the Synergy frame, and secure with the outer latches on the board edges.

This completes the installation for the **Squeeze & Tease 3D / WARP** option on the **MLE Board**. Next you will install the Squeeze & Tease 3D Fan Assembly.

Installing the Squeeze & Tease 3D Fan Assembly

	Caution	In order to provide adequate ventilation for the **Squeeze & Tease 3D/WARP Board**, the following instructions **must** be followed.
		For all systems with a **Squeeze & Tease 3D/WARP** option installed, the ambient temperature maximum is 40° Celsius.
		The fan inlet filter must be kept clean and free of obstructions.
	Important	The Fan used for WARP cards is the same as the fan used for 3D cards, therefore these instructions are used in both situations.

This fan provides adequate ventilation for the card and prevents damage caused by high ambient temperatures. It is recommended that you replace the fan every 5 years. If you need a replacement fan, please contact Ross Video Technical Support.

Use the following procedure to install the Squeeze & Tease 3D Fan assembly:

1. Turn off the power to the frame and carefully remove the **MLE Carrier** (4000A-002) from the chassis. Set it on a clean, flat, static free surface, with the front of the board toward you.

2. Locate the **Squeeze & Tease 3D Board** that is mounted on the left side of the **MLE Board**.

3. Carefully unpack the Squeeze & Tease 3D fan assembly (4000A-248), consisting of the fan assembly itself, a 10-pin ribbon cable, 2 hex standoffs, and two 3/8" long screws.

4. Attach one end of the ribbon cable to the 8-pin connector (**J6**) near the top center of the **Squeeze & Tease 3D** card.

Although the socket on the cable is 10-pin, it will always seat correctly, as it is restricted by the space between this connector and the 20-pin connector next to it.

5. Insert and tighten the threaded ends of the 2 standoffs to the front edge of the **Squeeze & Tease 3D** card, in the holes identified as **MP1** and **MP2**.

6. With the oblique angle on the upper left corner, attach the ribbon cable connector to the 10-pin connector at the top of the **Squeeze & Tease 3D Fan** assembly card.

7. Position the fan assembly on top of the standoffs, with the standoffs aligned with their respective holes on the fan assembly card (**MP1** to **MP1** and **MP2** to **MP2**).

8. Insert and tighten the 2 screws, taking care not to over tighten them. Refer to the following diagram:

Cable Assembly

3/8" Screws

Hex Standoffs
(Thread into mounting
holes MP1 and MP2)

Fan Assembly Synergy 2 - 4 Frame
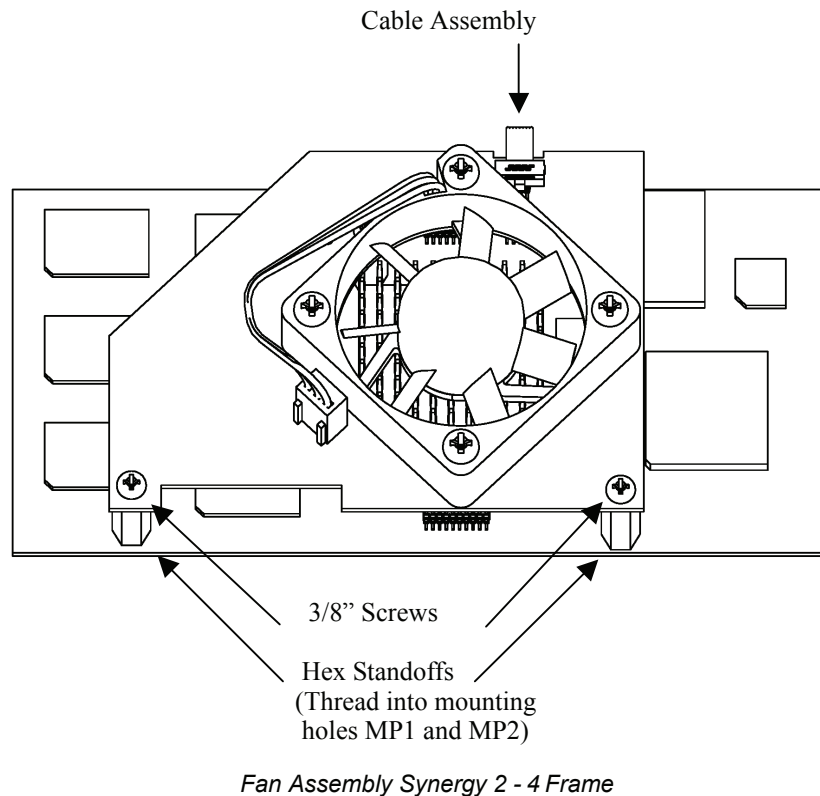
9. When complete, carefully replace the **MLE Carrier** into the Synergy frame, and secure with the outer latches on the board edges.

This completes the instructions for installing the Squeeze & Tease 3D Fan assembly on the **Squeeze & Tease 3D** card within the Synergy series frame. Contact Ross Video Technical Support if any further assistance is required.

Installing DataLink/Fan and DataLink Cables

If you have more than one **Squeeze & Tease 3D / WARP** card, you can link them together to share StillStore images across MLEs. DataLink/Fan and DataLink cables are provided in 1, 4, and 7 inch lengths.
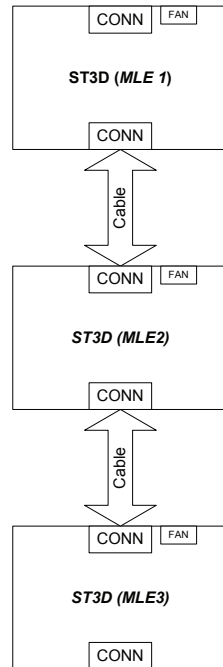
Connecting Multiple Squeeze & Tease 3D Cards

There are three possible configurations of multiple 3D cards:

- **Multiple Issue 4, Squeeze & Tease WARP Cards**

  This configuration requires multiple DataLink Connector and Fan cables. Refer to the section "**Connecting Multiple Issue 4, Squeeze & Tease WARP Cards**" on page 6–13 for details.

- **Multiple Issue 2 or 3, Squeeze & Tease 3D Cards**

  This configuration requires multiple DataLink/Fan cables. Refer to the section "**Connecting Multiple Issue 2 or 3, Squeeze & Tease 3D Cards**" on page 6–15 for details.

- **A combination of Issue 4, Squeeze & Tease WARP and Issue 2 or 3, 3D Cards**

  This configuration requires a combination of DataLink/Fan and DataLink Connector cables and Fan cables. Refer to the section "**Connecting Combinations of Squeeze & Tease Cards**" on page 6–17 for details.

Connecting Multiple Issue 4, Squeeze & Tease WARP Cards

An Issue 4, **Squeeze & Tease WARP** Card is provided with a DataLink Connector cable in 1, 4, or 7 inch lengths and the Fan Assembly is provided with a 1 inch 10-pin ribbon cable.
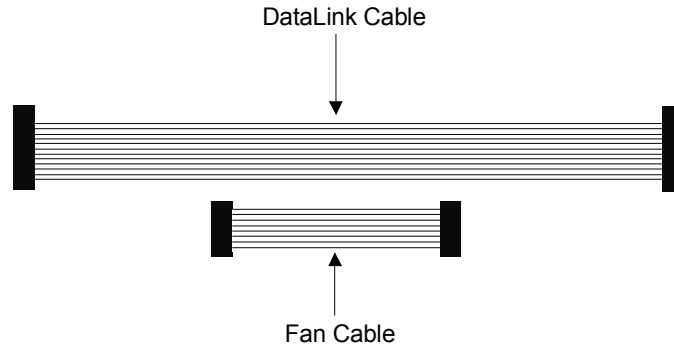
DataLink Cable and Fan Cable for Issue 4 — Squeeze & Tease WARP Cards

Each card has two DataLink connectors: one at the top of the card (beside the Ross Video logo) and another at the bottom of the card.
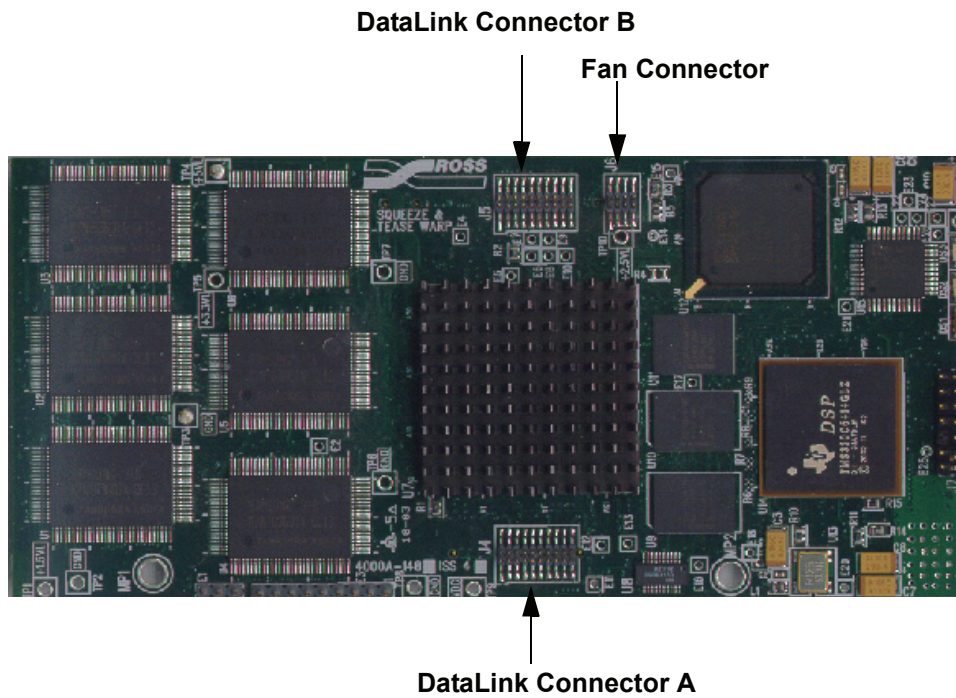
DataLink Connector Pins Issue 4 — Squeeze & Tease WARP Card

Connecting the Cable

⚠ **Important**   Read the following instructions carefully before you begin. It is possible to attach the cable incorrectly. If the pins are not lined up correctly, the DataLink will not work.

Use the following procedure to connect the cable:

1. On your Issue 4, **Squeeze & Tease WARP** cards, install the fan cable as instructed in the section "**Installing the Squeeze & Tease 3D Fan Assembly** " on page 6–10.

2. Attach one end of the ribbon cable to the connector pins on the bottom of the first card in the series.
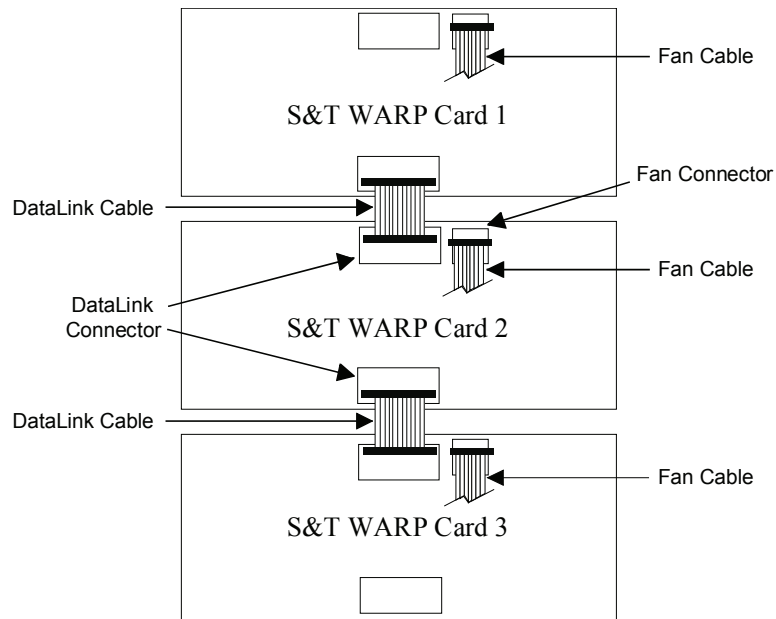
Connecting the Cable to Multiple Issue 4, Squeeze & Tease WARP cards

3. Attach the other end of the ribbon cable to the connector pins at the top of the next **Squeeze & Tease WARP** card in the series.

   Be sure to align the connector with the left most pin. Double-check that the first hole in the socket is seated on the top left pin on the connector. If the pins are not lined up correctly, DataLink will not work.

This completes the procedure to connect the cables.

Connecting Multiple Issue 2 or 3, Squeeze & Tease 3D Cards

The DataLink/Fan cable has two different ends. One end has only a DataLink connector socket. The other end has a DataLink connector socket and an extension that connects to the fan board on the **Squeeze & Tease 3D** card.
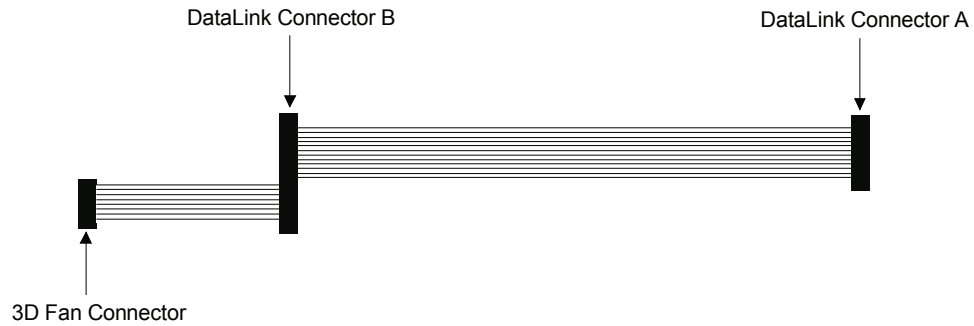
DataLink/Fan Cable for Issue 2 or 3 — Squeeze & Tease 3D Cards

Each card has two DataLink connectors: one at the top of the card (beside the Ross Video logo) and another at the bottom of the card.

- **Socket A** on the cable attaches to the Connector A pins at the bottom of the card.
- **Socket B** on the cable attaches to the Connector B pins at the top of the card.
- **3D Fan Connector Sockets** replace the fan power supply ribbon cable.
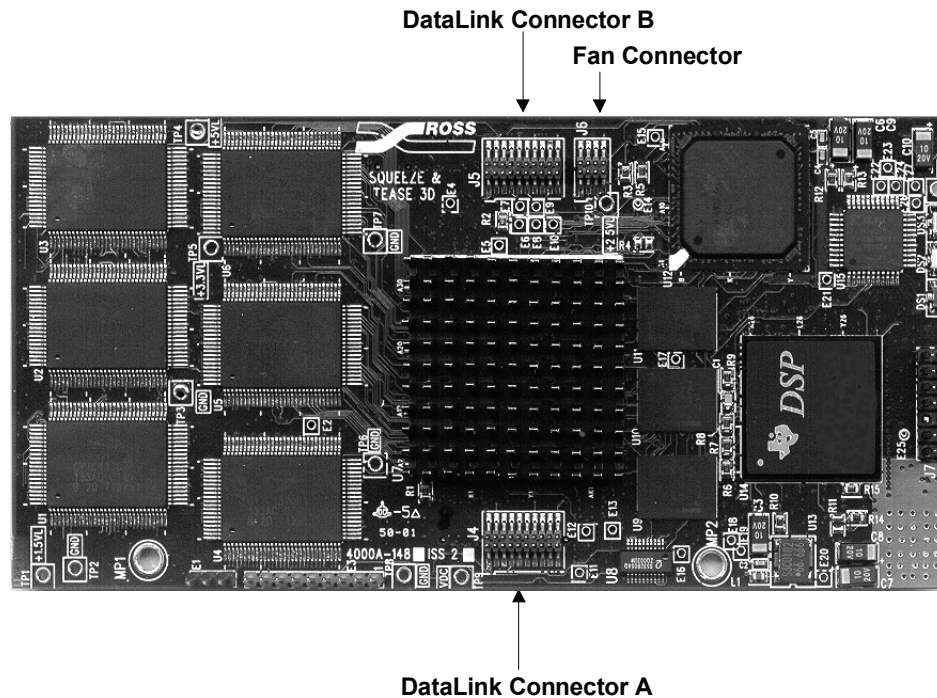
DataLink Connector Pins on Issue 2 or 3 — Squeeze & Tease 3D Cards

Connecting the Cable

⚠ **Important**   Read the following instructions carefully before you begin. It is possible to attach the cable incorrectly. If the pins are not lined up correctly, the DataLink will not work.

Use the following procedure to connect the cable:

1. If your Issue 2 or 3, **Squeeze & Tease 3D** cards have the fan assembly, you must remove the small ribbon cable that supplies power to the fan from the *second* card in the series. Remove the ribbon cable connectors from the top of the **Squeeze & Tease 3D Fan** assembly card and from the top center of the **Squeeze & Tease 3D** card itself. This cable is no longer needed, as the DataLink cable's extension will be used instead.

2. Attach **Socket A** on the ribbon cable to the connector pins on the bottom of the first card in the series. This is the end without the extension. The ribbon cable will only fit one way onto the connector pins.
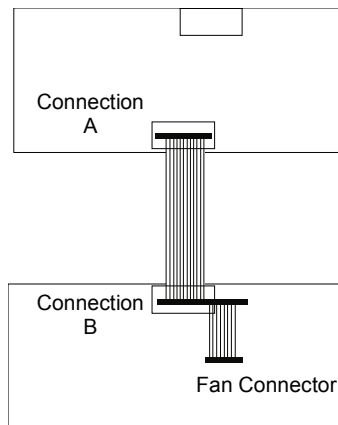
Issue 2 or 3 — Squeeze & Tease 3D Card Cable Connection

3. Attach **Socket B** on the ribbon cable to the connector pins at the top of the next 3D card in the series. Be sure to align the connector with the left most pin. Double-check that the first hole in the socket is seated on the top left pin on the connector. If the pins are not lined up correctly, DataLink will not work.

4. Attach one end of the Fan Power Connector the 8-pin connector near the top center of the **Squeeze & Tease 3D** card (to the right of **Connection B**, as illustrated).

5. Attach the other end of the cable connector to the 10-pin connector at the top of the **Squeeze & Tease 3D Fan** assembly card.

This completes the procedure to connect the cable. Refer to the section "**Installing the Squeeze & Tease 3D Fan Assembly** " on page 6–10 for more details on attaching the 3D Fan cable, if required.

Connecting Combinations of Squeeze & Tease Cards

There are three combinations of connecting multiple Squeeze & Tease 3D / WARP cards of different Issues to each other:

- **Issue 2 or 3, S&T 3D Cards connecting to Issue 2 or 3, S&T 3D Cards**

  This configuration uses DataLink/Fan Cable for Issue 2 or 3, Squeeze & Tease 3D cards. Refer to the section "**Connecting Multiple Issue 2 or 3, Squeeze & Tease 3D Cards**" on page 6–15 for more extensive instructions.

- **Issue 2 or 3, S&T 3D Cards connecting to Issue 4, S&T WARP Cards**

  This configuration uses DataLink Cable for Issue 4, Squeeze & Tease WARP cards. Refer to the section "**Connecting Combinations of Squeeze & Tease Cards**" on page 6–17 for more extensive instructions.

- **Issue 4, S&T WARP Cards connecting to Issue 4, S&T 3D Cards**

  This configuration uses DataLink Cable for Issue 4, Squeeze & Tease WARP cards. Refer to the section "**Connecting Multiple Issue 4, Squeeze & Tease WARP Cards**" on page 6–13 for more extensive instructions.
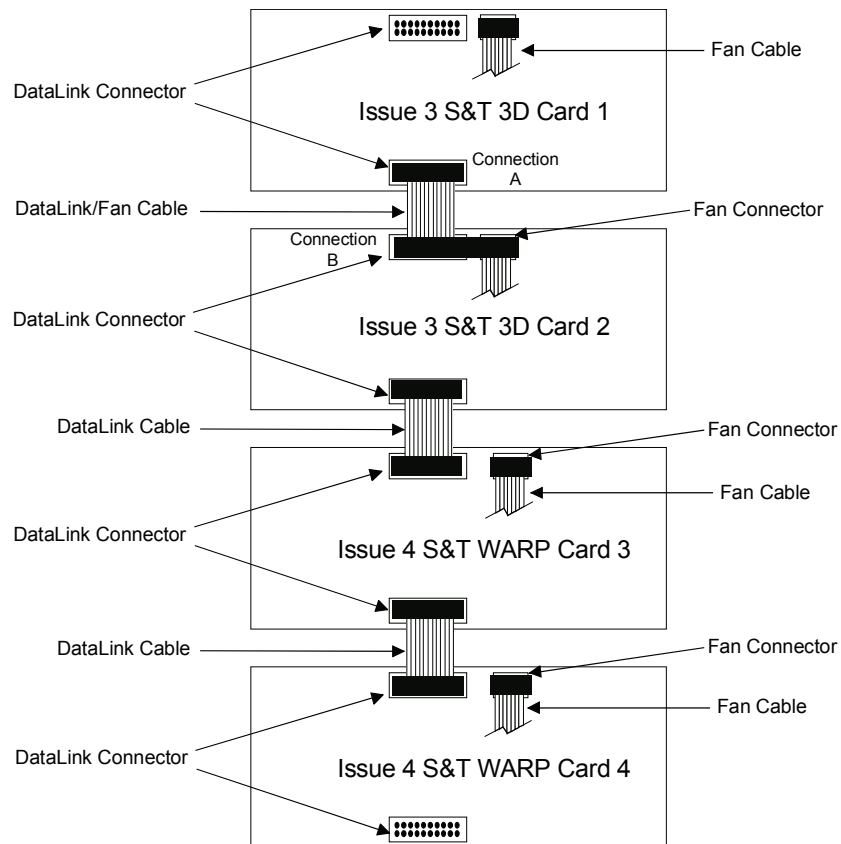
Connecting Cables to Multiple Combinations of Squeeze & Tease 3D and WARP Cards

This concludes the cabling for multiple combinations of Squeeze & Tease 3D/WARP Cards.

Squeeze & Tease 3D/WARP Software Upgrade

⚠	**Important**	Remember to upgrade your switcher software to the same version as the **Squeeze & Tease 3D/WARP** software before you begin. The switcher software *must* be upgraded *before* attempting to upgrade **Squeeze & Tease 3D/WARP**. Version 12, or later, software requires the 3D Fan Assembly to be in place before you upgrade. Refer to the section "**Installing the Squeeze & Tease 3D Fan Assembly** " on page 6–10 for details. If you do not have the 3D Fan Assembly, contact Ross Video Technical support.

The **Squeeze & Tease 3D/WARP** board has its own CPU and, therefore, requires its own software. The **Squeeze & Tease 3D/WARP** board will come preloaded with the latest version of software from the factory, but from time to time, new versions will be released that add new features to the capability of the board. When a new version is released, you can perform a software upgrade using floppy disks or a USB key. Both methods are described below.

Upgrading Software with Floppy Disks

Use the following procedure to perform a software upgrade using floppy disks:

1. Ensure that you have saved your switcher configuration, setups and registers. Refer to Chapter 2 in the *Synergy Series Installation Guide* for instructions.

2. Power off the frame and the control panel.

3. Move the **3D / WARP Software Upgrade Switch (DIP Switch 3, SW8)**, on the **Frame Processor Module (CPU Board)**, to its **UP** position, as displayed in the following figure.

Frame Processor Module (4000A-003)
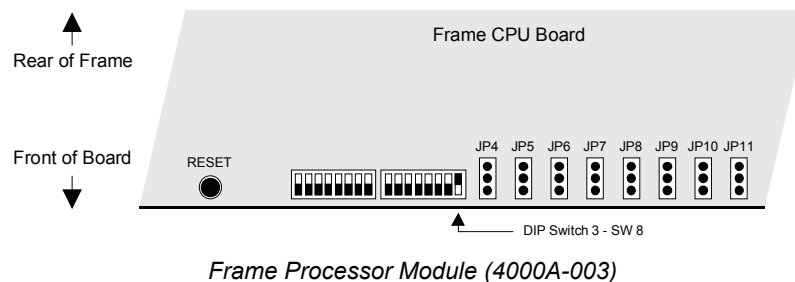
4. Verify that the 3D Fan Assembly is in place. Refer to the section "**Installing the Squeeze & Tease 3D Fan Assembly** " on page 6–10 for details. If you do not have the 3D Fan Assembly, contact Ross Video Technical Support.

5. Insert the **S&T 3D / WARP Upgrade Disk 1** into the floppy drive of the Synergy switcher.

6. Power the Synergy frame on first.

7. Power the Synergy control panel on second.

8. Follow the instructions on the menu system of the Synergy control panel, including when to insert **Upgrade Disk 2**, and wait for the upgrade process to complete. The completion is clearly indicated.

> ⚠️ **Caution**   Do NOT remove the floppy disk from the switcher before the LED on the switcher goes out. Doing so may destroy the data on your floppy disk, as well as the data on the next disk you insert into the switcher.
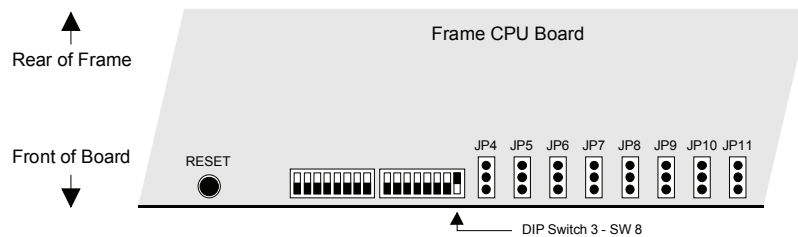
9. Remove the **S&T 3D / WARP Upgrade Disk 2** from the switcher.

10. Power off the Synergy frame and the control panel in any order.

11. Return the **3D / WARP Software Upgrade Switch** to its normal **DOWN** position.

12. Power on the Synergy frame and control panel in any order desired.

This completes the procedure for performing a **Squeeze & Tease 3D/WARP** software upgrade from floppy disks.

Upgrading Software with a USB Key

Use the following procedure to perform a software upgrade using a USB key:

1. Ensure that you have saved your switcher configuration, setups and registers. Refer to Chapter 2 in the *Synergy Series Installation Guide* for instructions.

2. Power off the Synergy frame and the control panel.

3. Move the **3D / WARP Software Upgrade Switch (DIP Switch 3, SW8)**, on the **Frame Processor Module (CPU Board)**, to its **UP** position, as displayed in the following figure.

Frame Processor Module (4000A-003)

4. Verify that the 3D Fan Assembly is in place. Refer to the section "**Installing the Squeeze & Tease 3D Fan Assembly** " on page 6–10 for details. If you do not have the 3D Fan Assembly, contact Ross Video Technical Support.

5. Insert the **USB key** that contains the **3D / WARP Software Upgrade** into the USB port of the Synergy switcher.

6. Power the Synergy frame on first.

7. Power the Synergy control panel on second.

> ✳️ **Important**   After restoring power to the Synergy control panel, you may receive the error message, "**USB Upgrade Failed**". Contact Ross Video Technical Support for more information on correcting the error.

8. Follow the instructions on the menu system of the Synergy control panel, and wait for the upgrade process to complete.

⚠ **Caution** | Do NOT remove the USB key from the switcher before the LED on the switcher goes out. Doing so may destroy the data on your USB key, as well as the data on the next USB key you insert into the switcher.

9. Remove the **USB key** from the USB port on the Synergy switcher.

10. Power off the Synergy frame and the control panel in any order.

11. Return the **3D / WARP Software Upgrade Switch** to its normal **DOWN** position.

12. Power on the Synergy frame and control panel in any order desired.

✳ **Important** | After restoring power to the control panel, you may receive the error message, "USB Upgrade Failed". Contact Ross Video Technical Support for more information on correcting the error.

This completes the procedure to perform a software upgrade using a USB key.

Dual Border Generator

The figure below illustrates the **Dual Border Generator**.

✎ **Note** | There are no jumpers on the **Dual Border Generator**.
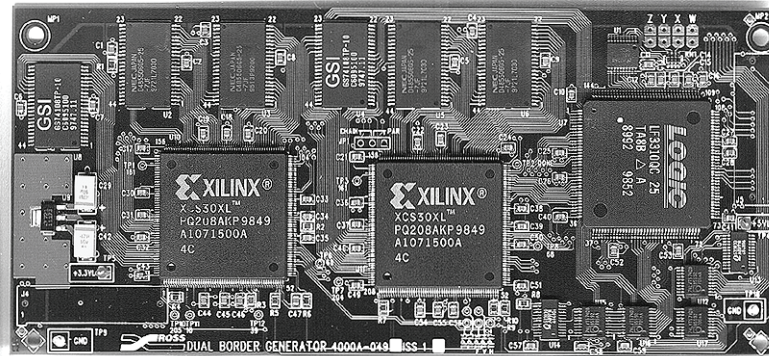
Dual Border Generator

The **Dual Border Generator** installs on the right side of the **MLE Board**, as indicated in the figure below. The board mates with two connectors as shown, plus two mounting standoffs.

✎ **Note** | Both mounting standoffs are secured to the base level **MLE Carrier Board**.
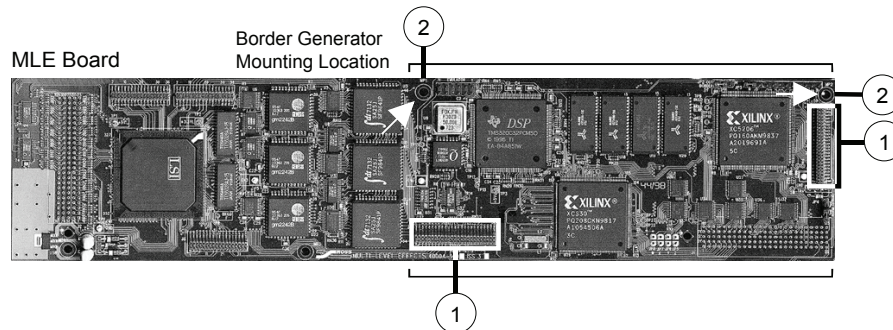
Dual Border Generator Location and Mounting

1) Mounting Connectors	2) Standoff Locations

Removing or Installing the Dual Border Generator

Use the following procedure to remove or install the optional **Dual Border Generator**:

Caution — Static discharge can cause serious damage to sensitive semiconductor devices. Avoid handling the switcher circuit boards in high static environments such as carpeted areas and when synthetic fiber clothing is worn. Touch the frame to dissipate static charge before removing boards from the frame and exercise proper grounding precautions when working on circuit boards.

1. Power down the Synergy frame.

2. Carefully remove the **MLE Carrier Board** from the Synergy frame, and set it on a clean, flat, static-free surface.

3. To remove the **Dual Border Generator**:

   • Locate the **Dual Border Generator** that you wish to remove.

   • Loosen and remove the mounting screws from the holes and set them aside in a safe place.

   • While applying upward pressure, slowly rock each connector out of its socket, being careful to avoid flexing the board too much — so as not to bend the pins.

   • Set the board aside on a clean, flat, static-free surface.

   • If the **Dual Border Generator** is going to be removed permanently from this **MLE Board**, set jumper **JP2** on the **MLE Board** to the **OUT** position.

   • If you need to remove the **MLE Board** below, remove both standoffs (with integral screw bases). These standoffs secure the **Dual Border Generator** to the **MLE Board**, but they also continue through to the base level **MLE Carrier Board**. Set the standoffs aside in a safe place.

     If installed, the optional **Squeeze & Tease Board** must *also* be removed.

     For additional **MLE Board** removal instructions, refer to the section "**Removing or Installing the MLE Board**" on page 6–2.

4. Install the **Dual Border Generator** as follows:

   • If protective plastic shrouds are installed over the target connectors on the **MLE Board**, remove and store them.

   • Set jumper **JP2** on the **MLE Board** to the **IN** position.

   • If the **MLE Board** that held the **Dual Border Generator** was removed, reinstall it first, and be sure to replace the standoffs into the **MLE Board**. Refer to the section "**Removing or Installing the MLE Board**" on page 6–2 for additional **MLE Board** installation details.

   • Carefully align the **Dual Border Generator** over the headers (**J4** and **J5**) on the **MLE Board**. Use your fingers to "feel" for the proper shroud-to-socket alignment. In addition, check that the standoffs align with the mounting holes.

   • Once aligned, push down on either side of each connector, until the board is fully seated.

   • Replace and tighten the mounting screws to secure the board. Do not over tighten the screws.

5. Double check the alignment of the **Dual Border Generator** by sighting down the connectors. No pins should be visible where the header meets the card.

Frame CPU and Aux Bus Carrier

In This Chapter

This chapter provides details on the Frame CPU and Aux Bus Carrier Boards, which are physically linked together.

The following topics are discussed:

- Frame CPU and Aux Bus Carrier Board
- Frame Jumpers and Switches
- Installing a Timed Aux Bus
- Removing a Timed Aux Bus
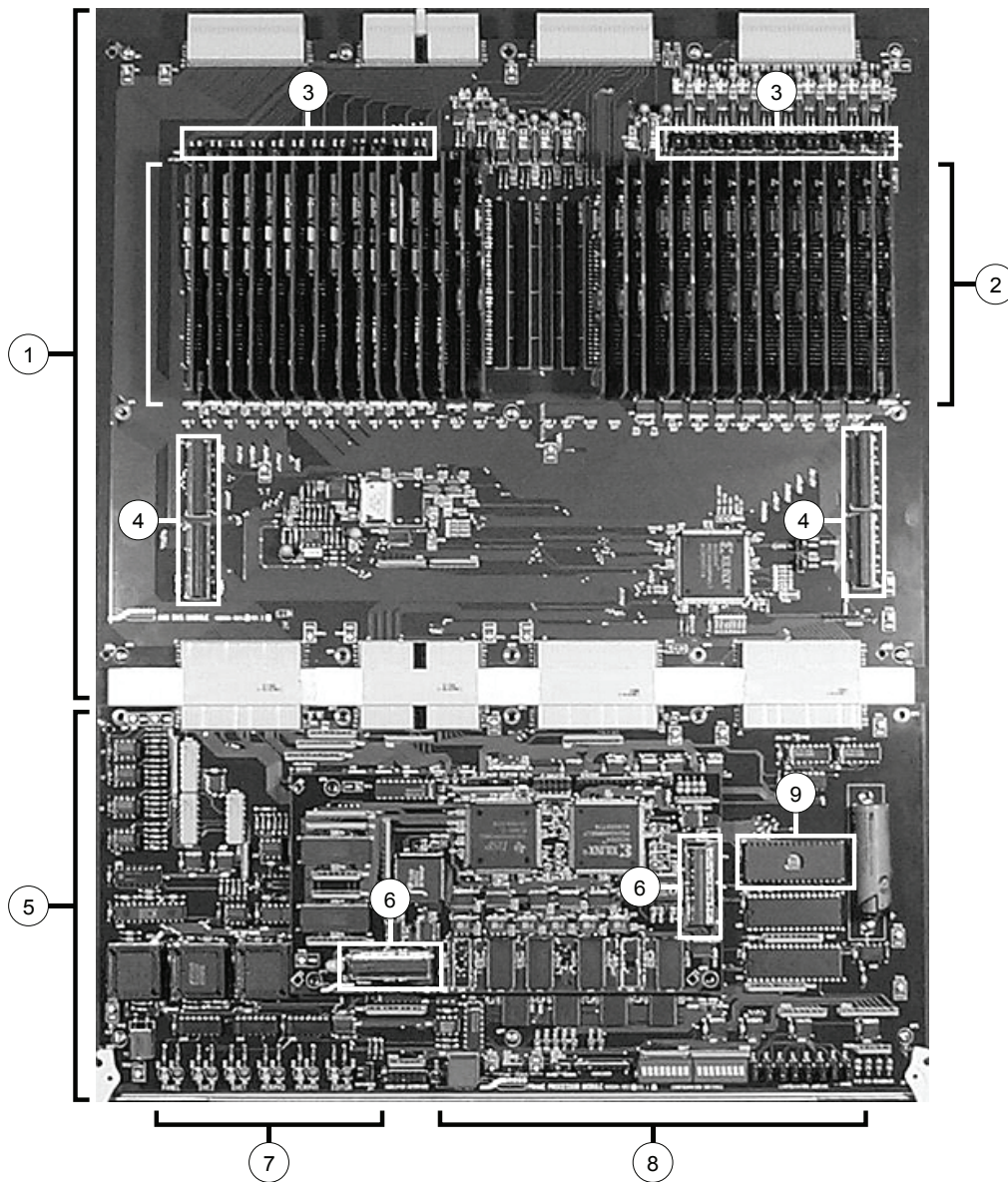- Installing the Preview Overlay Option

Frame CPU and Aux Bus Carrier Board

The figure below illustrates the combined **Frame CPU** and **Aux Bus Carrier** Boards.

✎	**Note**	The figure below includes the optional **Preview Overlay** and **Timed Aux Buses** installed.

Frame CPU and Aux Bus Carrier Boards

1) Aux Bus Carrier Board	4) Not Implemented	7) LED Section
2) Serializer/Deserializer Section	5) Frame CPU Board	8) Jumper/Switch Section
3) Aux Bus Timed/Untimed Jumpers	6) Preview Overlay Connectors	9) Boot EPROM

1. **Aux Bus Carrier Board**

   The **Aux Bus Carrier Board** (4000A-004) is permanently linked to the **Frame CPU Board** via four multi-pin connectors. Neither board will work without the other. The **Aux Bus Carrier Board** provides slots for an array of Serializer and Deserializer modules, slots for the future expansions, and circuitry for system reference.

2. **Serializer/Deserializer Section**

   The Serializer/Deserializer Section includes individual sockets for a group of **Deserializer Modules** (4000A-061) and **Serializer Modules** (4000A-062). All Deserializer and Serializer Modules are *identical* to those used on the **MLE Carrier Board**.

   • (*optional*) There are 12 slots at the far left are provided for Timed Aux Bus **Deserializer** modules.

   • (*optional*) There are 12 slots at the far right of the section are provided for Timed Aux Bus **Serializer** modules.

   • (standard) One slot is provided for the **Reference** input Deserializer module. This module must always be present.

   • (standard) One slot is provided for the system **Black** Serializer module. This output provides black in all switcher locations.

   • (standard) One slot is provided for the **Preview** output Serializer.

   • (*optional*) One slot is provided for the **Preview Overlay** option's Serializer module.

   • (standard) One slot is provided for the **White** output's Serializer module. This module is only installed in conjunction with the **DVE Send** option.

   • (future) Four slots will be used for future expansions.

3. **Aux Bus Timed/Untimed Jumpers**

   Twenty-four pairs of jumpers are provided for switching Aux Buses from timed to untimed. One pair of jumpers is provided for each of the twelve Aux Bus inputs and each of the twelve Aux Bus outputs. Each jumper pair corresponds to the socket directly below them and is clearly labeled.

   • With the jumpers positioned towards the front of the **Aux Bus Carrier Board**, the Aux Bus is untimed.

   • With the jumpers positioned towards the rear of the **Aux Bus Carrier Board**, the Aux Bus is timed. The corresponding Serializer and Deserializer modules *must* be installed.

4. **Not Implemented**

   These connectors are not implemented   .

5. **Frame CPU Board**

   The **Frame CPU** (4000A-003) carries the Frame Processor, slots for the optional **Preview Overlay** board, and an array of LEDs, jumpers, and switches along the front edge of the board.

6. **Preview Overlay Connectors**

   Two connectors are provided for the optional **Preview Overlay Board** (4000A-045).

7. **LED Section**

   Twelve serial activity LEDs are provided to monitor system communications.

   - Yellow LEDs indicate **TX** (transmit).
   - Green LEDs indicate **RX** (receive).

8. **Jumper/Switch Section**

   This section contains an array of jumpers and switches — some of which are provided for customer use. Refer to the section "**Frame Jumpers and Switches**" on page 7–4 for details.
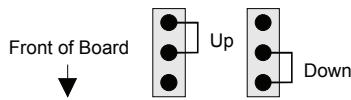
   - The jumper labeled "**Watchdog**" must be left in its current factory-installed position.
   - Jumpers **JP2** and **JP3** must be left in the **NORM** position.

9. **Boot EPROM**

   The Boot EPROM is socketed, in the event that an update of the EPROM is required.

Frame Jumpers and Switches

The figure below indicates the jumper positions used in the following descriptions.

Frame Jumper Positions

- **Up** — Jumper is away from the front of the board.
- **Down** — Jumper is towards the front of the board.

For all Synergy switchers, the figure below illustrates the location of jumpers and switches on the front edge of the **Frame CPU Board**.
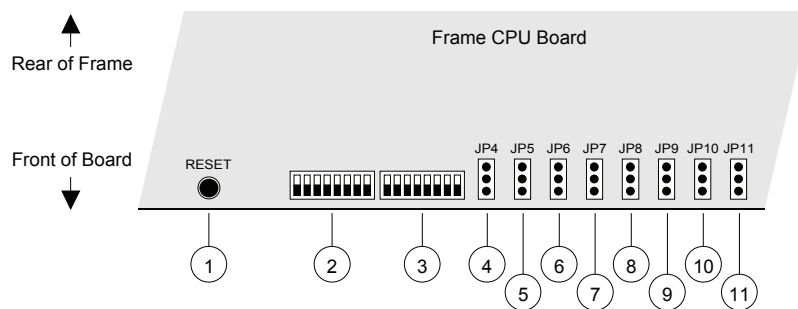
Frame Jumpers and Switches

1) Reset	5) JP5, Reserved	9) JP9, Reserved
2) Configuration Switch 1	6) JP6, Reserved	10) JP10, Reserved
3) Configuration Switch 2	7) JP7, Reserved	11) JP11, Reserved
4) JP4, Reserved	8) JP8, Reserved	

The following are descriptions of each jumper and switch identified in the figure, "**Frame Jumpers and Switches**" on page 7–4:

1. **Reset**

   Press the red **RESET** switch on the Synergy frame to initiate a *full system* reset. When the reset is initiated from the frame, the control panel's reset is initiated via a software message that is passed along the RS-422 control cable. In the unlikely event that the Synergy control panel has crashed, it may be necessary to *manually* reset the control panel.

2. **Configuration Switch 1**

   These switches are reserved for future use. Ross Video recommends leaving the switches in the default **Off** position, as labeled on the switch.

3. **Configuration Switch 2**

   These switches are reserved for future use. Ross Video recommends leaving the switches in the default **Off** position, as labeled on the switch.

4. **JP4 - JP9, Reserved**

   Jumpers **JP4** through **JP9** are reservedness future use. Ross Video recommends leaving each jumper in the default **Down** position.

10. **JP10, Installation Enable**

   Jumper **JP10** determines the installation status of the Synergy switcher:

   • Jumper is set to **Up** — Access to installation features is restricted as follows:

      ~ When you enter the **Installation Menu**, a message alerts you that "**Installation Settings are Locked**." However, you *are* permitted to view the menus as usual.

      ~ Upon exiting the installation menus, the "**Installation Settings are Locked**" menu once again alerts you that any changes will be *ignored* upon exiting the installation tree.

      ~ The installation **Load/Save to Disk** menus do not appear in the menu tree.

   • Jumper is set to **Down** — All installation settings can be changed without restriction. However, upon exiting the menus, an "**Installation Warning**" alerts you that settings are about to be changed:

   ```
   You are about to change the switcher's installation settings.
   Press 'Confirm' to save the new settings, or 'Cancel' to revert
   to the old settings.




      Confirm      Cancel
   ```
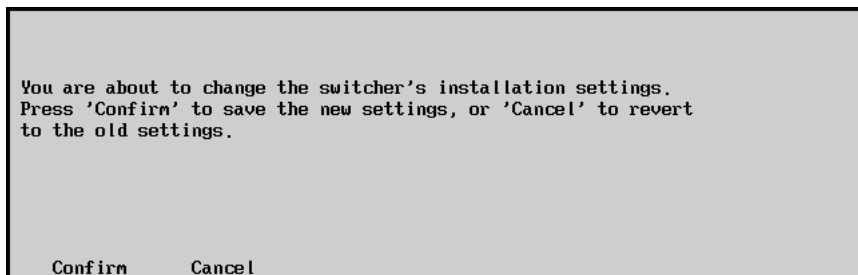
   Installation Change Confirmation Menu

✎ **Note**   Place the jumper in the **Up** position when you want to restrict access to installation menus. For certain facilities, this setting is recommended once installation is complete.

11. JP11, Software Upgrade

Jumper **JP11** controls the ability to upgrade software from a floppy disk or USB key:

* **Up** — Set the jumper to this position so that software can be upgraded from a floppy disk or USB key.

* **Down** — Set the jumper to this position so that software cannot be upgraded from a floppy disk or USB key. This is the default position.

Installing or Removing a Timed Aux Bus

The following topics are discussed in this section:

- Installing a Timed Aux Bus
- Removing a Timed Aux Bus
- Aux Bus Socket Labeling

Note that there is no software installation required for this option.

Installing a Timed Aux Bus

Use the following procedure to install a timed Aux Bus:

Caution   Static discharge can cause serious damage to sensitive semiconductor devices. Avoid handling the switcher circuit boards in high static environments such as carpeted areas and when synthetic fiber clothing is worn. Touch the frame to dissipate static charge before removing boards from the frame and exercise proper grounding precautions when working on circuit boards.

1. Ensure that you have received the following components in your **Timed Aux Bus** kit:
   - One **Deserializer Module** (4000A-061) — This module installs in a socket on the *left* (input) side of the **Aux Bus Carrier Board**.
   - One **Serializer Module** (4000A-062) — This module installs in the corresponding socket on the *right* (output) side of the board.

2. Power down the Synergy frame.

3. Carefully remove the **Aux Bus Carrier/Frame CPU Board** assembly from the Synergy frame, and set it on a clean, flat, static-free surface.

4. Read the Aux Bus slot labels closely.

5. Locate the "**IN**" slot (on the left side of the board) for the Aux Bus that you want to "time." The figure below illustrates the location of the slots and jumpers.
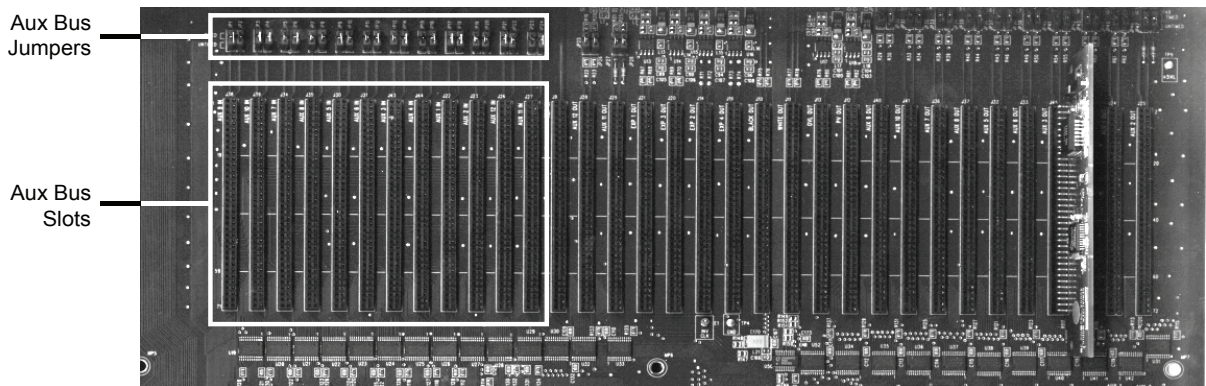
Aux Bus Input Slot and Jumper Locations — Aux Bus Carrier Board

Important

If you have an **Issue 1 Aux Bus Carrier Board** and you need to install a timed Aux Bus output, refer to the section "**Aux Bus Socket Labeling**" on page 7–10 for instructions.

6. Directly above the selected slot, locate the pair of timing jumpers, and move both jumpers to the **Timed** position.

7. Install the **Deserializer Module** as follows:

    • Carefully align the module over the socket.

    • Ensure that the board's components are facing to the left.

    • Use your fingers to "feel" for the proper pin-to-socket alignment.

    • While applying downward pressure, slowly rock the module vertically (top to bottom), until the module is fully seated. Avoid flexing the board — so as not to bend the pins.

    • After installation, "sight" down the board at the connector level, to make sure that there are no exposed pins.

Caution

Failure to reinstall a module with a precise 1:1 pin-to-socket orientation will damage the **MLE Carrier PCB**, the selected module — or both! Double check your work!

8. Locate the corresponding **OUT** slot (on the right side) for the Aux Bus that you want to "time." For example, **AUX 10 OUT**.

9. Directly above the selected slot, locate the pair of timing jumpers, and move both jumpers to the **Timed** position.

10. Install the **Serializer Module**, as outlined in step 7. The installation method is identical.

11. Repeat for any additional timed Aux Buses that you want to install.

12. Replace the **Aux Bus Carrier/Frame CPU Board** assembly in the Synergy frame.

13. Power on the Synergy frame.

This completes the installation procedure.

Testing the Aux Bus Output

You can now test the Aux Bus output in several ways:

• Route the selected Aux Bus output to a monitor, and switch between two signals on the Aux Bus — for example, a primary input and program signal that you know may *not* be perfectly timed. The signals should now switch seamlessly.

• Route the selected Aux bus output to the input of a DVE, and switch between two or more signals. While monitoring the DVE's output, there should be no green flashes on the monitor (flashes that are typically associated with untimed sources).

Removing a Timed Aux Bus

This procedure is typically required if you need to replace a faulty **Serializer** or **Deserializer** module on another Aux Bus circuit — or you simply want to move a timed Aux Bus from one Aux Bus output to another.

Use the following procedure to install a timed Aux Bus:

Caution Static discharge can cause serious damage to sensitive semiconductor devices. Avoid handling the switcher circuit boards in high static environments such as carpeted areas and when synthetic fiber clothing is worn. Touch the frame to dissipate static charge before removing boards from the frame and exercise proper grounding precautions when working on circuit boards.

1. Power down the Synergy frame.

2. Carefully remove the **Aux Bus Carrier/Frame CPU Board** assembly from the Synergy frame, and set it on a clean, flat, static-free surface.

3. Read the Aux Bus slot labels closely.

4. Locate the "**IN**" slot (on the left side of the board) for the Aux Bus that you want to remove. For example, **AUX 8 IN**.

Important If you have an issue 1 **Aux Bus Carrier Board** and you need to remove a timed Aux Bus output, please contact Ross Video **Customer Support** for a list of the correct board labels.

5. Remove a **Deserializer** module as follows:

   • Hold the module firmly.

   • While applying upward pressure, *slowly* rock the module horizontally (from side to side), until the module pulls out of the socket. Avoid pulling the board out too quickly — so as not to bend the pins.

6. If the module is *not* being replaced, directly above the selected slot, locate the pair of timing jumpers and move both jumpers to the "**Untimed**" position.

7. Store the module in an anti-static bag for later use, or for re-installation in another slot as required.

8. Locate the corresponding "**OUT**" slot (on the right side) for the Aux Bus that you want to remove. For example, **AUX 8 OUT**.

9. Remove the **Serializer Module** as follows:

   • Hold the module firmly.

   • While applying upward pressure, *slowly* rock the module horizontally (from side to side), until the module pulls out of the socket. Avoid pulling the board out too quickly — so as not to bend the pins.

10. If the module is not being replaced, directly above the selected slot, locate the pair of timing jumpers and move both jumpers to the "**Untimed**" position.

11. Repeat steps 4 through 10 for any additional timed Aux Buses that you want to remove.

12. Replace the **Aux Bus Carrier/Frame CPU Board** assembly in the Synergy frame.

13. Power up the Synergy frame.

This completes the procedure to install a timed Aux Bus.

Aux Bus Socket Labeling

Note	This section applies to **Issue 1 Aux Bus Carrier Boards** only.

On all **Issue 1 Aux Bus Carrier Boards**, sockets for the Aux Bus Serializer and Deserializer modules were mislabeled, and did not properly refer to the correct output Aux Bus BNC connectors.

This problem has been fixed in all subsequent boards, but if you have an **Issue 1 Aux Bus Carrier** board, use the following table to properly associated sockets with the correct BNCs.

BNC Connectors to Issue 1 Aux Bus Carrier Board

BNC Connector	**Refers to Socket**
Aux 1	Aux 9
Aux 2	Aux 10
Aux 3	Aux 7
Aux 4	Aux 8
Aux 5	Aux 5
Aux 6	Aux 6
Aux 7	Aux 3
Aux 8	Aux 4
Aux 9	Aux 1
Aux 10	Aux 2
Aux 11	Aux 12
Aux 12	Aux 11

Installing the Preview Overlay Option

The **Preview Overlay** option consists of two components:

- One Preview Overlay Board (4000A-045)
- One Serializer Module (4000A-062)

The figure below illustrates the **Preview Overlay Board**, with three sections highlighted.
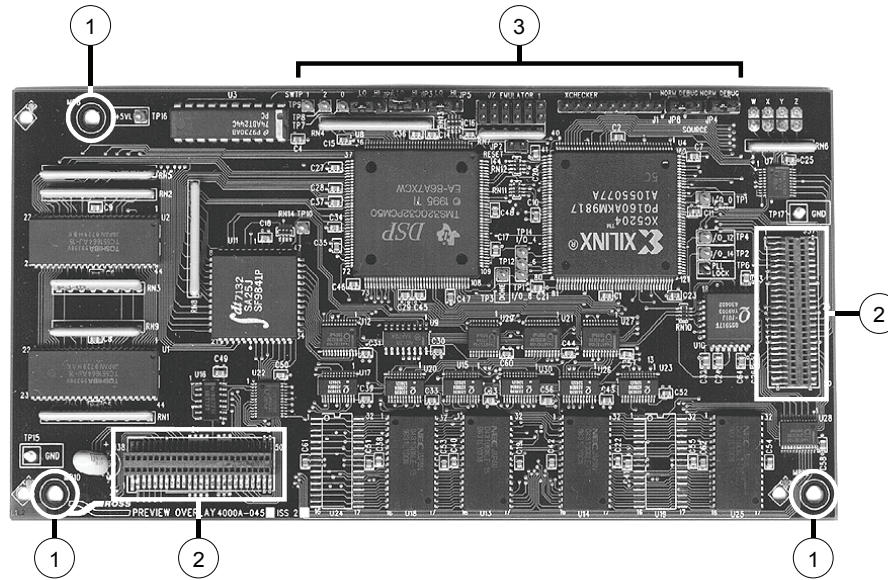
Preview Overlay Board

1) Mounting Holes	2) Connector Sockets	3) Jumper Section

Each component is discussed in the following section.

1. Mounting Holes

Three holes are provided for mounting the **Preview Overlay Board** on the **Frame CPU Board**, where permanent standoffs are provided.

2. Connector Sockets

Two multi-pin female connector sockets are provided on the **Preview Overlay Board**. When the board is mounted on the connectors below (on the **Frame CPU Board**), the pins push up from underneath, through the board itself, and into the socket from below. This arrangement is different from all other sockets in the system.

3. Jumper Section

A large quantity of jumpers and headers are provided in the jumper section, most of which are designed for *factory use only.* Note the following:

- Do not touch jumpers **JP3**, **JP5** and **JP6**. Leave them in their factory default positions as currently set.
- Do not touch the headers marked **Debug Only**.
- Ensure that jumpers **JP4** and **JP8** are left in the **NORM** position.

Installing the Preview Overlay Option

Use the following procedure to install the Preview Overlay option:

Caution | Static discharge can cause serious damage to sensitive semiconductor devices. Avoid handling the switcher circuit boards in high static environments such as carpeted areas and when synthetic fiber clothing is worn. Touch the frame to dissipate static charge before removing boards from the frame and exercise proper grounding precautions when working on circuit boards.

1. Unpack the Preview Overlay kit, and ensure that *both* the **Preview Overlay Board** and a **Serializer Module** are included. Both boards must be installed in order for the option to work properly.

2. Power down the Synergy frame.

3. Carefully remove the **Aux Bus Carrier/Frame CPU Board** assembly from the Synergy frame, and set it on a clean, flat, static-free surface.

4. If protective shrouds are installed on the Headers (**J37** and **J38**), remove them.

5. Align the **Preview Overlay Board** with the connectors (**J37** and **J38**) on the **Frame CPU Board**. Refer to page 6-2 for the connector locations, labeled as **6** on the figure.

6. Slowly press the board down onto the connectors (which will mate with holes on the bottom of the **Preview Overlay Board**).

   • Ensure that there are no bent or misaligned pins.

   • Continue pressing down, until there is a positive snap — as the board seats fully.

7. Secure the board with screws, into the three mounting holes and standoffs.

8. On the **Aux Bus Carrier Board**, locate the Serializer socket **J13**, on the right side of the Serializer/Deserializer Section. This socked is also marked **OVL OUT**.

9. Install the **Serializer Module** as follows:

   • Carefully align the module over the socket.

   • Ensure that the board's components are facing to the left.

   • Use your fingers to "feel" for the proper pin-to-socket alignment.

   • While applying downward pressure, slowly rock the module vertically (top to bottom), until the module is fully seated. Avoid flexing the board — so as not to bend the pins.

   • After installation, "sight" down the board at the connector level, to make sure that there are no exposed pins.

Caution | Failure to reinstall a module with a precise 1:1 pin-to-socket orientation will damage the **MLE Carrier PCB**, the selected module — or both! Double check your work!

10. Replace the **Aux Bus Carrier/Frame CPU Board** assembly in the Synergy frame.

11. Power on the Synergy frame.

This completes the installation procedure. There is no software installation required for the option, as the Synergy switcher auto-detects the option and automatically enables the new feature. Next you will test the Preview Overlay to verify its setup.

Testing the Preview Overlay Option

Use the following procedure to test the Preview Overlay option:

1. Connect a video monitor to the rear-chassis output labeled **OVL**. With the option installed, this output is now active.

2. On the Synergy control panel, verify that the buttons in the **Preview Overlay Group** are now active and that they light.
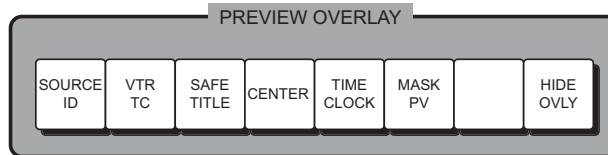
Synergy 4 — Preview Overlay Group

3. Select a video source as follows:

    •   Select a source on any **Preset Bus**.

    •   Select the same bus in the **Preview Bus Group**.

    •   Ensure that the same video source is now visible on the Preview Overlay output.

4. Test the buttons function in the **Preview Overlay Group** as follows:

    •   Press each button in the **Preview Overlay Group**.

    •   Ensure that the proper overlay is shown on the monitor output.

    •   Refer to the section, "**Preview Overlay Group**" in the *Synergy Series Operation Guide* for operating instructions.

This completes the procedure to test the **Preview Overlay** option.

Working with Installed Options

In This Chapter

This chapter discusses the system menus that allow you to install and verify serial numbers and software options for your Synergy switcher.

The following topics are discussed:

- Installed Options Menus
- Using the Installed Software Menu
- Using the Panel Boards Menu
- Using the Frame Boards Menu
- Using the Option Boards Menu
- Installing Serial Numbers
- Installing Software Options
- Storing and Recalling Option Codes

⚠️ **Important** Serial numbers allow Ross Video to properly track which options have been purchased by each customer. Switchers shipped in August 1999 and later have serial numbers installed (in flash memory) at the factory. Switchers shipped prior to August 1999 do not have serial numbers installed. Refer to the section "**Installing Serial Numbers**" on page 8–6 for instructions.

Installed Options Menus

Several important menus are available that allow you to verify all of the installed options in your Synergy switcher — with serial numbers as well as software option codes. The menus also display the revision levels of all system boards, and allow you to install software options.

Using the Installed Software Menu

✎ **Note** | All software options are stored in the Synergy frame. Thus, if control panels are swapped around, the enabled options will stay with the Frame — regardless of which panel is connected to it, even for panel-based options such as **VTR Remote Control**.

The **Main Area** of the **Software Options Menu** lists the serial number of your Synergy frame at the top, just beneath the menu name. This number is present at the top of all options menus. The **Main Area** also provides two columns of information:

- Column 1 lists the available software options.

- Column 2 indicates whether or not the option is installed.

Use the following procedure to view the installed software options for your Synergy switcher:

1. Navigate to the **Installed Options Menu** as follows:

   - Press **HOME** (to display the **Main Menu 1-2**).
   - **MORE** (to display the **Main Menu 2-2**).
   - **Setup** (to display the **Setup Menu**).
   - **Installed Options** (to display the **Installed Options Menu 1-2**).

2. Press **Software Options** to display the **Software Options Menu**.

```
Installed Options (1-2)
Frame Serial Number:F123456789

Editor Interface        :Yes    Peripheral Bus II       :Yes
VTR Remote Control      :Yes    Still Store (Aprisa)    :Yes
DVE Send and Remote CTRL :Yes   Character Generator     :Yes
Audio Server Control    :Yes    Small Audio Mixer       :Yes
Video Server Control    :Yes    Large Audio Mixer       :Yes
Router                  :Yes    Robotic System          :Yes
Serial Tally            :Yes    Monitor Wall            :No

  Software      Panel        Frame       Option     Enter Serial
  Options       Boards       Boards      Boards        Number      Add Option
```

Installed Options — Software Options Menu

This completes the procedure to view the software options you have installed on your Synergy switcher.

Notes on the Software Options Menu

Note the following when using the **Software Options Menu**:

- The menu is provided for information only — no action can be taken.

- If a serial number appears at the top of the menu, verify that the list reflects the exact options that you have purchased. If not, please contact **Ross Video Technical Support** for further information.

• If the label "**Unknown**" appears, the Synergy frame is powered off. Power on the Synergy frame so that the serial number can be recognized.

• If the label "**000000**" appears, a serial number is required. Your options will *temporarily* be activated but a valid serial number *must* be installed permanently — so that you do not lose switcher functionality. Refer to the section "**Installing Serial Numbers**" on page 8–6 for instructions.

Using the Panel Boards Menu

	Note	The **Panel Boards Menu** is provided for information only — no action can be taken.

The **Main Area** of the **Panel Boards Menu** provides three columns of information that pertain to the boards installed in the panel:

• **Board** Column — This is column lists each circuit board by part number and name.

• **Rev** Column — This column lists the hardware revision number of the associated board.

• **FPGA Rev** Column — This column lists the software revision number of the associated board.

Use the following procedure to view the installed control panel boards on your Synergy switcher:

1. Navigate to the **Installed Options Menu 1-2** as follows:

   • Press **HOME** (to display the **Main Menu 1-2**).

   • **MORE** (to display the **Main Menu 2-2**).

   • **Setup** (to display the **Setup Menu**).

   • **Installed Options** (to display the **Installed Options Menu 1-2**).

2. Press **Panel Boards** to display the **Panel Boards Menu**.

```
Installed Options (1-2)
Frame Serial Number:F123456789

Board                    Rev  FPGA Rev
4000-033 Panel CPU       10a  4000x033.bit 1998/12/01 09:49:35    Use Knob 2
4735-030 Left XPT Bus    2                                        to scroll
4735-031 Right XPT Bus   1                                        list.
4735-032 Global Memory   1
4735-034 Key Switch      1
4735-035 Trans Switch    1

   Software      Panel       Frame      Option    Enter Serial
   Options       Boards      Boards     Boards       Number
```

Installed Options Menu — Panel Boards

3. Use the middle knob to scroll the list.

This completes the procedure to verify the control panel boards you have installed on your Synergy switcher.

Using the Frame Boards Menu

The main area of the **Frame Boards Menu** provides three columns of information that pertain to the boards installed in the frame:

- **Board** Column — This column lists each circuit board by part number and name.

- **Rev** Column — This column lists the hardware revision number of the associated board.

- **FPGA Rev** Column — This column lists the software revision number of the associated board.

Use the following procedure to view the frame boards you have installed on your Synergy switcher:

1. Navigate to the **Installed Options Menu** as follows:

   - Press **HOME** (to display the **Main Menu 1-2**).
   - **MORE** (to display the **Main Menu 2-2**).
   - **Setup** (to display the **Setup Menu**).
   - **Installed Options** (to display the **Installed Options Menu 1-2**).

2. Press **Frame Boards** to display the **Frame Boards Menu**.

```
Installed Options (1-2)
Frame Serial Number:F123456789

Board                    Rev  FPGA Rev
4000-002 MLE Carrier     6a   4000x002.bit 2000/08/24 16:11:30   Use Knob 2
4000-003 Frame CPU       3a   4000-003.bit 2000/04/26 11:54:01   to scroll
4000-004 AuxBus module        4000-004.bit 2000/07/20 18:13:57   list.
4000-238 Input/XPT 1     1
4000-238 Input/XPT 2     N/I  Not Installed
4000-238 Input/XPT 3     N/I  Not Installed

  Software      Panel        Frame       Option     Enter Serial
  Options       Boards       Boards      Boards       Number
```

Installed Options — Frame Boards Menu

3. Use the middle knob to scroll the list.

This completes the procedure to view the frame boards you have installed on your Synergy switcher.

Using the Option Boards Menu

The main area of the **Option Boards Menu** provides three columns of information that pertain to the optional boards that can be installed in the frame:

- **Board** Column — This column lists each optional circuit board by name.

- **Rev** Column — This column lists the hardware revision number of the associated board.

- **FPGA Rev** Column — This column lists the software revision number of the associated board.

Use the following procedure to view the optional boards you have installed on your Synergy switcher:

1. Navigate to the **Installed Options Menu 1-2** as follows:

   • Press **HOME** (to display the **Main Menu 1-2**).

   • **MORE** (to display the **Main Menu 2-2**).

   • **Setup** (to display the **Setup Menu**).

   • **Installed Options** (to display the **Installed Options Menu 1-2**).

2. Press **Option Boards** to display the **Option Boards Menu**.

```
Installed Options (1-2)
Frame Serial Number:F123456789


Board                     Rev  FPGA Rev
Preview Overlay            2    4000-045.bit 1999/08/20 16:24:33    Use Knob 2
DVE SEND SIMM (return)          Installed (No Rev Readback)         to scroll
MLE1                       5d   4000S140.bit 2004/10/21 13:33:47    list.
                           5d   4000x140.bit 2002/06/27 18:07:03
  Squeeze & Tease               Not Purchased
  Border card              3a   4000-049.bit 2002/05/07 13:41:17

   Software        Panel        Frame        Option     Enter Serial
   Options         Boards       Boards       Boards        Number
```

Installed Options — Option Boards Menu

3. Use the middle knob to scroll the list.

This completes the procedure to verify the optional boards installed on your Synergy switcher.

Notes on Using the Option Boards Menu

Note the following when using the **Option Boards Menu**:

   • The status for each MLE reflects whether or not the available MLE options are installed:

      ~ Squeeze & Tease

      ~ Dual Border Generator

   • The status for each input slot reflects whether or not the optional **Input Carrier Board** is installed. Each **Input Carrier Board** has sockets provided for up to four hardware options.

Installing Serial Numbers

⚠	**Important**	If the label "**000000**" appears at the top of the **Installed Options Menus**, a serial number is required.

Use the following procedure to install serial numbers on your Synergy switcher:

1. Navigate to the **Installed Options Menu** as follows:

    *   Press **HOME** (to display the **Main Menu 1-2**).
    *   **MORE** (to display the **Main Menu 2-2**).
    *   **Setup** (to display the **Setup Menu**).
    *   **Installed Options** (to display the **Installed Options Menu 1-2**).

2. Press **Enter Serial Number** to display the **Enter Serial Number Menu**.

```
Enter Serial Number

Frame Serial Number:F123456789
Ross Encrypt Code:9C16

Please contact Ross Video at:
8 John Street
Iroquois, Ontario, Canada  K0E 1K0
1-613-652-4886
techsupport@rossvideo.com


    Finished      Cancel
```

Enter Serial Number Menu

✎	**Note**	The **Encrypt Code** is a *random number* that is generated each time the switcher is powered up. Its purpose is to prevent unauthorized installation of software options. The code remains valid until the switcher is powered down or reset. The next time the switcher is powered up, a *new* Encrypt Code is generated.

3. Call **Ross Video Technical Support** at the number listed on the menu.

4. When you speak to our Technical Support representative, tell them your name, your facility name, and the **Encrypt Code** as listed on the menu.

5. You will be given a numeric code that must be entered on the keypad in the **Global Memory Area**.

6. Enter the code, and press **ENTER** on the keypad or press **Finished** on the **Serial Number Menu**.

✎	**Note**	The system will not accept an invalid code. If the code entered is invalid, the serial number will not be changed. If your numeric code is not accepted, try entering it again, or contact Ross Video Technical Support for further assistance.

This completes the procedure for entering the serial number.

Installing Software Options

Use the following procedure to activate your software options (after entering a new serial number) or to install a new software option that you have just purchased.

⚠ **Important** | Ensure that your serial number is properly entered. Refer to the section "**Installing Serial Numbers**" on page 8–6 for more information.

1. Navigate to the **Installed Options Menu 1-2** as follows:

   • Press **HOME** (to display the **Main Menu 1-2**).

   • **MORE** (to display the **Main Menu 2-2**).

   • **Setup** (to display the **Setup Menu**).

   • **Installed Options** (to display the **Installed Options Menu 1-2**).

2. Press **Software Options** to display the **Software Options Menu**.

3. Press **Add Option** to display the **Enter Serial Number Menu**.

```
Enter Option Number

Frame Serial Number:F123456789
Ross Encrypt Code:4426

Please contact Ross Video at:
8 John Street
Iroquois, Ontario, Canada  K0E 1K0
1-613-652-4886
techsupport@rossvideo.com


  Finished     Cancel
```

Add Option Menu

4. Call **Ross Video Technical Support** at the number listed on the menu.

5. When you speak to our Technical Support representative, tell them your name, your facility name, the switcher's serial number and the **Encrypt Code** as listed on the menu.

6. Tell the Technical Support representative the name of the option(s) that you wish to install. Technical Support keeps an up-to-date record of the configuration and option status for each Synergy Switcher.

7. You will be given a numeric code by the Technical Support representative for each option. Enter the code on the keypad in the **Global Memory System Group** of the Synergy control panel.

8. Press **ENTER** on the keypad or press **Finished** on the **Serial Number Menu**. Once entered, the menu indicates "**Installed**," and the system displays the **Software Options Menu** to confirm.

9. Repeat steps 7 and 8 for each option.

✓ **Operating Tip** | Make a written note of your serial number and each option code, and store them in a safe place for future reference.

This completes the procedure to activate your software options.

Storing and Recalling Option Codes

The **Installed Options Menu** allows you to store and recall your option codes to a storage device, such as a floppy disk or USB key, for purposes of safe storage.

Note | You must have the **USB Removable Media Drive** option installed in order to use a USB key for storing and recalling option codes. Contact Ross Video Technical Support to learn if the option is available for your Synergy switcher.

Storing Option Codes

Use the following procedure to store option codes:

1. Navigate to the **Installed Options Menu 2-2** as follows:

   • Press **HOME** (to display the **Main Menu 1-2**).

   • **MORE** (to display the **Main Menu 2-2**).

   • **Setup** (to display the **Setup Menu**).

   • **Installed Options** (to display the **Installed Options Menu 1-2**).

   • **Software Options** (to display the **Software Options Menu**).

   • **MORE** (to display the **Installed Options Menu 2-2**).

```
Installed Options (2-2)
Frame Serial Number:F123456789

Editor Interface        :Yes    Peripheral Bus II       :Yes
VTR Remote Control      :Yes    Still Store (Aprisa)    :Yes
DVE Send and Remote CTRL :Yes   Character Generator     :Yes
Audio Server Control    :Yes    Small Audio Mixer       :Yes
Video Server Control    :Yes    Large Audio Mixer       :Yes
Router                  :Yes    Robotic System          :Yes
Serial Tally            :Yes

 Store Codes Recall Codes                         Delete All
   to Disk    From Disk                           SW Options
```

Installed Options Menu 2-2

2. Insert a storage device into the Synergy switcher as follows:

   • Insert a pre-formatted 1.4 MB high-density floppy disk into the floppy drive of the Synergy switcher.

   OR

   • Insert a USB key into the USB port of the Synergy switcher. You must wait 5 seconds after inserting the USB key into the USB port before you can store option codes to it.

3. Press **Store Codes to Disk** to store all of your option codes.

Caution | Do NOT remove the floppy disk or USB key from the switcher before the LED on the disk drive or USB port goes out. Doing so may destroy the data on your floppy disk or USB key, as well as the data on the next one you insert into the switcher.

4. Remove the storage device from the Synergy switcher.

This completes the procedure for saving your option codes to a storage device.

Recalling Option Codes

Important   Option codes stored to a floppy disk or USB key will only work on the Synergy switcher from which they were saved.

In case the option codes are accidentally erased or deleted, use the following procedure to recall option codes:

1. Navigate to the **Installed Options Menu 2-2** as follows:

   • Press **HOME** (to display the **Main Menu 1-2**).

   • **MORE** (to display the **Main Menu 2-2**).

   • **Setup** (to display the **Setup Menu**).

   • **Installed Options** (to display the **Installed Options Menu 1-2**).

   • **MORE** (to display the **Installed Options Menu 2-2**).

2. Insert the storage device containing the **Software Option Codes** backup that you created in the section "**Storing Option Codes**" on page 8–8.

Note   You must wait 5 seconds after inserting the USB key into the USB port before you can begin to recall your option codes.

3. Press **Recall Codes from Disk** to recall all of your option codes.

Caution   Do NOT remove the floppy disk or USB key from the switcher before the LED on the disk drive or USB port goes out. Doing so may destroy the data on your floppy disk or USB key, as well as the data on the next one you insert into the switcher.

4. Remove the storage device from the Synergy switcher.

This completes the procedure to recall option codes.

Note   The **Delete All SW Options** function is reserved for factory use only. Do not use this function.

DVE Send Option

In This Chapter

The Synergy switcher is designed to integrate with all popular brands of DVEs *seamlessly* — as if they were part of the switcher during on air production. The **DVE Send and Remote Control Option** makes this possible.

	Note	Synergy software version 2.00 or higher is required for the **DVE Send** option to function properly.

The following topics are discussed:

- Installing the DVE Send Option
- DVE Send Option Kit
- Installing the Deserializer and Serializer Modules
- Installing the Software Option
- Testing the DVE Send Option

	ESD Susceptibility	Static discharge can cause serious damage to sensitive semiconductor devices. Avoid handling the switcher circuit boards in high static environments such as carpeted areas and when synthetic fiber clothing is worn. Touch the frame to dissipate static charge before removing boards from the frame and exercise proper grounding precautions when working on circuit boards.

Installing the DVE Send Option

The **DVE SEND** button in an MLE's **Transition Group** assigns the external DVE, the *Primary* DVE, to that particular MLE, and selects DVE as the transition type (as opposed to wipe or dissolve). You can then select the next transition, using the **BKGD**, **KEY 1** and **KEY 2** buttons, and press the **AUTO TRANS** button to perform a DVE transition using the selected foreground and background sources.

This section provides instructions for installing and testing the **DVE Send and Remote Control Option**.

DVE Send Option Kit

The **DVE Send and Remote Control Option** kit consists of the following items:

- Two (2) **Deserializer Modules** (4000A-061)
- One (1) **Serializer Module** (4000A-062)
- Software Option Registration Key

Ensure that you have received all hardware components prior to continuing with the installation procedure.

Installing the Deserializer and Serializer Modules

Use the following procedure to install the **DVE Send and Remote Control Option**:

Caution	Static discharge can cause serious damage to sensitive semiconductor devices. Avoid handling the switcher circuit boards in high static environments such as carpeted areas and when synthetic fiber clothing is worn. Touch the frame to dissipate static charge before removing boards from the frame and exercise proper grounding precautions when working on circuit boards.

1. Power down the Synergy frame.

2. Carefully remove the **MLE Carrier Board** from the Synergy frame, and set it on a clean, flat, static-free surface, with the rear of the board away from you.

3. Unpack the **DVE Send** kit, which consists of two **Deserializer Modules** (4000A-061) and one **Serializer Module** (4000A-062).

Caution	In the following steps, failure to reinstall a module with a precise 1:1 pin-to-socket orientation will damage the **MLE Carrier Board**, the selected module — or both! Double check your work!

4. Locate the socket labeled **DVE SEND**, third from the right at the back end of the **MLE Carrier Board**.

   - Carefully align the **Serializer Module** (4000A-062) over the socket.
   - Ensure that the module components are facing to the left.
   - Use your fingers to "feel" for the proper pin-to-socket alignment.
   - While applying downward pressure, slowly rock the module vertically (top to bottom), until the module is fully seated. Avoid flexing the board — so as not to bend the pins.

- After installation, "sight" down the board at the connector level, to make sure that there are no exposed pins. It is recommended that you rotate the board 360 degrees to check all planes.

5. Locate the following two sockets on the left side at the back end of the **MLE Carrier Board**:

   - **J501**, labeled **DVE VIDEO RETURN**.
   - **J502**, labeled **DVE ALPHA RETURN**.

Note   The **DVE ALPHA RETURN** and **DVE VIDEO RETURN** signals route the DVE's video and alpha signals to the third (internal) keyer to the selected MLE, which is reserved exclusively for **DVE Send** operations.

6. For *each* socket, install a **Deserializer Module** (4000A-061) as follows:

   - Carefully align the **Deserializer Module** (4000A-062) over the socket.
   - Ensure that the module components are facing to the left.
   - Use your fingers to "feel" for the proper pin-to-socket alignment.
   - While applying downward pressure, slowly rock the module vertically (top to bottom), until the module is fully seated. Avoid flexing the board — so as not to bend the pins.
   - After installation, "sight" down the board at the connector level, to make sure that there are no exposed pins. It is recommended that you rotate the board 360 degrees to check all planes.

7. When complete, carefully replace the **MLE Carrier Board** into the frame, and secure with the outer latches on the board edges.

This completes the procedure to install the Serializer and Deserializer modules for the DVE Send Option. Next you will install the software registration key for the **DVE Send and Remote Control Option**.

Installing the Software Option

Use the following procedure to install the software registration key for the **DVE Send and Remote Control Option**.

Important   Ensure that your serial number is properly entered. Refer to the section "**Installing Software Options**" on page 8–7 for more information.

1. Navigate to the **Installed Options Menu 1-2** as follows:

   - Press **HOME** (to display the **Main Menu 1-2**).
   - **MORE** (to display the **Main Menu 2-2**).
   - **Setup** (to display the **Setup Menu**).
   - **Installed Options** (to display the **Installed Options Menu 1-2**).

2. Press **Software Options** to display the **Software Options Menu**.

3. Press **Add Option** to display the **Enter Serial Number Menu**.

```
 Enter Option Number

 Frame Serial Number:F123456789
 Ross Encrypt Code:4426

 Please contact Ross Video at:
 8 John Street
 Iroquois, Ontario, Canada  K0E 1K0
 1-613-652-4886
 techsupport@rossvideo.com


    Finished      Cancel
```

Add Option Menu

4. Call **Ross Video Technical Support** at the number listed on the menu.

5. When you speak to our Technical Support representative, tell them your name, your facility name, the switcher's serial number and the **Encrypt Code** as listed on the menu.

6. Tell the Technical Support representative the name of the option(s) that you wish to install. Technical Support keeps an up-to-date record of the configuration and option status for each Synergy Switcher.

7. You will be given a numeric code by the Technical Support representative for each option. Enter the code on the keypad in the **Global Memory System Group** of the Synergy panel.

8. Press **ENTER** on the keypad or press **Finished** on the **Serial Number Menu**. Once entered, the menu indicates "**Installed**," and the system displays the **Software Options Menu** to confirm.

✓ **Operating Tip**

> Make a written note of your option code, and store it in a safe place for future reference.

This completes the procedure to activate your software key for the **DVE Send and Remote Control Option**. Refer to the *Synergy Series Installation Guide* for further setup instructions including how to configure your primary external DVE, BNCs setup, Aux Bus setup, Clean Feed setup, and custom controls on the Synergy switcher.

Notes on the DVE Send Option

Note the following when installing the **DVE Send and Remote Control Option**:

• The **DVE Send and Remote Control Option** can be installed without installing the required software registration key — however, the option will not function properly.

• There are no jumpers that need to be set when installing the option.

• In previous versions of Synergy software, the **DVE Send** button was used to control external DVEs only. The default setting for the button, in version 14 or higher system software, is **Internal**. To enable the **DVE Send** button for external DVE functions, you must toggle its function in the Personality Menus of the Synergy switcher. Refer to Chapter 13 "**External DVEs**" in the *Synergy Series Installation Guide* for information.

Testing the DVE Send Option

Testing the DVE Send option requires several important steps — many of which are more fully covered in the *Synergy Series Installation Guide*. The following is a summary of the procedures that must be followed:

1. Ensure that the **DVE Send** hardware and software options are properly installed as outlined in the section "**Installing the DVE Send Option** " on page 9–2.

2. Ensure that your external DVE is properly installed and cabled to the Synergy switcher. Refer to the "**Primary DVE Connections**" section of the *Synergy Series Installation Guide* for instructions.

> **Note** | The external DVE *must* be configured as a *primary* **DVE** in order to function properly with the **DVE Send** option.

3. Ensure that reference is properly connected. Refer to the section, "**Reference Connection**" of the *Synergy Series Installation Guide* for instructions.

4. Ensure that video and alpha inputs are properly connected to the DVE, from the Synergy switcher's Aux outputs. Refer to the section, "**Primary DVE Input Connection**" of the *Synergy Series Installation Guide* for instructions.

5. Ensure that video and alpha inputs are connected *back* to the Synergy switcher. Refer to the section, "**DVE Output Connections**" of the *Synergy Series Installation Guide*, section for instructions.

6. Ensure that the Aux Buses for the Synergy switcher are properly programmed. Refer to the section, "**Aux Bus Panel Programming**" of the *Synergy Series Installation Guide* for instructions.

7. Ensure that the Aux Bus tallies on the Synergy switcher are properly programmed. Refer to the section, "**Assigning Aux Bus Tallies**" of the *Synergy Series Installation Guide* for instructions.

8. Ensure that remote control and communications between the Synergy switcher and the DVE is properly installed and configured.

    • Refer to the section, "**DVE Remote Control Connections**" of the *Synergy Series Installation Guide* for instructions.

    • Refer to the section, "**DVE Communications Setup**" of the *Synergy Series Installation Guide* for details on establishing RS-422 communications with the primary DVE.

9. On the Synergy control panel, ensure that **DVE SEND** button in the **Transition Group** light and latch.

10. On the Aux Buses that feed the DVE, select signals and check that the DVE is receiving the signals at its input.

11. On the DVE, manually manipulate the image (such as re-sizing it), and leave the image in one static location.

12. On the Synergy control panel, select an MLE and ensure that you can key the DVE as a standard **Auto Select** key.

13. On the DVE, program a multi-keyframe transition that has both the video and key channels enabled. Store the effect in the numeric range of **1** to **40** (so that it can be accessed from the switcher's 40 "shot box" buttons in the **Pattern Control Group**).

14. Select foreground and background sources on an MLE, and press the **DVE SEND** button in the same MLE.

15. Select the DVE effect in one of two ways:

    • In the **Pattern Control Group**, press the "shot box" button for the desired DVE effect.

    • Enter the effect's two-digit number on the keypad of the **Global Memory System Group**.

    • Press **ENTER**.

16. Press **BKGD** in the appropriate MLE **Transition Group**.

17. Press **AUTO TRANS** to initiate the transition.

18. Verify the Synergy switcher as follows:

    • Ensure the Synergy switcher performs a match-frame cut to the internal DVE keyer;

    • Ensure the Synergy switcher cues the DVE to the starting keyframe of the effect and issues a "**Run Forward**" or "**Run Reverse**" command to the DVE as appropriate.

This completes the procedure to test an installed DVE Send option. Refer to Chapter 12 "**DVE Send**" in the *Synergy Series Operation Guide* for more detailed instructions on DVE Send operations.

Power Supplies

In This Chapter

This chapter provides information about redundant power, and procedures for replacing the power supplies for the Synergy control panel and frame.

The following topics are discussed:

- A Note About Redundant Power
- Replacing a Control Panel Power Supply
- Calibrating the Control Panel Power Supply
- Replacing a Frame Power Supply
- Replacing a Frame Power Supply Fan

A Note About Redundant Power
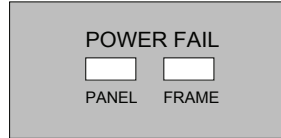
The **Redundant Power Supply** option provides protection against AC power failure — in both the Synergy frame and Synergy control panel. The option allows the entire Synergy switcher to receive power from two independent power sources. With the option installed, complete failure of one power source will not affect switcher operation.

The installation of the **Redundant Power Supply** option is a complex upgrade procedure that is best performed at the Ross Video factory. For information on upgrading your Synergy switcher with redundant power, contact Ross Video Technical Support.

Replacing a Control Panel Power Supply

This section provides detailed instructions for replacing a failed power supply in the Synergy control panel. Note that a supply failure *may* be indicated by the **PANEL** LED on the Synergy control panel.


```
        POWER FAIL
     ┌────┐  ┌────┐
     └────┘  └────┘
     PANEL   FRAME
```

Control Panel — Power Fail LEDs

When the **PANEL** LED is lit, it indicates that there is a fault with the primary or secondary power supply of the Synergy control panel.

Replacing a Control Panel Power Supply

If you suspect that a power supply for the Synergy control panel has failed, you will need to replace the power supply.

Use the following procedure to replace the power supply for the Synergy control panel.

	Warning	Hazardous voltages are present inside the Synergy control panel tub. This procedure should be performed by qualified service personnel only.
		To reduce the risk of electric shock, do not perform any servicing unless you are qualified to do so.

1. Turn off the Synergy control panel power switches. If a redundant power supply is installed, ensure that *both* switches are turned off.

2. Check the fuses. Each switch has an associated fuse holder that corresponds to the proper power supply. The fuse rating is printed on the panel surface.

   • If the fuse is blown, spare fuses are available in the spare parts kit, or from Ross Video Technical Support.

   • If the fuse is intact, replace it in the holder and continue with the next step.

3. Check that the main breaker for your AC supply has not tripped.

   • If the breaker has tripped, reset it to restore power.

   • If the breaker is intact, continue to the next step.

4. Unplug all AC power cords from the AC outlets.

5. Lift the top of the Synergy control panel to reveal the electronics bay inside.

6. Remove the protective cover from the electronics bay, and set the screws in a safe place for later re-installation.

7. Locate the power supply that you wish to replace.

- **Synergy 2** — On the Synergy 2 switcher, the main power supply is located to the right of the circuit board (as you face the control panel). The **redundant** supply is located in front of the circuit board.

- **Synergy 3, 4** — On the Synergy 3 and Synergy 4 switchers, the main power supply is located on the right (as you face the control panel). The **redundant** supply is on the left.

There are ten connections to the power supply, plus four bolts that secure the power supply's mounting plate to the control panel bay.
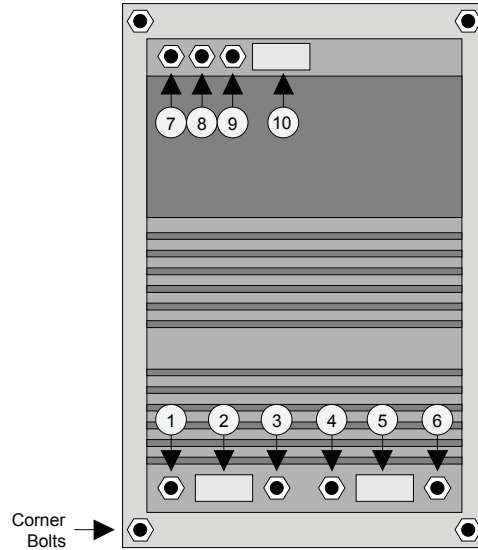
Power Supply Connections

8. Prior to removing the supply and its connections, use masking tape to label *all ten cables* that are connected to the supply. This step ensures that all cables are replaced in the same location. Use the numbering scheme as illustrated above:

- **1** to **6** for the front six connections.
- **7** to **10** for the rear four connections.

9. Remove cables **1** through **6** as follows:

- Disconnect each cable from the front of the supply.
- Set the nuts aside in a safe place for later re-installation.
- For cables **1**, **3**, **4** and **6**, note the orientation of components as shown in the side view below.
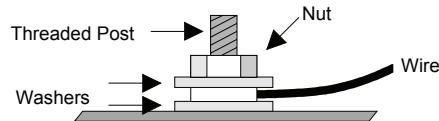
Cables 1, 3, 4 and 6 Connections — Side View

10. Remove the four corner nuts and washers, and set them aside in a safe place.

11. Lift the power supply from the captive bolts, and slide it forward to facilitate easy removal of the rear connections.

12. Remove cables **7** through **10** as follows:

    • Disconnect the cables from the rear of the supply.

    • Set the nuts aside in a safe place for later re-installation.

13. Remove the old power supply assembly from the control panel bay and set it aside.

14. Unpack the new power supply, and align it inside the control panel bay, on top of the four captive bolts.

15. Re-pack the old power supply in the new supply's shipping container, and return it to **Ross Video Technical Support**. The supply will be inspected to determine the cause of the failure.

16. Re-attach cables **7** through **10** to the rear of the new supply. Use the diagram on page 10–4 for reference.

17. Replace the washers and nuts on the four corner bolts.

18. Re-attach cables **1** through **6** to the front of the new supply. Use the diagram on page 10–4 for reference.

19. Verify all connections. It is not necessary to remove the labels from the ten power supply cables.

20. Re-connect all AC power cords.

21. Power on the Synergy control panel.

Note   Do not replace the protective cover over the electronics bay until you have completed the calibration procedure.

This completes the procedure for replacing a power supply of the Synergy control panel. Next you will calibrate the power supply voltages.

Calibrating the Control Panel Power Supply

Although each Control Panel power supply is calibrated at the factory, it is highly recommended that you check the supply's voltages and re-calibrate the supply only if required — once it has been installed in the Synergy control panel.

Use the following procedure to check and calibrate the Synergy control panel power supply:

1. Ensure that you have access to a digital voltmeter.

2. Ensure that only the *newly installed* power supply (or the one that you want to test) is turned on. If both power supplies are on, turn the old one (or the one that you do not want to test) off. This step ensures that correct voltages will be measured.

3. If the top of the control panel is up, lower it momentarily in order to place the panel in the **Lamp Test** mode. This diagnostic mode ensures that a suitable load is placed on the power supply.

4. Navigate to the **Lamp Test Menu** as follows:

    - Press **HOME** (to display the **Main Menu 1-2**).
    - **MORE** (to display the **Main Menu 2-2**).
    - **Setup** (to display the **Setup Menu**).
    - **Panel Diagnostics** (to display the **Panel Diagnostics Menu 1-2**).
    - Press **Lamp Test** (to display the **Lamp Test Menu**).
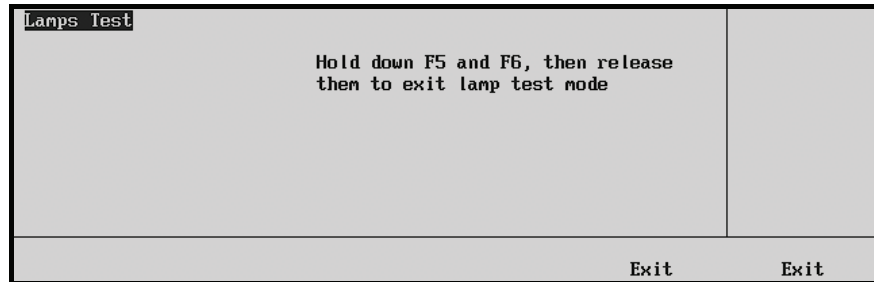
Lamp Test Menu

5. Press any button in the **Pattern Control Group** to light all of the buttons in the group.

6. Raise the top of the Synergy control panel to access the circuit board below.

7. Locate the calibration controls at the front edge of the circuit board. Use the figure below for reference.
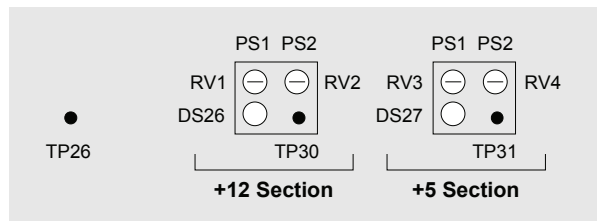
Power Supply Calibration Controls

- The following controls are provided for the Main Supply (**PS1**):
    ~ **RV1** — this control adjusts the +12 volt supply.
    ~ **RV3** — this control adjusts the +5 volt supply.
- The following controls are provided for the Redundant Supply (**PS2**):
    ~ **RV2** — this control adjusts the +12 volt supply.
    ~ **RV4** — this control adjusts the +5 volt supply.
- The following controls are provided for *both* supplies:
    ~ **DS26** (green) — this control indicates that +12 volt power is on.
    ~ **DS27** (green) — this control indicates that +5 volt power is on.
    ~ **TP30** — this control is the +12V test point.
    ~ **TP31** — this control is the +5V test point.
    ~ **TP26** — this control is the ground test point.

8. Ensure that the green LEDs **DS26** and **DS27** are both on.

9. Test the +5V supply as follows:

    • Connect the voltmeter's probes between **TP26** (ground) and **TP31**.

    • Measure the voltage. The proper reading should be +5V, ± 50 millivolts. If not, adjust as follows:

        ~ Adjust trim pot **RV3** (for power supply 1).

        ~ Adjust trim pot **RV4** (for power supply 2).

10. Test the +12V supply as follows:

    • Connect the voltmeter's probes between **TP26** (ground) and **TP30**.

    • Measure the voltage. The proper reading should be +12V, ± 50 millivolts. If the voltage does not fall into the correct range, adjust as follows:

        ~ Adjust trim pot **RV1** (for power supply 1).

        ~ Adjust trim pot **RV2** (for power supply 2).

    • Once the new supply has been calibrated, proceed to the next step.

11. Exit the **Lamp Test Mode** as follows:

    • Lower the top of the control panel momentarily.

    • Exit the mode by pressing *both* **Exit** buttons beneath the display.

12. Replace the protective cover for the electronics bay as follows:

    • Raise the top of the panel, and replace the protective cover over the electronics bay.

    • Secure all screws around the edges of the top cover.

    • Lower the top of the control panel to complete the procedure.

This completes the procedure to check and calibrate the power supply of the Synergy control panel.

Replacing a Frame Power Supply

This section provides detailed instructions for replacing a failed power supply in the Synergy frame. A supply failure *may* be indicated by the **FRAME** LED on the Control Panel.
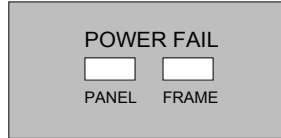
If the **FRAME** LED is lit, it indicates that there is a fault with the Synergy frame primary supply, secondary supply, or fans.

Replacing a Frame Power Supply

If you suspect that a power supply has failed, use the following procedure to change a Synergy frame supply. Note that the procedure for each supply (both primary and redundant) is identical.

⚡	**Warning**	Hazardous voltages are present inside the chassis power supply housing. This procedure should be performed by qualified service personnel only.
		To reduce the risk of electric shock, do not perform any servicing unless you are qualified to do so.

1. As a first step in troubleshooting, with power on, look at the power supply indicators on the front of the Synergy frame.
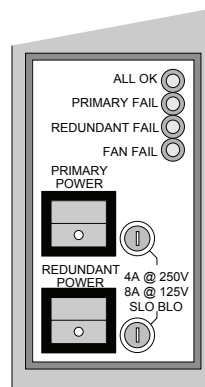
Primary and Redundant Power Supply LEDs

Four LEDs indicate the condition of the primary and redundant power supplies, plus the fan as follows:

- **ALL OK** — This LED indicates that there are no error conditions in the fans or power supplies. During normal operations, this green LED should be lit.

- **PRIMARY FAIL** — This LED indicates that the primary power supply has failed, or is not connected properly.

- **REDUNDANT FAIL** — This LED indicates that the secondary (redundant) power supply has failed, or is not connected properly.

- **FAN FAIL** — This LED indicates that one of the three fans is drawing too much current, or has stopped turning.

2. If a **FAIL** LED is on (or if you suspect another type of power supply problem), turn off the Synergy frame main and redundant power switches.

3. Check the fuses as follows:

   - Each switch has an associated fuse holder that corresponds to the proper power supply. The fuse rating is printed on the panel surface.

   - If the fuse is blown, spare fuses are available in the spare parts kit, or from Ross Video Technical Support.

   - If the fuse is intact, replace it in the holder and continue with the next step.

4. Check that the main breaker for your AC supply has not tripped.

   - If the breaker has tripped, reset it to restore power.

   - If the breaker is intact, continue to the next step.

5. Remove the power supply tray from the frame, and set it on a clean, flat, static free surface. The tray does not have a protective cover. Use the figure below for reference.

Power Supply Tray Components
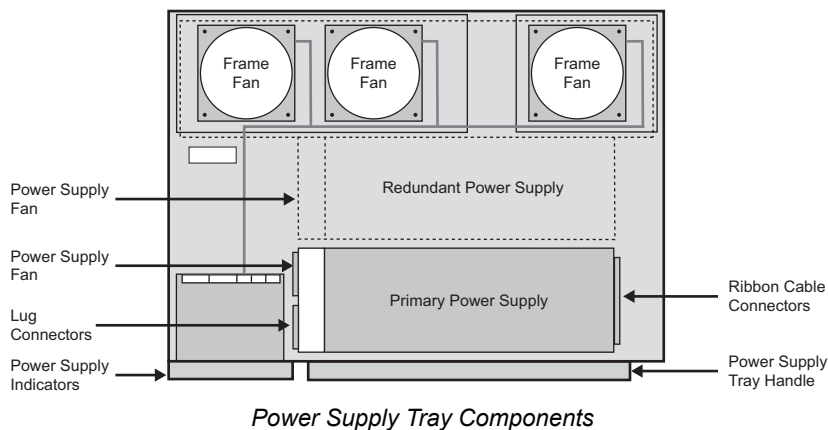
6. Locate the supply that you want to change.

✎ **Note**   The **Primary Power Supply** is located towards the front handle; the **Redundant Power Supply** is located behind it, near the fans.

7. For the selected supply, locate the end of the supply that has two flat ribbon cables connected. Each connector has two associated screws.

8. Remove all screws.

9. Pull off the ribbon cable connectors.

10. Set the screws aside in a safe place for later reinstallation.

11. Disconnect the small pin/socket connector underneath the ribbon cables.

✎ **Note**   The **RED** wire is situated at the top of the connector.

12. Remove the pin/socket connector as follows:

   • Turn the tray around.

   • Locate the end of the supply that has the fan, three lug connectors and one pin/socket connector.

   • If a plastic shell is present over the connectors, remove it.

   • Remove the pin/socket connector.

   • Note the arrangement of the three lug connectors and wires, from left to right, **White**, **Black**, and **Green**.

   • Loosen the screws.

   • Remove the three lug connectors and wires.

13. Remove the supply from the tray as follows:

   • Remove the four screws from the *side* of the supply.

   • Remove the four screws from the *back* of the supply.

   • Set the screws aside in a safe place for later reinstallation.

Note On the **Redundant Power Supply**, the four side screws are difficult to reach, due to the proximity of the fans.

   • Lift the supply from the tray. If it is still under warranty, return the supply to Ross Video for failure analysis.

14. Replace the new supply in the tray.

15. Replace the four *side* screws and the four *back* screws.

16. On the "fan" side of the supply, replace the three wires and lug connectors, being careful to align each wire in its original position, from left to right, **White**, **Black**, and **Green**.

17. Replace the pin/socket connector as follows:

   • Rotate the tray.

   • Replace the pin/socket connector.

   • Replace the two ribbon cable connectors.

18. Replace the tray in the Synergy frame.

19. Power on the Synergy frame.

20. Ensure that the green **ALL OK** LED is lit.

Note For the Synergy frame supply, there is no calibration procedure required. Each supply provides its own auto-calibration.

This completes the procedure to replace the Synergy frame power supply.

Replacing a Frame Power Supply Fan

This section provides instructions for replacing a failed fan in the Synergy frame power supply tray. A fan failure *may* be indicated by the **FRAME** LED on the Synergy control panel.

```
┌─────────────────────┐
│                     │
│     POWER FAIL      │
│    ┌────┐  ┌────┐    │
│    └────┘  └────┘    │
│    PANEL   FRAME     │
│                     │
└─────────────────────┘
```

Control Panel — Frame Power Fail LED

If the **FRAME** LED is lit, it indicates that there is a fault with the Synergy frame primary supply, secondary supply, or fans.

⚠	**Caution**	As of September 2005, Synergy frames include **12V** fans in the **Power Supply Assembly** (4000A-070. Previous Synergy frames used **5V** fans for the for the **Power Supply Assembly**.
		Contact Ross Video Technical Support to ensure you are installing the correct type of fan for your Synergy frame and **Power Supply Assembly**.

Replacing a Frame Power Supply Fan

The procedure for replacing a 5V or a 12V fan is identical.

⚡	**Warning**	Hazardous voltages are present inside the frame power supply housing. This procedure should be performed by qualified service personnel only. To reduce the risk of electric shock, do not perform any servicing unless you are qualified to do so.

Use the following procedure to replace a Synergy frame power supply fan:

1. Verify the power supply status of the Synergy frame as follows:

   • Ensure the Synergy frame is powered on.

   • Locate the frame power supply indicators on the front of the Synergy frame.

   • If the **FAN FAIL** LED is lit, it indicates that *one* of the three fans is drawing too much current, or has stopped turning.

2. Power off the Synergy frame main and redundant power switches.

3. Determine which fan has failed as follows:

   • Pull out the power supply tray.

   • The fan that is *not* spinning down is the one that has failed.

   • Verify the type of fans installed in your power supply tray by reading the manufacturer label on the failed fan. Synergy frames installed with 12V fans will

also include a Warning label stating the fan voltage. Use the figure "**Power Supply Tray Components**" for reference.

⚠	**Important**	You must replace a failed fan with a new fan of the same voltage. For example, you cannot replace a 5V fan with a 12V fan.

4. Set the power supply tray on a clean, flat, static free surface with the tray handle facing you. Use the figure below for reference. The tray does not have a protective cover.

5. Locate the fan that you want to change. Each fan has an individual cable connector and harness, but *all* fan harnesses are laced together. Use the figure below for reference.
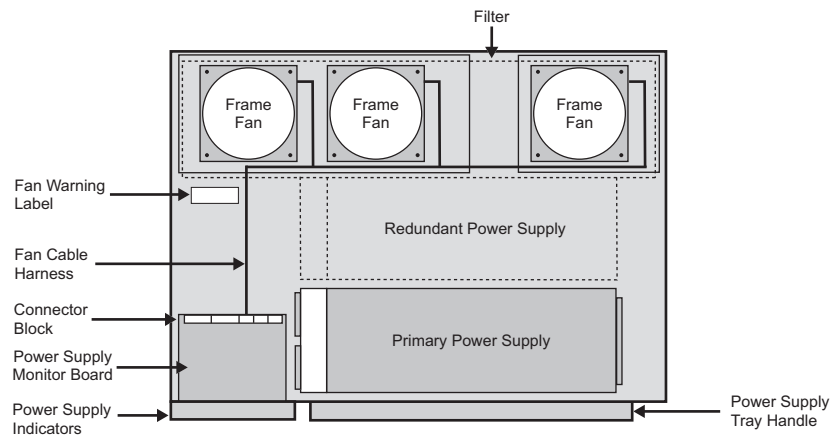
Power Supply Tray Components

6. Clip *all cable ties* along the length of the harness, leading from the failed fan to the **Power Supply Monitor Board** and the **Connector Block**.

7. Remove the failed fan as follows:

   • Locate the back of the failed fan.

   • Remove the four nuts that secure the fan to the tray. Be careful to retain the nuts, and set them aside for later re-installation.

   • Disconnect the connector for the failed fan.

   • Note the orientation of the Air flow arrow on the fan.
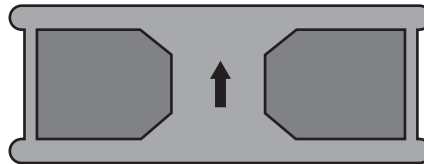
Synergy Frame Fan — Air Flow arrow

   • Slide the fan up from its mounting posts.

   • Carefully remove the fan and cable harness from the tray.

8. Install the new fan as follows:

- Install the new fan in the same orientation as the other fans, ensuring the Air Flow arrow on the fan points away from the metal surface of the tray.
- Secure the fan with the four nuts which were removed previously.
- Lay the new cable harness along the path of the current one.
- Attach the connector for the new fan to the **Connector Block**.
- Secure the cable harness with new cable ties.

9. Replace the power supply tray in the Synergy frame.

10. Turn on the power switches.

11. Verify that the **ALL OK** LED is lit.

This completes the procedure to replace a failed fan in the Synergy frame.

Calibration and Diagnostics

In This Chapter

This chapter provides information about calibrating the Synergy switcher, and running a variety of diagnostic tests.

The following topics are discussed:

- Switcher Calibration
- Panel Diagnostic Tools
- Displaying Panel Information
- Potentiometer Test
- Fader Test
- Joystick Test
- Button Test
- Lamp Test
- Memory Test
- Display Test
- Disk Test
- Panel TX/RX Test
- Tally Test
- DIP/Jump Test
- Frame Diagnostic Tools

Switcher Calibration

The **Calibration Menu** allows you calibrate all analog controls on the switcher panel, including the faders, the XYZ positioner, and all knobs (excluding those to the right of the display).

The main area of the **Calibration Menu** provides a visual display of all analog controls, including the faders, positioner, and all knobs. The **Scroll Area** is blank and the **Label Area** provides only one function.

⚹	**Important**	You must calibrate *all analog controls* on your switcher. Failure to do so will map a false limit into switcher memory (for the control(s) that you did not calibrate), thus preventing proper switcher operation.

Calibrating the Analog Controls

⚠	**Caution**	Use the Calibration Mode with caution.
		Perform the calibration only when you suspect that there has been "drift" in the knobs or the joystick, or that there is a "limit" problem with a fader.

Use the following procedure to calibrate the analog controls of the Synergy switcher:

1. Navigate to the **Calibration Menu** as follows:

   - Press **HOME** (to display the **Main Menu 1-2**).
   - **MORE** (to display the **Main Menu 2-2**).
   - **Setup** (to display the **Setup Menu**).
   - **Installation** (to display the **Installation Menu 1-2**).
   - **MORE** (to display the **Installation Menu 2-2**).
   - **Calibration** (to display the **Calibration Menu**).

```
Calibration
FADERS                KNOBS                    Right:Not moved
 1:Not moved            Aspect:Not moved      Bottom:Not moved
 2:Not moved            Border:Not moved        Glow:Not moved
 3:Not moved              Soft:Not moved       Width:Not moved
                       Rotation:Not moved     Density:Not moved
                            Hue:Not moved        Clip:Not moved
POSITIONER                  Sat:Not moved        Gain:Not moved
 X:Not moved                Lum:Not moved         Hue:Not moved
 Y:Not moved                Top:Not moved      Reject:Not moved
 Z:Not moved               Left:Not moved     Supress:Not moved

                                                          Accept
```

Calibration Menu

✎	**Note**	The screen capture shown above is for a Synergy 3. The number of **Faders** (as shown in the **FADERS** column) differs on the **Calibration Menu** for the Synergy 2 and 3 switchers.

2. Calibrate the faders as follows:

    •   Move *each fader* to its full upper limit until it touches the stop.

    •   Move *each fader* to its full lower limit until it touches the stop.

    •   Repeat this procedure two or three times for *each fader.*

    As you move the faders, you will see a series of numbers appear in the **Main Area**, under the **FADERS** heading. The numbers for each fader *may not match* — this is normal.

3. Calibrate the positioner by moving *each axis* as follows:

    •   Calibrate the **X-Axis** by moving the joystick fully left and right. Repeat this procedure two or three times.

    •   Calibrate the **Y-Axis** by moving the joystick fully up and down. Repeat this procedure two or three times.

    •   Calibrate the **Z-Axis** by twisting the joystick knob fully clockwise and counterclockwise. Repeat this procedure two or three times.

    As you move the joystick, you will see a series of numbers appear in the **Main Area**, under the **POSITIONER** heading. The numbers for each axis *may not match* — this is normal.

4. Calibrate the knobs as follows:

    •   Move *each knob* fully left and right.

    •   Repeat this procedure two or three times for *each knob*.

    As you move the knobs, you will see a series of numbers appear in the **Main Area**, under the **KNOBS** heading. The numbers for each knob *may not match* — this is normal.

5. At this point, you can complete the calibration or exit the menu safely as follows:

Note
> Any controls that were not touched during the calibration process will display "**Not Moved**". These controls will retain their previous calibration limits.

•   To exit the menu safely, without accepting the newly calibrated controls, press **HOME**.

•   To complete the calibration, press **Accept**.

Caution
> When you press **Accept**, *do not* hold the positioner off center. This will program a false "center" for the joystick, and you will have to re-calibrate the switcher again to clear it.

This completes the procedure to calibrate the analog controls of the Synergy switcher.

Panel Diagnostic Tools

All Synergy switchers provide a full array of panel diagnostic tools. The following topics are discussed in this section:

- Displaying Panel Information
- Potentiometer Test
- Fader Test
- Joystick Test
- Button Test
- Lamp Test
- Memory Test
- Display Test
- Disk Test
- Panel TX/RX Test
- Tally Test
- DIP/Jump Test

Displaying Panel Information

Note The following menus are for reference only. No action can be taken.

Use the following procedure to display panel information:

1. Navigate to the **Panel Diagnostics Menu** as follows:
   - Press **HOME** (to display the **Main Menu 1-2**).
   - **MORE** (to display the **Main Menu 2-2**).
   - **Setup** (to display the **Setup Menu**).
   - **Panel Diagnostics** (to display the **Panel Diagnostics Menu**).

2. Press **Information** to display the **Panel Information Menu**, a sample of which is shown below. Information is provided for both the Synergy control panel and frame.

```
Information

Panel Info              Frame Info
Apr  7 2006             Apr  7 2006
12:09:40                12:04:15
Synergy 17.00           Synergy 17.00

Stack:1406dah           Stack:0a01h


    System      Errors      Reset Count
```

Information Menu — System Display

3. Press **Errors** to display a list of errors, a sample of which is shown below. Information is provided for both the panel and frame.

```
Information - Communication Com Port Stats              ↑PAN2FRM  (PF)
                                                Panel   AUXPAN 1 (A1)
Panel Port: AUXPAN 1        Frame Port: DVExtrem        ↓AUXPAN 2 (A2)
Bad byte counts:0           Bad byte counts:0
Bad checksums  :0           Bad checksums  :0           ↑PERIPH2  (P2)
Parity errors  :0           Parity errors  :0   Frame   DVE      (D2)
Framing errors :0           Framing errors :0           DVE 1    (D1)
Over runs      :0           Over runs      :0
Forced restarts:0           Forced restarts:0
NACKs received :0           NACKs received :0
Other errors   :0           Other errors   :0

    System          Errors      Reset Count
```

Information Menu — Errors Display

- Use the **Panel** knob to scroll through a list of individual panel ports, with the communication errors for the selected port being displayed in the main area of the display. If **Total Errors** is selected, the displayed information will include *all* communication errors for the entire panel.

- Use the **Frame** knob to scroll through a list of individual frame ports, with the communication errors for the selected port being displayed in the main area of the display. If **Total Errors** is selected, the displayed information will include *all* communication errors for the entire frame.

4. Press **Reset Count** to manually reset the error counts. Note, however, that all counts are automatically reset on power up.

This completes the procedure to display panel information.

Potentiometer Test

The **Pots Test Menu** allows you to test the response of all potentiometers on the Synergy control panel.

Use the following procedure to test the potentiometers:

1. Navigate to the **Panel Diagnostics Menu 1-2** as follows:

   - Press **HOME** (to display the **Main Menu 1-2**).
   - **MORE** (to display the **Main Menu 2-2**).
   - **Setup** (to display the **Setup Menu**).
   - **Panel Diagnostics** (to display the **Panel Diagnostics Menu 1-2**).

2. Press **Pots Test** to display the **Pots Test Menu**.

```
Pots Test

KNOB:Top Display Knob
Value:0
                                    |




    Normal         Scaled       Raw
```

Pots Test Menu

3. Test the three knobs in the **System Control** area as follows:

   • Press **Normal**.

   • Turn each knob left and right.

   The display will indicate the rate at which you are turning the knob numerically, and graphically with a bar graph. The value will return to 0 when you stop turning the knob.

4. Test all other knobs as follows:

   • Press **Scaled**.

   • Turning the knob will display the absolute position of the knob both numerically and graphically using a bar graph.

      ~ The number (displayed in hexadecimal) should range from **0** (full counter-clockwise) to **FFF** (full clockwise) and should be stable and jitter-free.

5. If the number does not reach both limits, perform a calibration as outlined in the section "**Switcher Calibration**" on page 11–2.

This completes the procedure to test the potentiometers.

Fader Test

The **Fader Test Menu** allows you to test all the MLE faders on the Synergy control panel.

Use the following procedure to test the faders:

1. Navigate to the **Panel Diagnostics Menu 1-2** as follows:

   • Press **HOME** (to display the **Main Menu 1-2**).

   • **MORE** (to display the **Main Menu 2-2**).

   • **Setup** (to display the **Setup Menu**).

   • **Panel Diagnostics** (to display the **Panel Diagnostics Menu 1-2**).

2. Press **Fader Test** to display the **Fader Test Menu**.
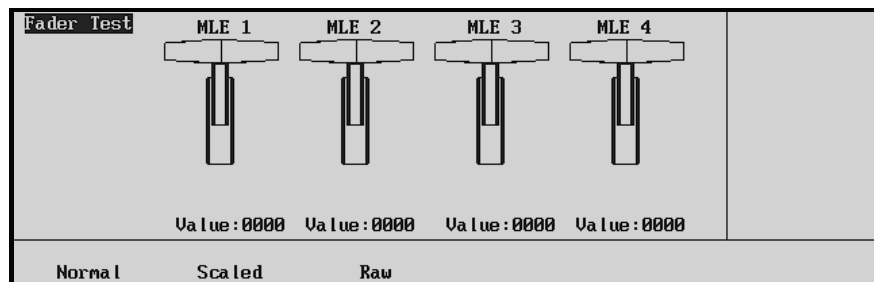
Fader Test Menu

✎   **Note**   The example screen shown above is for a Synergy 4. The number of **Faders** differs on the **Calibration Menu** for the Synergy 2 and 3.

3. Test the faders as follows:

- Press **Normal**.
- Move each fader up and down. The position of the fader is shown both numerically (in hexadecimal) and graphically:
  - ~ The number should range from **000** (up) to **FFF** (down), and the number should be stable and jitter-free.

4. If the number does not reach both limits, perform a calibration as outlined in the section "**Switcher Calibration**" on page 11–2.

This completes the procedure to test the faders.

Joystick Test

The **Joystick Test Menu** allows you to test all three axes of the Joystick.

Use the following procedure to test the Joystick:

1. Navigate to **Panel Diagnostics Menu 1-2** as follows:

- Press **HOME** (to display the **Main Menu 1-2**).
- **MORE** (to display the **Main Menu 2-2**).
- **Setup** (to display the **Setup Menu**).
- **Panel Diagnostics** (to display **Panel Diagnostics Menu 1-2**).

2. Press **Joystick Test** to display the **Joystick Test Menu**.
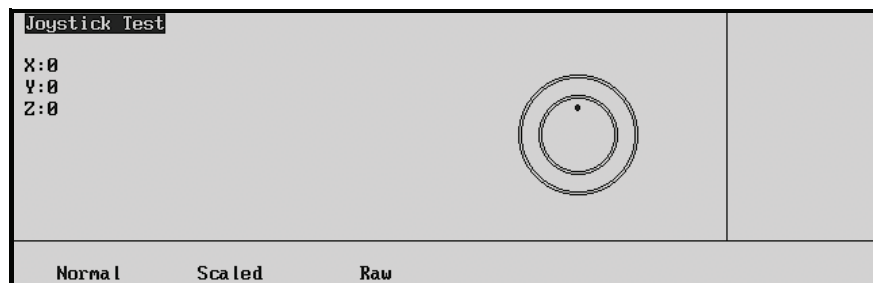
Joystick Test Menu

3. Test the joystick as follows:

- Press **Normal**.
- Move the positioner up, down, left, right, and twist in both directions. The position of the fader is displayed both numerically and graphically.
  - ~ The number should range from **0** (center) to **64**, and the number should be stable and jitter-free.

4. If the number does not reach these limits, perform a calibration as described in the section "**Switcher Calibration**" on page 11–2.

This completes the procedure to test the Joystick.

Button Test

The **Button Test Menu** allows you to test all pushbuttons on the Synergy control panel.

Use the following procedure to test the buttons:

1. Navigate to **Panel Diagnostics Menu 1-2** as follows:

   • Press **HOME** (to display the **Main Menu 1-2**).

   • **MORE** (to display the **Main Menu 2-2**).

   • **Setup** (to display the **Setup Menu**).

   • **Panel Diagnostics** (to display **Panel Diagnostics Menu 1-2**).

2. Press **Button Test** to display the **Button Test Menu**.

```
Button Test

BUTTON     #07          Hold down F5 and F6, then release
AREA       #08          them to exit button test mode
MLE        #01
Last action:Button Up




                                        Exit           Exit
```
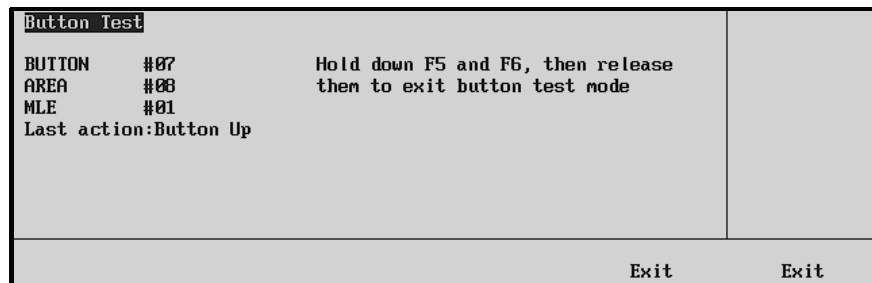
Button Test Menu

3. Press each button as required.

4. Exit the menu by pressing *both* **Exit** buttons beneath the display.

This completes the procedure to test the buttons.

Lamp Test

The **Lamp Test Menu** allows you to test large groups of buttons on the Synergy control panel.

Use the following procedure to test the lamps:

1. Navigate to the **Panel Diagnostics Menu 1-2** as follows:

   • Press **HOME** (to display the **Main Menu 1-2**).

   • **MORE** (to display the **Main Menu 2-2**).

   • **Setup** (to display the **Setup Menu**).

   • **Panel Diagnostics** (to display the **Panel Diagnostics Menu 1-2**).

2. Press **Lamp Test** to display the **Lamp Test Menu**.

```
Lamps Test

                      Hold down F5 and F6, then release
                      them to exit lamp test mode




                                        Exit           Exit
```
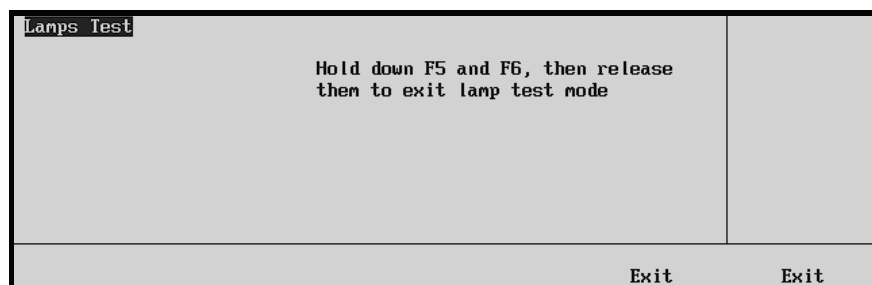
Lamp Test Menu

3. Press buttons in selected panel regions, to test *all lamps* in those regions as required.

4. Exit the menu by pressing *both* **Exit** buttons beneath the display.

This completes the procedure to test the lamps.

Memory Test

The **Memory Test Menu** allows you to test various system EPROMs.

Use the following procedure to test the memory:

1. Navigate to the **Panel Diagnostics Menu 2-2** as follows:

   • Press **HOME** (to display the **Main Menu 1-2**).
   • **MORE** (to display the **Main Menu 2-2**).
   • **Setup** (to display the **Setup Menu**).
   • **Panel Diagnostics** (to display **Panel Diagnostics Menu 1-2**).
   • **MORE** (to display **Panel Diagnostics Menu 2-2**).

2. Press **Memory Test** to display the **Memory Test Menu**.
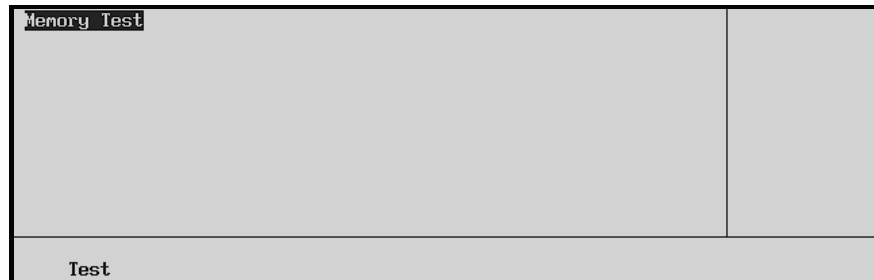
Memory Test Menu

3. Test the memory as follows:

   • Press **Test** to initiate the test of the first EPROM.
   • Press **Test** again to continue testing each EPROM in succession.
   • The menu will report **Pass** or **Fail** per the results of each test.

This completes the procedure to test the memory.

Display Test

The **Display Test Menu** allows you to test the main menu display of the Synergy control panel.

Use the following procedure to test the display:

1. Navigate to the **Panel Diagnostics Menu 2-2** as follows:

   • Press **HOME** (to display the **Main Menu 1-2**).
   • **MORE** (to display the **Main Menu 2-2**).
   • **Setup** (to display the **Setup Menu**).
   • **Panel Diagnostics** (to display **Panel Diagnostics Menu 1-2**).
   • **MORE** (to display **Panel Diagnostics Menu 2-2**).

2. Press **Display Test** to display the **Display Test Menu**.

Display Test Menu

The menu and mnemonics displays are exercised.

3. Press *any button* below the display to advance to the next in the series of display tests. A variety of tests are available.

This completes the procedure to test the display.

Disk Test

The **Disk Test Menu** allows you to test the floppy disk drive or USB port of the Synergy switcher.

⚠ **Caution**

> The contents of the floppy disk or USB key will be lost when you perform this test.

Use the following procedure to test the floppy disk drive or USB port:

1. Navigate to the **Panel Diagnostics Menu 2-2** as follows:

   • Press **HOME** (to display **Main Menu 1-2**).

   • **MORE** (to display the **Main Menu 2-2**).

   • **Setup** (to display the **Setup Menu**).

   • **Panel Diagnostics** (to display the **Panel Diagnostics Menu 1-2**).

   • **MORE** (to display the **Panel Diagnostics Menu 2-2**).

2. Press **Disk Test** to display the **Disk Test Menu**.

Disk Test Menu

3. Test the floppy disk drive or USB port as follows:

   • Insert a blank or pre-formatted disk into the drive. If you have a USB port, insert a blank USB key.

   • Press **Test** to begin the read/write test. The menu will report **Pass** or **Fail** per the results of the test.

This completes the procedure to test the floppy disk drive or USB port.

Panel TX/RX Test

The **Panel TX/RX Test Menu** allows you to test communications with various remote control and communications ports. The internal test checks the UART which generates the serial data stream. The external test additionally tests the line drivers and receivers.

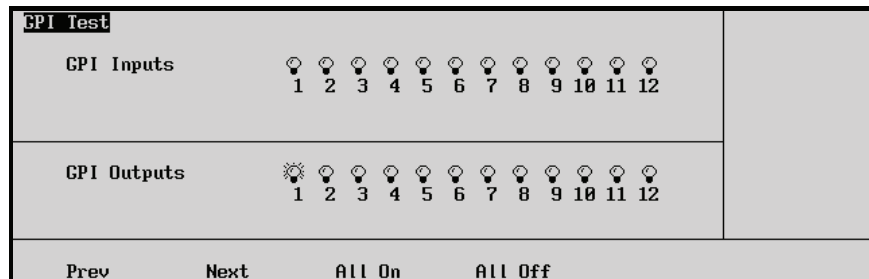✎   **Note**   A proper loop-back connector is required to conduct the external test.

Use the following procedure to test panel TX/RX functions:

1. Navigate to the **Panel Diagnostics Menu 2-2** as follows:

   - Press **HOME** (to display **Main Menu 1-2**).
   - **MORE** (to display **Main Menu 2-2**).
   - **Setup** (to display the **Setup Menu**).
   - **Panel Diagnostics** (to display **Panel Diagnostics Menu 1-2**).
   - **MORE** (to display **Panel Diagnostics Menu 2-2**).

2. Press **TX/RX Test** to display the **Panel TX/RX Test Menu**.

```
Panel TX/RX Test
Waiting for user



                                    Com Port:  PAN2FRM  (PF)
                                               AUXPAN 1 (A1)
                                               AUXPAN 2 (A2)
                                               AUXPAN 3 (A3)
                                              ↓REMOTE 1 (R1)

                                    Monitor        Test
```

Panel TX/RX Test Menu

3. Test a communication port as follows:

✎   **Note**   Peripheral equipment should be disconnected from the selected port while running the test.

   - Use the **Com Port** knob to select the port that you wish to test.
   - If available, attach an appropriate loop-back connector to the port that you wish to test.
   - If a loop-back connector is not available, the system will only be able to perform a partial test (the UART will be tested, however, the line drivers and receivers will not).
   - Press **Test** to begin the TX/RX test. The menu will report **Pass** or **Fail** for internal and external tests.

This completes the procedure to test TX/RX functions. Repeat the procedure for each additional port that you wish to test.

Monitoring Panel TX/RX Functions

You can also monitor the traffic on a selected communications port.

⚠	**Important**	This option is used primarily for troubleshooting and diagnostic purposes. You should not need to use this option unless advised by Ross Video Technical Support.

Use the following procedure to monitor the traffic on a selected communications port:

1. Navigate to the **Panel Diagnostics Menu 2-2** as follows:

   • Press **HOME** (to display **Main Menu 1-2**).

   • **MORE** (to display **Main Menu 2-2**).

   • **Setup** (to display the **Setup Menu**).

   • **Panel Diagnostics** (to display **Panel Diagnostics Menu 1-2**).

   • **MORE** (to display **Panel Diagnostics Menu 2-2**).

2. Press **TX/RX Test** to display the **Panel TX/RX Test Menu**.

Panel TX/RX Test Menu

3. Use the **Com Port** knob to select the port that you wish to monitor.

4. Press **Monitor** to display the **Com Port Monitor Menu**.
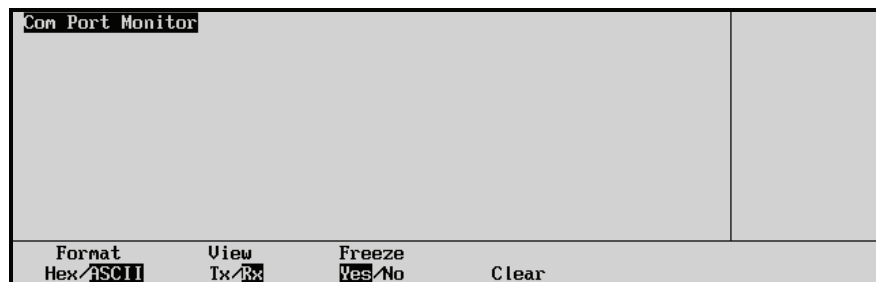
Com Port Monitor Menu

5. Press **Format** to toggle between **Hex** and **ASCII** to select how information is displayed:

   • **Hex** — Use this option to display the raw data as Hexadecimal numbers.

   • **ASCII** — Use this option to display the data as printed characters.

6. Press **View** to toggle between **Tx** and **Rx** as follows:

   • **Tx** — Use this option to display the traffic being transmitted from the panel.

   • **Rx** — Use this option to display the traffic being received by the panel.

7. Press **Freeze** to toggle between **Yes** and **No** as follows:

   • **Yes** — Use this option to freeze the current data on the display. New traffic data is not recorded.

   • **No** — Use this option to have old traffic data is continuously cycled out to allow space for the newest traffic data to be displayed.

8. Press **Clear** to clear all recorded data for the selected traffic flow.

This completes the procedure to monitor the traffic on a selected communications port. Repeat this procedure for every communications port you wish to monitor.

Tally Test

The **Tally Test Menu** allows you to test all tally relays.

Use the following procedure to test tally relays:

1. Navigate to the **Panel Diagnostics Menu 2-2** as follows:

   • Press **HOME** (to display **Main Menu 1-2**).

   • **MORE** (to display **Main Menu 2-2**).

   • **Setup** (to display the **Setup Menu**).

   • **Panel Diagnostics** (to display **Panel Diagnostics Menu 1-2**).

   • **MORE** (to display **Panel Diagnostics Menu 2-2**).

2. Press **Tally Test** to display the **Tally Test Menu**.

```
Tally test

Current lit tally:72




    Prev        Next        All On      All Off
```
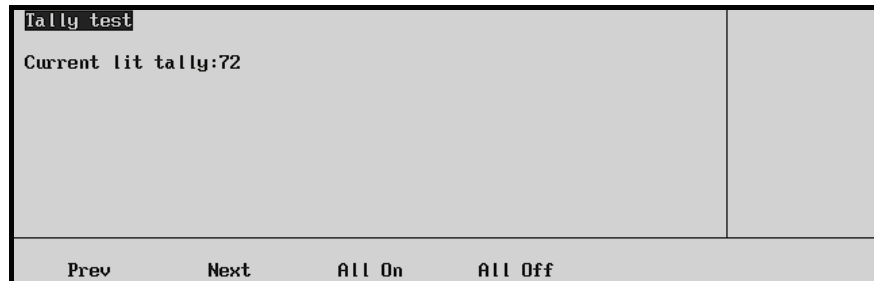
Tally Test Menu

3. Select the desired tally function as follows:

   • **Prev** — Press this button to test the previous relay (as indicated on the menu).

   • **Next** — Press this button to test the next relay (as indicated on the menu).

   • **All On** — Press this button to turn all tally relays on.

   • **All Off** — Press this button to turn all tally relays off.

This completes the procedure to test tally relays.

DIP/Jump Test

The **DIP/Jump Test** allows you to test the DIP and jumper switches in the panel with the aid of a graphical representation on the display. The graphical representation runs in real time, meaning any changes made to the physical state of the panel DIP or jumper switches will be displayed instantly.

⚠✱ **Important**   As the switches are located within the electronics bay inside the Synergy control panel and covered with a protective plate, we do not advise accessing these switches without first contacting Technical Support for assistance.

Use the following procedure to test the panel DIP and jumper switches:

1. Navigate to the **Panel Diagnostics Menu 2-2** as follows:

    • Press **HOME** (to display **Main Menu 1-2**).

    • **MORE** (to display **Main Menu 2-2**).

    • **Setup** (to display the **Setup Menu**).

    • **Panel Diagnostics** (to display **Panel Diagnostics Menu 1-2**).

    • **MORE** (to display **Panel Diagnostics Menu 2-2**).

2. Press **DIP/Jump Test** to display the **DIP/Jump Test Menu**.
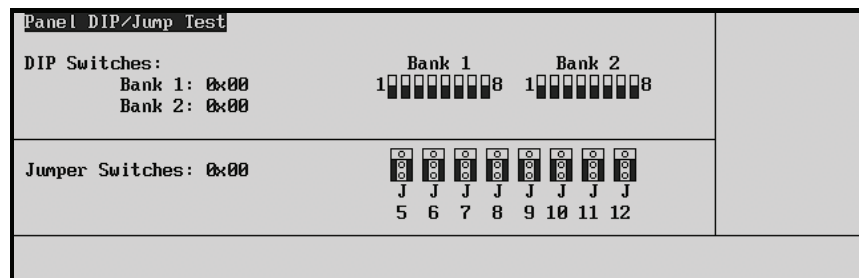
DIP /Jumper Switch Test Menu

This concludes the procedure to test the panel DIP and jumper switches.

Frame Diagnostic Tools

All Synergy switchers provide several frame diagnostic tools. Each diagnostic function is discussed in the following sections:

- TX/RX Test
- DIP/Jump Test
- GPI Test
- Internal Video Test

TX/RX Test

The **TX/RX Test Menu** allows you to test frame communications with various remote control and communications ports. You can also monitor the traffic on the selected port.

Testing Frame TX/RX Functions

Use the following procedure to test frame TX/RX functions:

Note | A proper loop-back connector is required to conduct the external test.

1. Navigate to the **Frame Diagnostics Menu** as follows:
   - Press **HOME** (to display the **Main Menu 1-2**).
   - **MORE** (to display the **Main Menu 2-2**).
   - **Setup** (to display the **Setup Menu**).
   - **Frame Diagnostics** (to display the **Frame Diagnostics Menu**).

2. Press **TX/RX Test** to display the **Frame TX/RX Test Menu**.

```
Frame TX/RX Test

Waiting for user

                                              FRM2PAN  (FP)
                                   Com Port: OverDrive(ED)
                                              CDK111   (P1)
                                              CDK111   (P2)
                                              Dveous   (D2)
                                              DVExt-V2 (D1)

                                   Monitor      Test
```
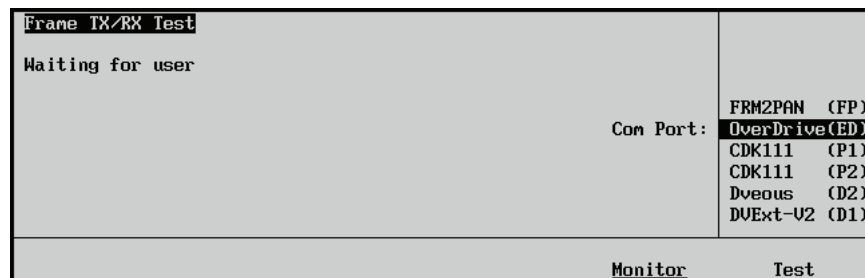
Frame TX/RX Test Menu

3. Test a communications port on the Synergy frame as follows:
   - Use the **Com Port** knob to select the port that you wish to test.
   - Press **Test** to begin the Frame TX/RX test. The menu will report **Pass** or **Fail** per the results of the test.

This concludes the procedure to test frame TX/RX functions. Repeat the procedure for additional ports that you wish to test.

Monitoring the Frame TX/RX Functions

You can also monitor the traffic on a selected communications port.

⚠️ **Important** | This option is used primarily for troubleshooting and diagnostic purposes. You should not need to use this option unless advised by Ross Video Technical Support.

Use the following procedure to monitor frame TX/RX functions:

1. Navigate to the **Frame Diagnostics Menu** as follows:

   * Press **HOME** (to display the **Main Menu 1-2**).
   * **MORE** (to display the **Main Menu 2-2**).
   * **Setup** (to display the **Setup Menu**).
   * **Frame Diagnostics** (to display the **Frame Diagnostics Menu**).

2. Press **TX/RX Test** to display the **Frame TX/RX Test Menu**.
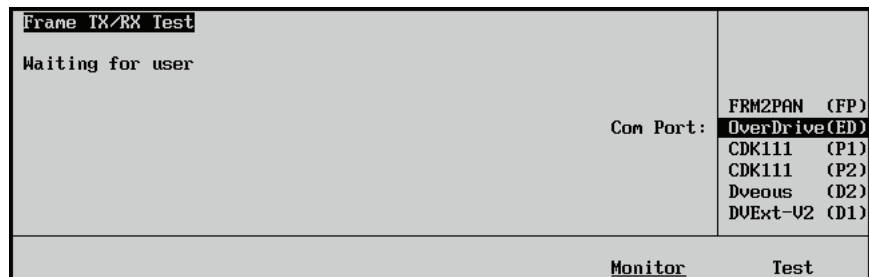
Frame TX/RX Test Menu

3. Use the **Com Port** knob to select the port that you wish to monitor.

4. Press **Monitor** to display the **Com Port Monitor Menu**.
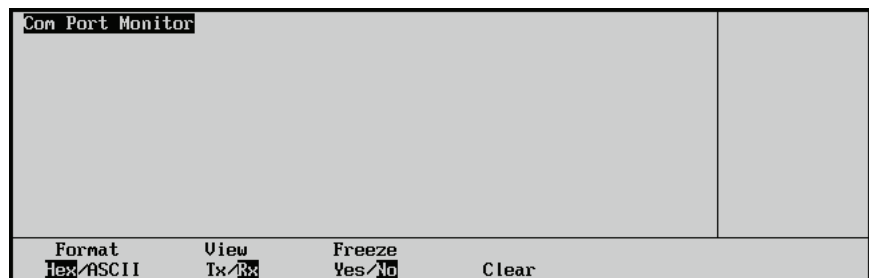
Com Port Monitor Menu

5. Toggle the **Format** button between **Hex** and **ASCII** to set how the information is displayed.

   * **Hex** — Use this option to display the raw data as Hexadecimal numbers.
   * **ASCII** — Use this option to display the data as printed characters.

6. Toggle the **View** button between **Tx** and **Rx** to display traffic flow.

   * **Tx** — Use this option to display the traffic being transmitted from the frame.
   * **Rx** — Use this option to display the traffic being received by the frame.

7. Toggle the **Freeze** button between **Yes** and **No**.

   • **Yes** — Use this option to freeze the current data on the display and not record any new traffic data.

   • **No** — Use this option to continuously cycle traffic data to allow for the newest data to be displayed.

8. Press **Clear** to clear all recorded data for the selected traffic flow.

This concludes the procedure to monitor frame TX/RX functions.

DIP/Jump Test

The **DIP/Jump Test** allows you to test the DIP and jumper switches in the frame with the aid of a graphical representation on the display.

The graphical representation runs in real time, meaning any changes made to the physical state of the frame DIP or jumper switches will be displayed instantly.

⚠️	**Important**	The majority of these switches are for factory use only, we do not advise accessing these switches without first contacting Ross Video Technical Support for assistance.

Use the following procedure to test the frame DIP and jumper switches:

1. Navigate to the **Frame Diagnostics Menu** as follows:

   • Press **HOME** (to display the **Main Menu 1-2**).

   • **MORE** (to display the **Main Menu 2-2**).

   • **Setup** (to display the **Setup Menu**).

   • **Frame Diagnostics** (to display the **Frame Diagnostics Menu**).

2. Press **DIP/Jump Test** to display the **Frame DIP/Jump Test Menu**.
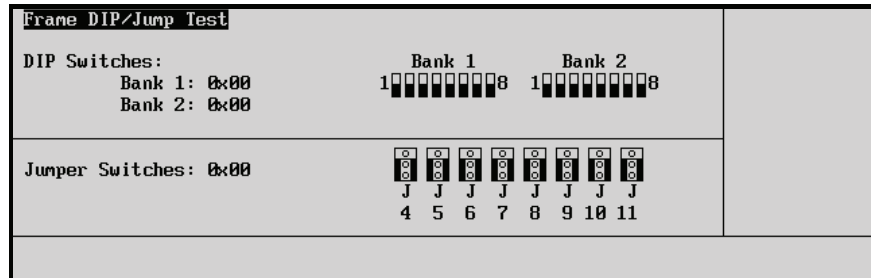
Frame DIP/Jump Test Menu

This concludes the procedure to test the frame DIP and jumper switches.

GPI Test

The **GPI Test** uses a graphical display of light bulbs to indicate to the user which GPI inputs and outputs are **On** or **Off**.

✎	**Note**	A proper loop-back connector is required to conduct the external test.

Use the following procedure to test the GPI inputs and outputs:

1. Navigate to the **Frame Diagnostics Menu** as follows:

   • Press **HOME** (to display the **Main Menu 1-2**).
   • **MORE** (to display the **Main Menu 2-2**).
   • **Setup** (to display the **Setup Menu**).
   • **Frame Diagnostics** (to display the **Frame Diagnostics Menu**)

2. Press **GPI Test** to display the **GPI Test Menu**.


```
GPI Test

    GPI Inputs        ♀ ♀ ♀ ♀ ♀ ♀ ♀ ♀ ♀ ♀ ♀ ♀
                      1  2  3  4  5  6  7  8  9 10 11 12


    GPI Outputs       ☼ ♀ ♀ ♀ ♀ ♀ ♀ ♀ ♀ ♀ ♀ ♀
                      1  2  3  4  5  6  7  8  9 10 11 12


    Prev       Next        All On       All Off
```

GPI Test Menu

3. Select the desired GPI function as follows:

   • **Prev** — Press this button to test the previous input or output, as indicated on the menu.
   • **Next** — Press this button to test the next input or output, as indicated on the menu.
   • **All On** — Press this button to turn all GPI inputs and outputs on.
   • **All Off** — Press this button to turn all GPI inputs and outputs off.

This concludes the procedure to test the GPI inputs and outputs.

Internal Video Test

The **Internal Video Test** allows you to test the video paths within the Synergy frame.

✱	**Important**	To perform this test, you will need a test file, which is provided by **Ross Video Technical Support**. This file contains stored memories, which were created using the Synergy switcher's internally generated video sources, namely color backgrounds and washes. Contact Ross Video Technical Support before proceeding with this test.

When *any* memory is stored, the system does a video checksum and saves the information. Then, when the memory is recalled from the provided file, it compares the checksum with the one in the memory and gives a Pass or Fail result.

Use the following procedure to test the internal video paths:

1. Navigate to the **Frame Diagnostics Menu** as follows:

   • Press **HOME** (to display the **Main Menu 1-2**).
   • **MORE** (to display the **Main Menu 2-2**).
   • **Setup** (to display the **Setup Menu**).
   • **Frame Diagnostics** (to display the **Frame Diagnostics Menu**).

2. Press **Internal Video Test** to display the **Internal Video Test Menu**.

```
┌─────────────────────────────────────────────────┬────────────┐
│Internal Video Test                               │            │
│                                                  │            │
│ Waiting for user to press F6...                  │            │
│                                                  │            │
│                                                  │            │
│                                                  │            │
│                                                  │            │
│                                                  │            │
│                                                  │            │
├──────────────────────────────────────────────────────────────┤
│   Test All    Test Single                          Run Test   │
└──────────────────────────────────────────────────────────────┘
```
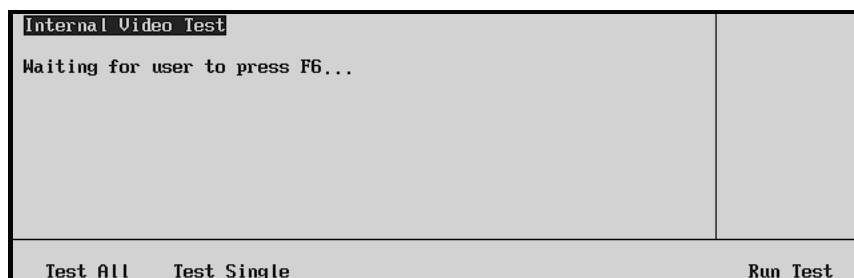
Internal Video Test Menu

3. Select an internal video test option as follows:

   • Press **Test All** to test all of the memory registers at once. This is the switcher default option.

   • Press **Test Single** to test a selected memory register only. The following menu is displayed.

```
┌─────────────────────────────────────────────────┬────────────┐
│Internal Video Test                               │            │
│                                                  │            │
│ Waiting for user to press F6...                  │            │
│                                                  │            │
│                                                  ├────────────┤
│                              Select memory:  │Memory0  (00)│ │
│                                              │ Memory1  (01)│ │
│                                              │ Memory2  (02)│ │
│                                              │ Memory3  (03)│ │
│                                              │↓Memory4  (04)│ │
├──────────────────────────────────────────────────────────────┤
│   Test All    Test Single                          Run Test   │
└──────────────────────────────────────────────────────────────┘
```
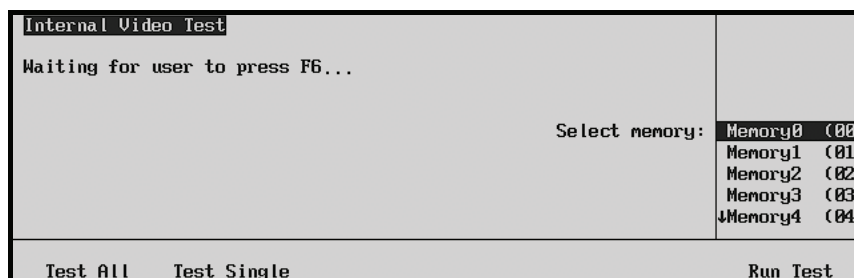
Internal Video — Test Single Menu

   ~ Use the **Select memory** knob to choose the memory you wish to test.

4. Press **Run Test** to begin the internal video test. The menu will report **Pass** or **Fail** per the results of the test.

This concludes the procedure to test the internal video paths.

Control Panel Boards

In This Chapter

This chapter provides details about each "switch" board in the control panel for each Synergy switcher, plus the CPU Board layout.

The following topics are discussed:

- Synergy 2 Control Panel Boards
- Synergy 3 Control Panel Boards
- Synergy 4 Control Panel Boards
- Panel CPU Board Layout
- Control Panel CPU Board Replacement
- Basic Interconnections

Synergy 2 Control Panel Boards

The figure below illustrates a view *underneath* the Synergy 2 control panel.

Front Edge

Lower Panel Section	4317-030
	4317-034
Upper Panel Section	4317-037
	Display
	Disk Drive
	4317-036
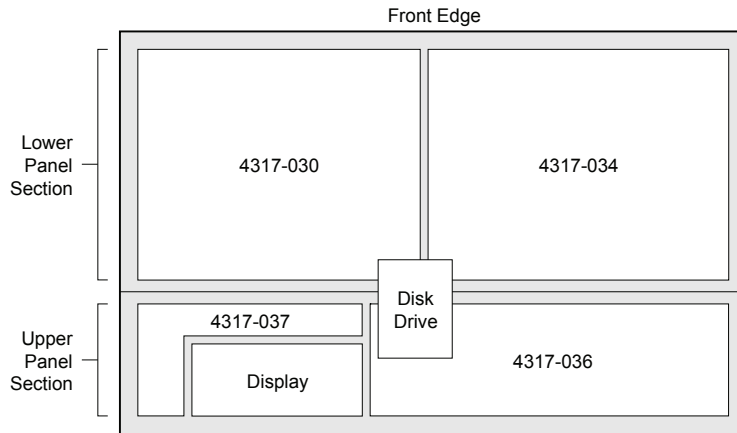
Underside View — Synergy 2 Control Panel

Lower Panel Section

The following are board numbers located in the Lower Panel Section of the Synergy 2 control panel:

- **4317-030** — This board includes all crosspoint bus, Aux Bus and re-entry switches.

- **4317-034** — This board includes buttons, switches and potentiometers in the entire effects area: **Key**, **Matte**, **Effects Control**, **Positioner**, **Transition**, **Fade to Black**, and **Downstream Keyers**.

Upper Panel Section

The following are board numbers located in the Upper Panel Section of the Synergy 2 control panel:

> **Note** — The floppy disk controller is replaced by a USB controller if you have the **USB Removable Media Drive** option installed.

- **4317-036** — This board includes buttons, switches and potentiometers in the **Pattern Control** group and Global Memory System group, A-D converters for all knobs, faders and joystick, plus the FPGA that decodes the optical potentiometers beside the large display.

- **4317-037** — This board includes function switches, such as **F1** and **F2**, that surround the large display, plus a power module (attached to the top side of the board) that provides power to the display's backlight. A guard shield is included, because the power module generates over 1000 VAC.

Synergy 3 Control Panel Boards

The figure below illustrates a view *underneath* the Synergy 3 control panel.

Front Edge

| 4530-031 | | | | |
| 4530-030 | 4530-038 | 4530-035 | 4530-034 |

Lower Panel Section

Disk Drive

Upper Panel Section

| 4530-202 | | 4735-037 | |
| | 4735-032B | Display | 4735-036B |
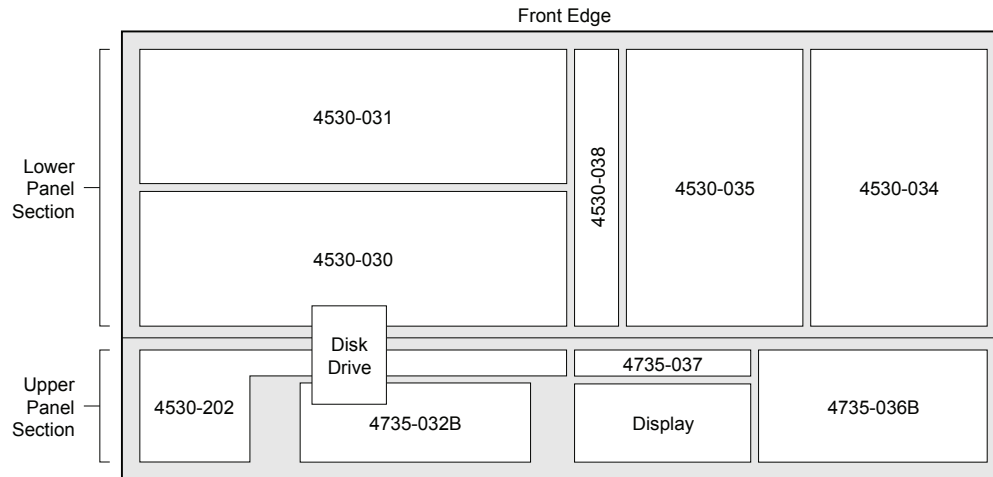
Underside View — Synergy 3 Control Panel

Lower Panel Section

The following are board numbers located in the Lower Panel Section of the Synergy 3 control panel:

- **4530-030** — This board includes the upper crosspoint bus switches (MLE 1).

- **4530-031** — This board includes the lower crosspoint bus switches (MLE 2, MLE 3).

- **4530-034** — This board includes the buttons, switches and potentiometers on the right-hand side of effects area (**Key**, **Effects Control**, **Positioner**, **Fade to Black**, and **Downstream Keyer 2**).

- **4530-035** — This board includes the buttons, switches and potentiometers on the left-hand side of effects area: **Transition**, **Memory**, **Preview Overlay** and **Downstream Keyer 1**.

- **4530-038** — This board includes the crosspoint re-entry switches.

Upper Panel Section

The following are board numbers located in the Upper Panel Section of the Synergy 3 control panel:

Note The floppy disk controller is replaced by a USB controller if you have the **USB Removable Media Drive** option installed.

- **4735-032B** — This board includes switches and display for the **Global Memory System**.

- **4735-036B** — This board includes buttons, switches and potentiometers in the **Pattern Control** and **Matte** groups, A-D converters for all knobs, faders and joystick, plus the FPGA that decodes the optical potentiometers beside the large display.

- **4735-037** — This board includes function switches, such as **F1** and **F2**, that surround the large display, plus a power module (attached to the top side of the board) that provides power to the display's backlight. A guard shield is included, because the power module generates over 1000 VAC.

- **4530-202** — This board includes crosspoint switches for the **Aux Bus** and **Aux Bus Assign** groups.

Synergy 4 Control Panel Boards

The figure below illustrates a view *underneath* the Synergy 4 control panel. Refer to the figure when reviewing this section.
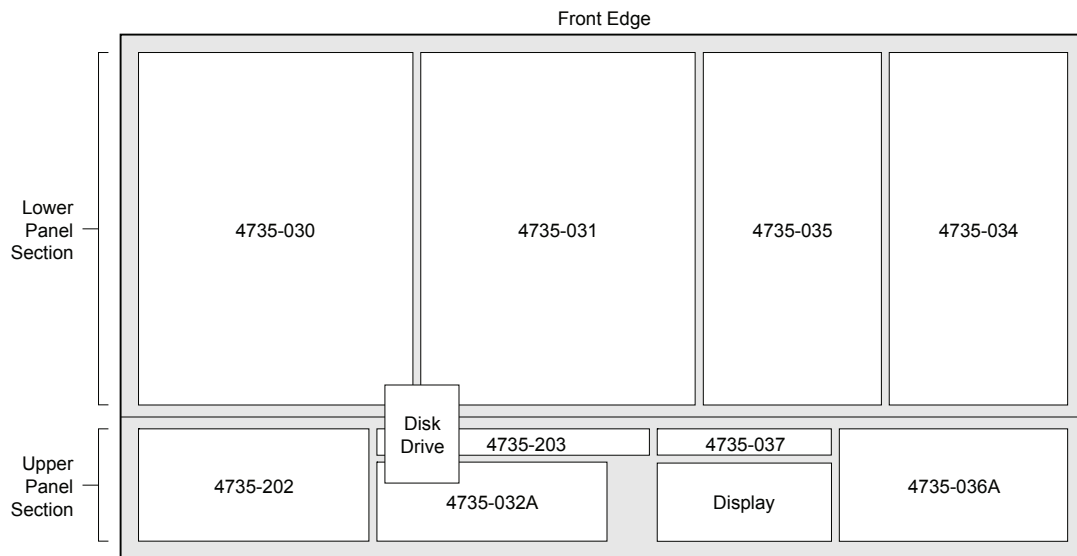
Underside View — Synergy 4 Control Panel

Lower Panel Section

The following are board numbers located in the Lower Panel Section of the Synergy 4 control panel:

- **4735-030** — This board includes the left-hand crosspoint bus switches.

- **4735-031** — This board includes the right-hand crosspoint bus and re-entry switches.

- **4735-034** — This board includes the buttons, switches and potentiometers on the right-hand side of effects area: **Key**, **Matte**, **Effects Control**, **Positioner**, **Fade to Black**, and **Downstream Keyer 2**.

- **4735-035** — This board includes the buttons, switches and potentiometers on the left-hand side of effects area: **Transition**, **Memory**, **Preview Overlay** and **Downstream Keyer 1**.

Upper Panel Section

The following are board numbers located in the Upper Panel Section of the Synergy 4 control panel:

Note The floppy disk controller is replaced by a USB controller if you have the **USB Removable Media Drive** option installed.

- **4735-032A** — This board includes the switches and display for the **Global Memory System**.

- **4735-036A** — This board includes the buttons, switches and pots in the **Pattern Control** group, A-D converters for all knobs, faders and joystick, plus the FPGA that decodes the optical potentiometers beside the large display.

- **4735-037** — This board includes the function switches, such as **F1** and **F2**, that surround the large display, plus a power module (attached to the top side of the board) that provides power to the display's backlight. A guard shield is included, because the power module generates over 1000 VAC.

- **4735-202** — This board includes the left-hand crosspoint bus switches for **Aux Bus** and **Aux Bus Assign** groups.

- **4735-203** — This board includes the right-hand crosspoint bus switches for the **Aux Bus**.

Panel CPU Board Layout

The figure below illustrates a top view of the Control Panel CPU Board (4000-033), which is identical for all Synergy switchers. Refer to the section "**Installing the VTR Remote Control Option**" on page 14–4 for instructions on installing the **Extended Tallies** option. For information on replacing your Control Panel CPU Board, refer to the section "**Control Panel CPU Board Replacement**" on page 12–10.
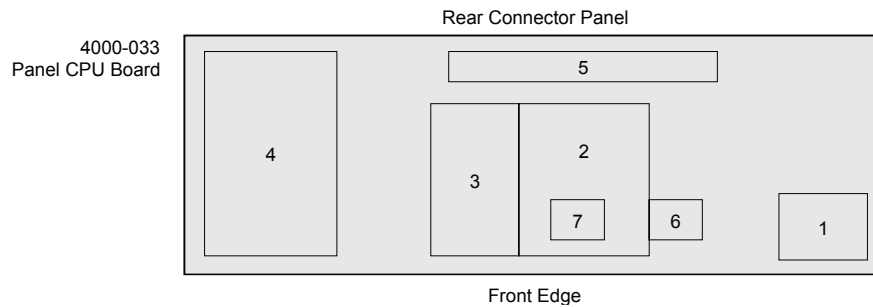
Control Panel CPU Board — Functional Blocks

The major *functional blocks* are described below.

1. **Power Distribution Connectors**

   This area includes the power distribution connectors for most circuit boards in the panel. Each board has its own dedicated power supply connection.

2. **Microprocessor Control and Memory**

   This area includes the microprocessor control and memory block, factory preset jumpers and DIP switches. There are no user-serviceable jumpers or switches in this area.

3. **Ribbon Cables**

   This area includes three cables:

   Note — The front ribbon cable differs if you have the **USB Removable Media Drive** option installed. Refer to the appropriate section for your switcher in the chapter "**Control Panel Hardware Options**" on page 15–1 for details.

   • The front cable is routed to the floppy disk drive.
   • The middle cable is the main data cable for all of the crosspoint boards.
   • The back cable is routed to the LCD display.

4. **Standard Primary Tallies**

   This area provides relays for the system's standard 36 primary tallies, plus two headers and three standoffs are provided for mounting the **Extended Tally** option board. Refer to "**Installing the Extended Tallies Option**" on page 15–2 for information on installing the **Extended Tally** option.

5. Rear Panel Connectors

Rear panel connectors are included in this section, as well as the associated interface electronics. The maximum baud rate for each remote control port is 115,200 K baud. Refer to the section "**Rear Panel Connectors**" on page 12–8 for details.

6. Socketed IC

One socketed IC is provided for the panel's boot prom (**U62**).

7. Floppy Disk Controller

This section includes the floppy disk controller.

Note   The floppy disk controller is replaced by a USB controller if you have the **USB Removable Media Drive** option installed.

Rear Panel Connectors

The figure below illustrates the rear panel's connector section. All connectors are *always* present, whether or not you have options installed. The section is identical on all Synergy switchers. In the *Synergy Series Installation Guide*, refer to Appendix A, "**Specifications**" for a list of all control panel pinouts.
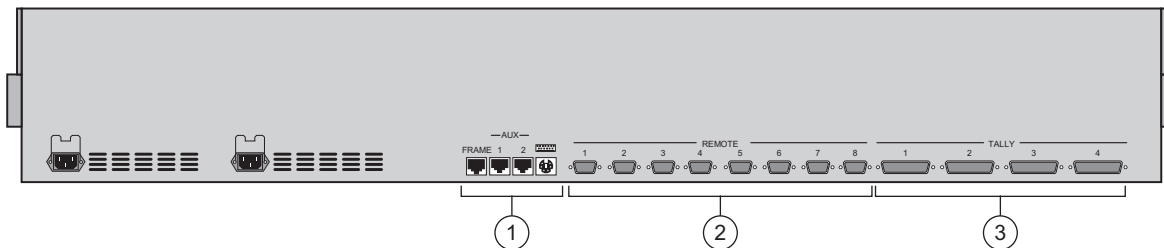
Synergy Series Control Panel — Rear View, Connector Section with Keyboard Port

1) Panel Communications	2) Remote Device Control	3) Tally Connectors

Each component is discussed in the following section.

1. Panel Communications

Four connectors are provided for panel communications.

- **FRAME** — One 8-pin shielded Telco connector is provided for communications between the Synergy frame (**PANEL** connector) and the control panel.

- **AUX 1**, **2, 3** — Three 6-pin shielded Telco connectors are provided for communications between the control panel and remote Aux panels. **Aux 3** is replaced by a Keyboard Port if you have a version 10 or later **Panel CPU Board**.

- **Keyboard Port** — One PS/2 port is provided for connecting a standard keyboard to the control panel, and replaces the Aux 3 connector if a version 10 or later **Panel CPU Board** is installed.

Important   Do NOT place anything on your keyboard or place your keyboard in a position where any of the keys could be accidently pressed. This could result in the Switcher acting unpredictably.

2. **Remote Device Control**

   Eight 9-pin D-Type connectors are provided for communicating with remote peripheral devices, such as VTRs, disk recorders, video servers, or other serial controlled devices.

   •   For VTR control, the **VTR Remote Control Option** must be installed.

   •   For Video Server control, the **Video Server Control Option** must be installed.

   •   For Audio Server control, the **Audio Server Control Option** must be installed.

3. **Tally Connectors**

   Four 25-pin "D" connectors are provided for tallies.

   •   The functionality of connectors **1** and **2** is standard, providing 36 tally relays.

   •   The functionality of connectors **3** and **4** is optional, providing an additional 36 tally relays. The **Extended Tallies** option must be installed.

Control Panel CPU Board Replacement

This section helps you to install an Issue 10 **Control Panel CPU Board** in your Synergy 2, 3, or 4 switcher. This procedure is required should you wish to make use of the keyboard functionality, which is available with version 15 and higher of the Synergy 2, 3, and 4 SD software, or install the USB Controller option, which is available with version 16 and higher of the Synergy series SD software. The procedure is universal for all three Synergy switchers.

	Note	Ensure that you have an Issue 10 **Panel CPU Board** (4000-033), a 5mm socket wrench, and a Phillips #1 screwdriver before proceeding with the installation.

Replacing the Control Panel CPU Board

Use the following procedure to replace the **Control Panel CPU Board** in your Synergy switcher:

	Caution	Static discharge can cause serious damage to sensitive semiconductor devices. Avoid handling the switcher circuit boards in high static environments such as carpeted areas and when synthetic fiber clothing is worn. Touch the frame to dissipate static charge before removing boards from the frame and exercise proper grounding precautions when working on circuit boards.

1. Ensure your switcher configuration is saved to a floppy disk or USB key and power down the Synergy control panel.

2. Disconnect all cables attached to the connectors on the rear of the panel, beginning with the AC power connection(s). It is advisable to label each one with the port identification to facilitate reconnection.

3. On the rear of the control panel, on either side of the eight **REMOTE** ports and the four **TALLY** connectors, you will find 24 –5 mm Hex jack screws. Remove these screws and set aside in a safe place.

4. Lift the top of the control panel to reveal the electronics bay inside.

5. Remove the protective cover from the electronics bay, and set the screws in a safe place for later re-installation.

6. If you have the **Extended Tallies** option (4000A-038) installed, it will have to be removed prior to removal of the **Panel CPU Board** (4000-033). It is located on top of the **CPU Board**, in the upper left corner of the control panel tub, as shown below.

Panel CPU Board — Extended Tallies Option
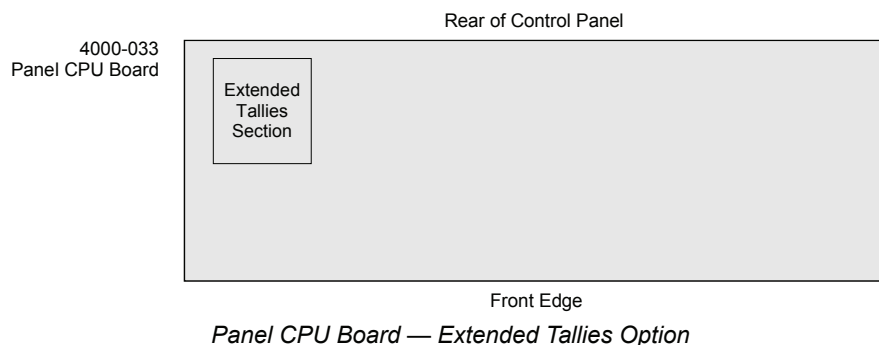
7. Remove the **Extended Tallies** option as follows:

- Remove the four screws securing the **Tally Board** to the **CPU Board**, and gently pry it off, taking care not to bend the pins.

- Remove the standoffs to which it was attached, and set the board, the standoffs, and the screws aside in a safe place for later re-installation.

8. Disconnect all data and power connectors from the **CPU Board**. Prior to detachment, it is advisable to label the power cables on the right side of the board to ensure that they are later re-attached to the correct connector. However, the balance of the cables are of different widths and should not need to be labeled.

9. Locate and remove all the screws that secure the **CPU Board** to the bottom of the tub. These screws are identified as **MP1**, **MP2**, etc. up to and including **MP21**.

10. Carefully remove the old **CPU Board** and position the new **CPU Board** in place. Re-install and tighten the screws to secure the board to the bottom of the tub. However, if you have the **Extended Tallies** option, *do not* install screws in **MP1**, **MP7**, **MP15**, and **MP18**. Instead, re-install the standoffs that you removed in step 6.

⚠ **Caution** | As a general rule, to avoid damage to the boards and panel, *do not overtighten the screws* when re-assembling the Synergy control panel.

11. To re-install the **Extended Tallies** option:

- Align the tally board over the connectors, and gently press down on it until it is fully seated.

- Ensure you have the proper pin-to-socket alignment.

⚠ **Caution** | Failure to reinstall a module with a precise 1:1 pin-to-socket orientation will damage the Panel CPU Board, the selected module — or both! Double check your work!

12. Install and tighten screws in the **MP1**, **MP7**, **MP14**, and **MP16** mounting holes and standoffs to secure the tally board to the CPU board.

13. Carefully re-attach all data and power cables.

14. Replace the protective cover on the electronics bay, and secure all screws around the edges of the top cover.

15. Lower the control panel top.

16. Re-install the 24 Hex jack screws on the control panel's rear connector panel.

17. Re-attach all cables to the **REMOTE** and **TALLY** ports, as desired.

This completes the procedure for replacing the **Panel CPU Board** in your Synergy control panel.

When you have finished this procedure, re-calibrate your switcher as per the instructions in the section "**Switcher Calibration**" on page 11–2. If you require additional information, contact Ross Video Technical Support. If you are installing a USB Controller for your Synergy switcher, refer to the appropriate section in "**Control Panel Hardware Options**" on page 15–1.

Basic Interconnections

This section describes the basic types of interconnections on the Synergy control panel boards. As a general rule, the Panel CPU communicates with the upper boards through 50-pin ribbon cables — essentially, an extended CPU data bus.

- In the Synergy 3 and Synergy 4 panels, there are two cables. One runs along the back of the top section, and the other runs along the bottom.

- In the Synergy 2 panel, a single cable is used that runs first to Board 4317-037, over to Board 4317-030, across to Board 4317-034 and then down to Board 4317-036.

All ribbon cable connectors are the same, but the orientation of each connector only allows them to be attached in one place.

Notes on the Synergy Control Panel

Note the following:

- Each upper Control Panel board has a 6-pin keyed power connector (white), that carries +5V, +12V and ground.

- All Faders are the same, and all Fader assemblies are interchangeable. Each is connected through a 16-pin dip-style socketed connector, with an indicator that shows the location of pin 1.

- Each blue display (for example, in the panel memory areas) also has a 16-pin connector, directly beside each display module.

- The Positioner on each Synergy control panel connects with a 16-pin ribbon cable.

- On the Synergy 3, the 4530-038 is not connected to the main ribbon cable. Instead, it is connected via a 34-pin cable to Board 4530-031. A dedicated power connector also connects the 4530-038 to the 4530-031.

- On the Synergy 3, the 4735-037 is also not connected to the main ribbon cable. Instead, it is connected via a 16-pin cable to Board 4735-036B.

- On the Synergy 3 and Synergy 4, a small 34-pin ribbon cable connects the **034** to the **036**. This cable carries analog signals from the potentiometers to the A-D converter board.

- On the Synergy 3 and Synergy 4, a 16-pin ribbon cable connects the **035** to the **036**. This cable carries fader analog signals, and connects the switches in the transition area to the A-D converter board.

- On the Synergy 4 only, a small 26-pin ribbon cable connects the 4735-202 to the Aux Bus crosspoint switch boards (4735-203).

- On all switchers, the floppy drive has a dedicated data connector and power connector that each run from the **Panel CPU Board**. Each connector is labeled **Floppy Disk**.

Note   A USB Port will replace the floppy drive if you have the **USB Removable Media Drive** option installed. Refer to "**Control Panel Hardware Options**" on page 15–1 for details.

Notes on Optical Encoders

Note the following important points regarding the optical encoders:

- The optical encoders (at the edge of the display) use 4-pin connectors that plug into the edge of the **036** board.

⚠️ **Caution**

> If you need to remove these connectors in order to service an optical encoder, *do not* plug them in backwards. If the connection polarity is wrong, it will destroy the encoder. If you remove them, note the polarity. Older versions of Synergy switchers shipped in 1998 have un-keyed connectors for the encoders — newer versions have keyed connectors.

Notes on the LCD Display

Note the following points regarding the LCD Display (for all switchers):

- For **037** boards prior to **Issue 2**, a flat ribbon cable runs from the Panel CPU board, and is split into four leads. Three leads connect directly to the LCD Display, while the fourth lead connects to the Backlight Converter Module for purposes of power and control. In addition, a small 2-pin connector (on the back side of the Converter Module) plugs into the display backlight.

- For **037** boards at **Issue 2** or greater, a flat ribbon cable runs from the Panel CPU board and connects to a mating connector on the **037**. The **037**, in turn, has a single 15-pin cable that runs to the display itself, plus another 2-pin connector that plugs into the Backlight Converter Module for purposes of power and control.

Control Panel Maintenance

In This Chapter

This chapter provides instructions for a variety of Synergy control panel maintenance procedures.

The following topics are discussed:

- Replacing a Bulb
- Replacing a Button
- Replacing a Fader
- Replacing a Potentiometer
- Replacing the Display
- Repairing a Damaged Serial Port

Replacing a Bulb

This section provides instructions for replacing a burned-out bulb in a Synergy control panel.

✓ **Operating Tip**

> Check the bulb before you proceed. The button may not be lighting simply because the bulb has become loose. Try pushing the bulb down to fully seat it. If this does not solve the problem, continue with the replacement procedure.

Testing the Lamps

As a prerequisite, use the **Lamp Test** to verify that the target bulb is burned out.

Use the following procedure to test the lamps:

1. Navigate to the **Panel Diagnostics Menu 1-2** as follows:

    *   Press **HOME** (to display the **Main Menu 1-2**).
    *   **MORE** (to display the **Main Menu 2-2**).
    *   **Setup** (to display the **Setup Menu**).
    *   **Panel Diagnostics** (to display the **Panel Diagnostics Menu 1-2**).

2. Press **Lamp Test** to display the **Lamp Test Menu**.
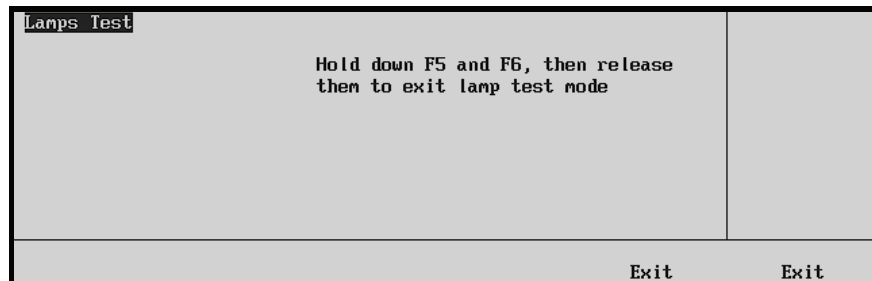
Lamp Test Menu

3. Test the lamps as follows:

    *   Press buttons in selected panel regions, to test *all lamps* in those regions as required.
    *   To exit the menu, press *both* **Exit** buttons beneath the display.

This completes the procedure to verify that the target bulb is burned out. Next, you will replace the burned-out bulb.

Replacing the Bulb

Use the following procedure to replace the burned-out bulb:

1. Once you have located the burned-out bulb, power down the Synergy control panel.

2. Remove the keycap to reveal the sleeve and bulb within. Refer to the figure below.

✓ **Operating Tip** | If you have trouble removing a control panel button, use a pair of wide-tipped pliers (1/2 inch) with masking tape wrapped around the ends. For best results, wiggle the button back and forth as you extract it. This helps to remove the button easily, and also avoids scratching the surface paint.
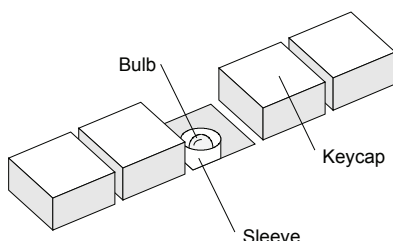
Location of Sleeve and Bulb

3. Remove the burned-out bulb as follows:

   - Carefully push down the sleeve with your fingers.

   - While holding down the sleeve, use needle-nose pliers to carefully grab the plastic body of the bulb and pull it out.

   - Note that the bulb has a two-wire connection in which polarity is not important.

4. Replace the burned-out bulb as follows:

   - Select a new bulb from your spare-parts kit.

   - Align the two pins of the replacement bulb with the two holes in the button — the orientation of the bulb does not matter.

   - Replace the keycap.

⊛ **Important** | Ensure to align the notch in the base of the keycap vertically to the panel, as shown below. If it is not aligned in this manner, it will not properly snap in place.
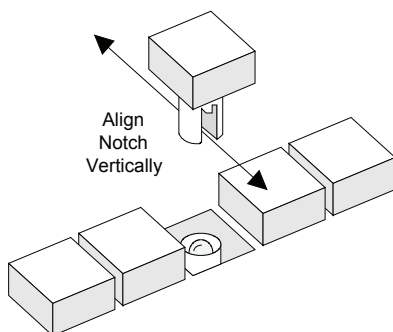
Aligning the Keycap

5. Power on the Synergy control panel.

6. Verify that the bulb is now working properly. Refer to the section "**Testing the Lamps**" on page 13–2 for instructions.

This completes the procedure to replace the burned-out bulb.

Replacing a Button

This section provides instructions for replacing a button in the Synergy control panel. This procedure may become necessary if a button contact fails, or if the button becomes sticky.

⚠	**Caution**	This procedure should be performed by qualified service personnel only — in particular, those *highly skilled* at de-soldering and soldering components.
		To reduce the risk of damage to the button solder pads, do not perform any servicing unless you are qualified to do so.

Testing the Button

As a prerequisite, use the **Button Test Menu** to verify that the target button is sticky or has failed.

Use the following procedure to test the button:

1. Navigate to **Panel Diagnostics Menu 1-2** as follows:

   • Press **HOME** (to display the **Main Menu 1-2**).

   • **MORE** (to display the **Main Menu 2-2**).

   • **Setup** (to display the **Setup Menu**).

   • **Panel Diagnostics** (to display **Panel Diagnostics Menu 1-2**).

2. Press **Button Test** to display the **Button Test Menu**.
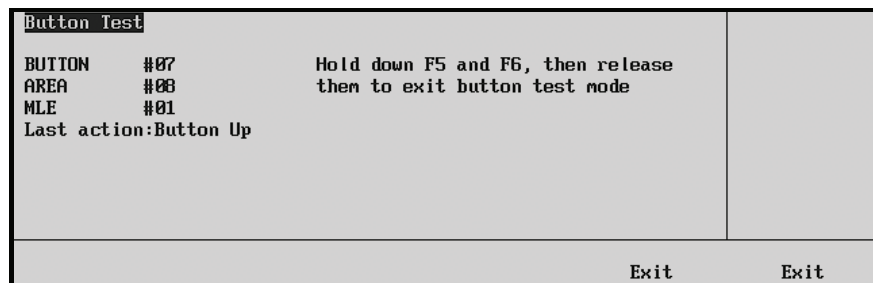
Button Test Menu

3. Press the target panel button(s) as required.

4. Exit the menu by pressing *both* **Exit** buttons beneath the display.

This completes the procedure to test the buttons. Next you will replace the failed button.

Replacing the Button

Use the following procedure to replace the failed button:

⚠	**Caution**	Static discharge can cause serious damage to sensitive semiconductor devices. Avoid handling the switcher circuit boards in high static environments such as carpeted areas and when synthetic fiber clothing is worn. Touch the frame to dissipate static charge before removing boards from the frame and exercise proper grounding precautions when working on circuit boards.

1. Power off the Synergy control panel.

2. Remove the keycap to reveal the sleeve and bulb within. Refer to the figure below.

✓	**Operating Tip**	If you have trouble removing a control panel button, use a pair of wide-tipped pliers (1/2 inch) with masking tape wrapped around the ends. For best results, wiggle the button back and forth as you extract it. This helps to remove the button easily, and also avoids scratching the surface paint.

Location of Sleeve and Bulb

3. Carefully push down the sleeve with your fingers.

4. While holding down the sleeve, use needle-nose pliers to carefully grab the plastic body of the bulb and pull it out. Note that the bulb has a two-wire connection in which polarity is not important.

5. Locate the button that has failed as follows:

    •   Lift up the top of the panel to reveal the circuit boards underneath.

    •   Locate the button that has failed.

    There are two types of buttons used in the panel — a large tall button used for the crosspoint buses, and a smaller, short button used for all other functions. The figure below shows the underside of each button and the arrangement of solder pads. Each type of button has six solder pads.

Button Types — Solder Pads

6. Carefully heat each solder pad, and use a solder-sucker to remove the solder.

⚠️ **Caution**

> A fair amount of heat is required to de-solder each pad, due to the large ground plane within the boards. However, using too much heat may damage the solder pads themselves. This procedure should be performed by qualified service personnel only — those highly skilled at soldering and de-soldering.

7. Once all solder has been removed, pull out the button from the top of the control panel.

8. Insert a new button in the same orientation as the removed one:

   • For large buttons, ensure that the peg on the base of the button is properly aligned with the keyhole in the switcher board itself.

   • For small buttons, ensure that the **+** indicator on the base of the button is properly aligned with the **+** sign (or square pad) on the switcher board itself.

9. Re-solder the button to secure it in position.

10. Close the top of the Synergy control panel.

11. Replace the bulb and keycap, and be careful to align the notch in the base of the keycap vertically to the panel, as shown below. If it is not aligned in this manner, it will not properly snap in place.

Align
Notch
Vertically
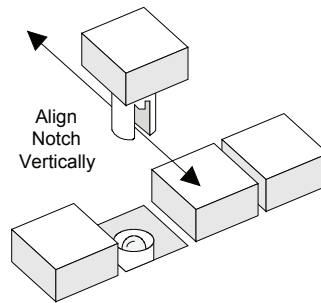
Aligning the Keycap

12. Power on the Synergy control panel.

13. Verify that the button now works properly. Refer to the section "**Testing the Button**" on page 13–5 for instructions.

This completes the procedure to replace a failed button.

Replacing a Fader

This section provides instructions for replacing a fader in the Synergy control panel.

Testing the Fader

As a prerequisite, use the **Fader Test Menu** to verify that the target fader has failed.

Use the following procedure to test the target fader:

1. Navigate to the **Panel Diagnostics Menu 1-2** as follows:

   • Press **HOME** (to display the **Main Menu 1-2**).

   • **MORE** (to display the **Main Menu 2-2**).

   • **Setup** (to display the **Setup Menu**).

   • **Panel Diagnostics** (to display the **Panel Diagnostics Menu 1-2**).

2. Press **Fader Test** to display the **Fader Test Menu**.
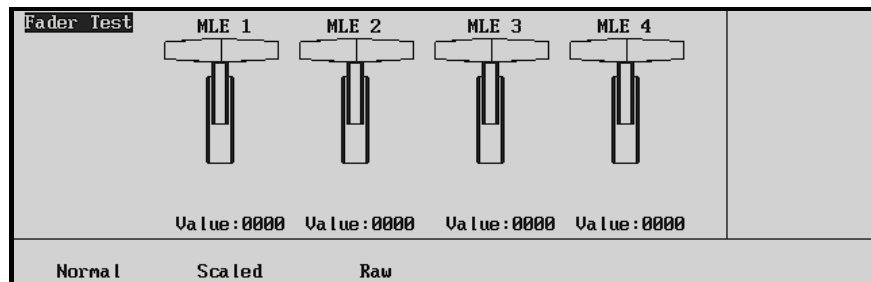
Fader Test Menu for a Synergy 4

3. Test the faders as follows:

   • Press **Normal**.

   • Move the faders up and down. The position of the fader is shown both numerically (in hexadecimal) and graphically:

      ~ The number should range from **000** (up) to **FFF** (down), and the number should be stable and jitter-free.

   • If the number does not reach both limits, perform a calibration as outlined in the section "**Switcher Calibration**" on page 11–2.

This completes the procedure to test the target fader. Next you will replace the failed Fader.

Replacing the Fader

Use the following procedure to replace the failed fader:

	Caution	Static discharge can cause serious damage to sensitive semiconductor devices. Avoid handling the switcher circuit boards in high static environments such as carpeted areas and when synthetic fiber clothing is worn. Touch the frame to dissipate static charge before removing boards from the frame and exercise proper grounding precautions when working on circuit boards.

1. Once you have located the failed fader, power off the Synergy control panel power.

2. Remove the screws on either side of the handle, as illustrated on page 13–9.

    *   Once removed, the handle will separate, leaving the fader shaft.

    *   Set all parts aside for later reassembly.
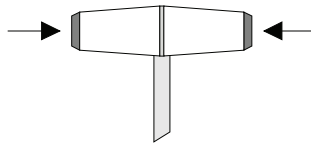
Location of Screws in Fader Handle

3. Open the control panel and locate the failed fader. The figure below illustrates a view of the fader assembly, as seen from below.
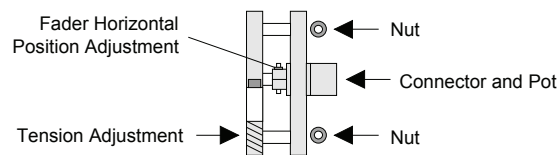
Fader Assembly — Top View

4. Disconnect the cable from the circuit board to the Connector/Pot assembly, and note its orientation.

5. Remove the two nuts that secure the entire fader assembly to the tub, and set them aside for later reassembly.

6. Remove the entire assembly, and replace with a new fader assembly.

7. Secure the assembly to the tub using the two nuts, then re-attach the connector from the circuit board to the fader.

8. Although the fader is factory-calibrated, ensure that the fader arm is positioned directly in the middle of the control panel slot. If not, loosen the **Horizontal Position Adjustment** screw, re-position the shaft, and secure once again.

9. If required, adjust the tension of the fader using the **Tension Adjustment** screw.

	Note	The tension of all faders should be adjusted to suit user preference, and to ensure that the tension on all switcher faders is similar.

---

10. Close the Synergy control panel top and re-attach the two sides of the handle. If the handle does not seat tightly or if it rattles, insert a small piece of tissue paper inside the inner machine groove.

11. Re-attach the two sides of the handle, and tighten them securely.

12. Power on the Synergy control panel.

13. Verify that the fader now functions properly. Refer to the section "**Testing the Fader**" on page 13–8 for instructions.

This completes the procedure to replace a failed fader.

Replacing a Potentiometer

This section provides instructions for replacing a knob (potentiometer) in the **Pattern Control**, **Effects Control Group** and **Mattes Group** of the Synergy control panel. The procedure does not cover changing the rotary encoders to the right of the display in the **System Control** area. Contact Ross Video Technical Support for instructions if one of the rotary encoders has failed.

Testing the Potentiometer

As a prerequisite, use the **Pots Test Menu** to verify that the target potentiometer has failed.

Use the following procedure to test the target potentiometer:

1. Navigate to the **Panel Diagnostics Menu 1-2** as follows:

   • Press **HOME** (to display the **Main Menu 1-2**).

   • **MORE** (to display the **Main Menu 2-2**).

   • **Setup** (to display the **Setup Menu**).

   • **Panel Diagnostics** (to display the **Panel Diagnostics Menu 1-2**).

2. Press **Pots Test** to display the **Pots Test Menu**.

```
┌──────────────────────────────────────────────────────────────┐
│ Pots Test                                              │      │
│                                                        │      │
│ KNOB:Top Display Knob                                  │      │
│ Value:0                                                │      │
│                                          |             │      │
│                                                        │      │
│                                                        │      │
│                                                        │      │
│                                                        │      │
│──────────────────────────────────────────────────────────────│
│    Normal        Scaled        Raw                             │
└──────────────────────────────────────────────────────────────┘
```
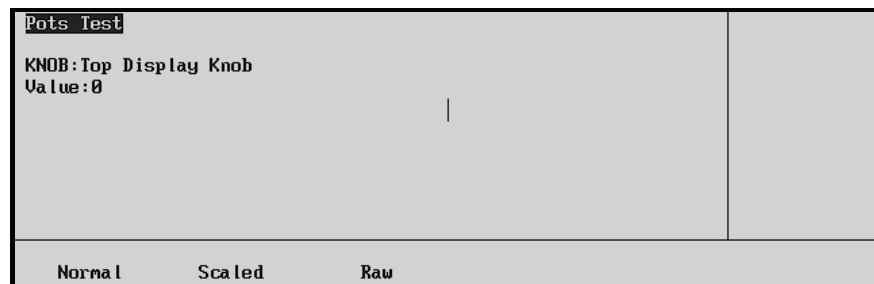
Pots Test Menu

3. If your target potentiometer is located in the **Global Memory System Group**, you can test it as follows:

   • Press **Normal**.

   • Turn the knob left and right.

   The display will indicate the rate at which you are turning the knob numerically, and graphically with a bar graph.

4. Test all other knobs as follows:

   • Press **Scaled**.

   • Turning the knob will display the absolute position of the knob both numerically and graphically using a bar graph.

      ~ The number (displayed in hexadecimal) should range from **0** (full counter-clockwise) to **FFF** (full clockwise) and should be stable and jitter-free.

   • If the number does not reach both limits, perform a calibration as outlined in the section "**Switcher Calibration**" on page 11–2.

This completes the procedure to test the potentiometers. Repeat the potentiometers test after the calibration. If the number does not reach both limits or if it does not respond, you must continue to the replacement procedure.

✎	**Note**	If *all potentiometers* appear to have failed, the problem is in the cable or in the A-D converter. In this situation, please contact Ross Video Technical Support, as a board swap may be required.

Replacing the Potentiometer

Use the following procedure to replace the failed potentiometer:

⚠	**Caution**	Static discharge can cause serious damage to sensitive semiconductor devices. Avoid handling the switcher circuit boards in high static environments such as carpeted areas and when synthetic fiber clothing is worn. Touch the frame to dissipate static charge before removing boards from the frame and exercise proper grounding precautions when working on circuit boards.

1. Power off the Synergy control panel power.

2. Remove the knob caps as follows:

   • Remove *all* the knob caps in the *entire section* that contains the failed knob. Refer to the table below for the location of the knob.

   • Each knob has a small screw that secures the knob to the shaft.

   • Loosen the screw ¼ turn and lift off the cap.

Location of Potentiometers

	Synergy 2	Synergy 3	Synergy 4
Pattern Control Knobs	4317-036 board	4735-036B board	4735-036A board
Effects Control Knobs	4317-034 board	4530-034 board	4735-034 board
Mattes Knobs	4317-034 board	4735-036B board	4735-034 board

3. Lift up the top of the control panel to reveal the circuit boards underneath, and locate the board that contains the failed potentiometer. Refer to the table above for the location of the knob.

4. Disconnect all power and data connectors from the board. Because the end of each connector rests in close proximity to the mating header (when disconnected), there is no need to label the connectors.

5. Remove *all screws* from the bottom of the board, and set them in a safe place for later reconnection.

6. Carefully drop the board out from underneath the control panel, and set it on a clean, flat, static-free surface. All potentiometers are secured to the board by a metal plate. Note the position of the failed potentiometer.

7. Using a socket driver, loosen and remove *all nuts and lock washers* that secure the potentiometers to the metal plate.

8. Remove the metal plate and set it aside in a safe place, along with all nuts and lock washers. All potentiometers are now supported only by their leads.

9. On the bottom of the board, locate the failed potentiometer.

10. De-solder the three connecting leads of the failed potentiometer. The figure below illustrates the silk-screened pot symbol on the board.
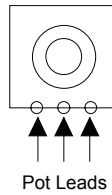
Potentiometer Label

11. Replace the failed potentiometer in the proper orientation.

12. Carefully re-solder the three leads.

13. Verify the replaced potentiometer as follows:

    • Set the circuit board on a piece of cardboard so as to insulate it.

    • Re-connect all power and data cables to the circuit board.

    • Power on the Synergy control panel.

    • Perform the diagnostic test as outlined in the section "**Testing the Potentiometer**" on page 13–11.

14. Power off the Synergy control panel.

15. Disconnect all power and data cables from the board and continue with the full re-assembly.

16. Reconnect the metal plate using the lock washers and nuts. Tighten all nuts securely.

17. Carefully replace the circuit board through the underside of the Synergy control panel.

⚛ **Important**

> Replacing the circuit board is a tricky procedure, due to the tight tolerances of the LEDs. It is highly recommended that you use two people to perform the re-installation procedure, with one person supporting the board from below, and the other guiding it from the top.
>
> • If required, remove button keycaps that are adjacent to the LEDs, to facilitate your ability to insert a screwdriver and gently *nudge* the LEDs into place.
>
> • If required, remove the LEDs themselves from the circuit board, and make a careful note of their position, color and orientation. Next, re-connect the circuit board using a minimum number of screws, and insert the LEDs through the top of the Synergy control panel, until they are firmly seated in their sockets. Use the lamp diagnostic test to verify that all LEDs are properly inserted in the board.

18. Secure the board to the panel with the mounting screws.

19. Reconnect all power and data cables to the board.

20. Close the top of the Synergy control panel.

21. Power on the Synergy control panel.

22. Verify that the potentiometer now functions properly. Refer to the section "**Testing the Potentiometer**" on page 13–11 for instructions.

23. Perform the switcher calibration procedure, to ensure that all potentiometers are properly calibrated. Refer to the section "**Switcher Calibration**" on page 11–2 for instructions.

This completes the procedure to replace a failed potentiometer.

Replacing the Display

This section provides instructions for replacing the entire display. This procedure may be required if the display fails, or more likely, if the backlight begins to fade (with age), and becomes too dim for your preference.

Testing the Display

As a prerequisite, use the **Display Test Menu** to verify the condition of the display.

Use the following procedure to test the display:

1. Navigate to the **Panel Diagnostics Menu 2-2** as follows:

   • Press **HOME** (to display the **Main Menu 1-2**).

   • **MORE** (to display the **Main Menu 2-2**).

   • **Setup** (to display the **Setup Menu**).

   • **Panel Diagnostics** (to display **Panel Diagnostics Menu 1-2**).

   • **MORE** (to display **Panel Diagnostics Menu 2-2**).

2. Press **Display Test** to display the **Display Test Menu**.

Display Test Menu

   The menu and mnemonics displays are exercised.

3. Press *any button* below the display to advance to the next in the series of display tests. A variety of tests are available.

This completes the procedure to test the display. You may want to adjust the contrast of the display before you proceed with the replacement procedure.

Adjusting the Contrast

Use the following procedure to adjust the contrast of the display:

1. Navigate to the **Display Menu** as follows:

   • Press **HOME** (to display the **Main Menu 1-2**).

   • **MORE** (to display the **Main Menu 2-2**).

   • **Setup** (to display the **Setup Menu**).

   • **Display** (to display the **Display Menu**).

2. Press **Large Display** to display the **Large Display Menu**.


```
Display

                                                              ( 34.9%)
                                                              Contrast




    Large      Mnemonic
    Display    Displays
```

Display Test Menu

3. Use the middle **Contrast** knob to adjust contrast.

This completes the procedure to adjust the contrast of the display. If the readability of the display does not improve, continue to the replacement procedure.

Replacing the Display

Use the following procedure to replace the display:

	Caution	Static discharge can cause serious damage to sensitive semiconductor devices. Avoid handling the switcher circuit boards in high static environments such as carpeted areas and when synthetic fiber clothing is worn. Touch the frame to dissipate static charge before removing boards from the frame and exercise proper grounding precautions when working on circuit boards.

1. Once you have verified the condition of the display, power off the Synergy control panel

	Warning	Ensure that power is off. This step is extremely important, because high voltages are present in the display module area when it is running.

2. Lift up the top of the Synergy control panel to reveal the circuit boards underneath.

3. Unscrew the metal finger shield (an L-bracket) using the two screws in the bottom of the **037** board. Set the shield and screws aside for later reinstallation.

4. Disconnect the data cables from the display module's 15-pin header. Depending upon the model of the **037** board, these data cables will originate from a single cable, or from a larger wiring harness.

5. Use needle-nose pliers to disconnect the single small power connector that also originates from the adjacent **037** board.

6. Remove the screws from each corner or the display module, and set them aside for later reconnection.

7. Carefully drop the display module out from underneath the Synergy control panel.

8. Install the new display module in the Synergy control panel, and secure with the four corner screws.

9. Use needle-nose pliers to reconnect the single small power connector (that originates from the **037** board) to the display module.

10. Reconnect the data cables to the display module's 15-pin header, and ensure that they are properly aligned.

11. Reattach the metal finger shield to the bottom of the **037** board.

12. Close the top of the Synergy control panel.

13. Power on the Synergy control panel.

14. Verify that the display functions properly. Refer to the section "**Testing the Display**" on page 13–15 for instructions.

15. Adjust the new display's contrast for optimum readability as follows:

    • Navigate to the **Large Display Menu** as follows:

        ~ Press **HOME** (to display the **Main Menu 1-2**).

        ~ **MORE** (to display the **Main Menu 2-2**).

        ~ **Setup** (to display the **Setup Menu**).

        ~ **Large Display** (to display the **Large Display Menu**).

    • Use the **Contrast** knob to adjust the contrast.

This completes the procedure to replace a failed display.

Repairing a Damaged Serial Port

Because the serial ports on the rear of the Synergy control panel interface with external equipment, it is possible to damage the electronics that drive these ports. Some situations which may cause a port failure are:

- External equipment failure

- Improper cabling

- Power surge

- Lightning strike

⚠ **Caution** | The replacement procedure should be performed by qualified service personnel only. If you are not familiar with handling electronic components, please contact Ross Video Technical Support.

This section includes procedures to test and repair a damaged serial port.

Testing the Serial Port

As a prerequisite, perform a diagnostic test, using the **TX/RX Test Menu**, on the specific port.

The **TX/RX Test Menu** allows you to test communications with various remote control and communications ports. The internal test checks the UART which generates the serial data stream. The external test additionally tests the line drivers and receivers.

✎ **Note** | A proper loop-back connector is required to conduct the external test.

Use the following procedure to test TX/RX functions:

1. Navigate to **Panel Diagnostics Menu 2-2** as follows:

   - Press **HOME** (to display **Main Menu 1-2**).
   - **MORE** (to display **Main Menu 2-2**).
   - **Setup** (to display the **Setup Menu**).
   - **Panel Diagnostics** (to display **Panel Diagnostics Menu 1-2**).
   - **MORE** (to display **Panel Diagnostics Menu 2-2**).

2. Press **TX/RX Test** to display the **Panel TX/RX Test Menu**.

```
Panel TX/RX Test
Waiting for user


                                    Com Port:  PAN2FRM  (PF)
                                               AUXPAN 1 (A1)
                                               AUXPAN 2 (A2)
                                               AUXPAN 3 (A3)
                                              ↓REMOTE 1 (R1)

                                    Monitor       Test
```

Panel TX/RX Test Menu

	Note	Peripheral equipment should be disconnected from the port while running the test.

3. Test a communication port as follows:

   • Use the **Com Port** knob to select the port that you wish to test.

   • If available, attach an appropriate loop-back connector to the port that you wish to test.

   • If a loop-back connector is *not* available, the system will only be able to perform a partial test (the UART will be tested, however, the line drivers and receivers will not).

   • Press **Test** to begin the TX/RX test.

4. The menu will report **Pass** or **Fail** for internal and external tests.

   • If the test passes an internal loopback test but fails to communicate with external equipment, a serial port driver may have failed. Continue to the next procedure to repair the driver.

   • If the internal loopback test itself fails, contact Ross Video Technical Support for further assistance.

5. Repeat the procedure for each additional port that you wish to test.

This completes the procedure to test TX/RX functions. Next you will repair the damaged serial port.

Repairing a Damaged Serial Port

	Caution	This procedure should be performed by qualified service personnel only. If you are not familiar with handling electronic components, contact Ross Video Technical Support.

Use the following procedure to repair a damaged serial port.

	ESD Susceptibility	Static discharge can cause serious damage to sensitive semiconductor devices. Avoid handling the switcher circuit boards in high static environments such as carpeted areas and when synthetic fiber clothing is worn. Touch the frame to dissipate static charge before removing boards from the frame and exercise proper grounding precautions when working on circuit boards.

1. Power off the Synergy control panel.

2. Lift the top of the Synergy control panel to reveal the electronics bay inside.

3. Remove the protective cover from the electronics bay, and set the screws in a safe place for later re-installation.

4. In the upper central section of the Synergy Control Panel CPU Board, locate the **Rear Panel Connectors Section**, as shown below.

Rear Connector Panel

```
4000-033
Panel CPU Board
```


Rear Panel Connectors Section

Front Edge
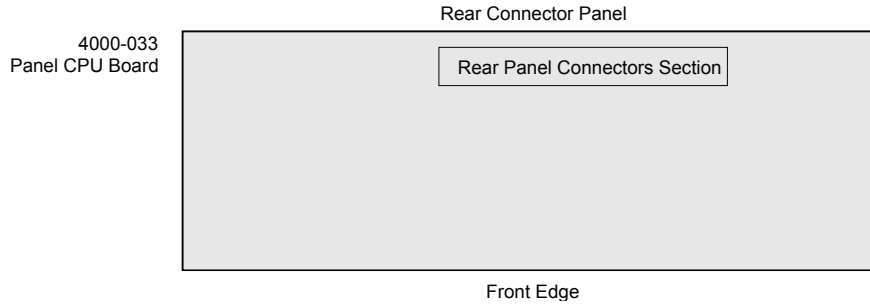
Panel CPU Board — Rear Panel Connectors Section

5.   Refer to the table below outlines the type and location of the driver ICs for each of the serial ports on the control panel.

Driver ICs for Serial Ports

Serial Port on Control Panel	AD7306	DG413	DS8921
Frame			U18, U25
Aux 1			U24
Aux 2			U22
Aux 3			U21
Remote 1	U16	U17	
Remote 2	U14	U15	
Remote 3	U12	U13	
Remote 4	U10	U11	
Remote 5	U8	U9	
Remote 6	U6	U7	
Remote 7	U4	U5	
Remote 8	U2	U3	

6.   Remove all ICs listed above for the damaged port. Use a small flat-head screwdriver to gently pry the devices from their respective sockets.

7.   Carefully replace each IC with the matching type from the spare parts kit.

   •   Ensure that **pin 1** (indicated with a dot on the IC) is oriented towards the rear of the Control Panel electronics bay.

   •   Align the IC with the socket, so that the pins rest on the holes. Push down firmly with an even pressure to press it into place.

   •   If the IC is placed in the socket incorrectly, you can use a small flat-blade screwdriver to reach under the IC and pry it up.

8. Before replacing the electronics bay cover, power on the Synergy control panel.

9. Verify the operation of the port using the **Diagnostic Menu**. Refer to the section "**Testing the Serial Port**" on page 13–18 for instructions.

Note	If the port still fails to operate properly, contact Ross Video Technical Support for assistance.

10. Once the operation of the port has been verified, complete the procedure as follows:

    • Power off the Synergy control panel.

    • Replace the protective cover over the electronics bay.

    • Secure all screws around the edges of the cover.

    • Power on the Synergy control panel.

    • Lower the top of the Synergy control panel.

This completes the procedure to repair a damaged serial port.

Control Panel Options

In This Chapter

This chapter provides instructions for installing Synergy control panel software options.

The following topics are discussed:

- Installing the Routing Switcher Interface
- Installing the Character Generator Interface
- Installing the VTR Remote Control Option
- Installing the Audio Server Control Option
- Installing the Video Server Control Option
- Installing the Robotic Camera System Interface
- Installing the Monitor Wall Interface
- Installing the Editor Interface Option

Installing the Routing Switcher Interface

This section provides general instructions for installing the **Routing Switcher Interface Option**, which adds routing switcher interface capability to your Synergy digital production switcher. You can connect a number of Routers to your Synergy switcher. The procedure for connecting the Router will depend on the type of Router you have. Refer to the *Synergy Series Installation Guide* for more details.

Use the following procedure to install the **Routing Switcher Interface Option**:

1. Install the **Routing Switcher Interface Option**. Refer to the section "**Installing Software Options**" on page 8–7 for instructions.

2. Ensure that one of the serial ports on your router is properly set up to communicate with the Synergy switcher.

3. Ensure that the serial ports on your router is properly connected to a remote port on the Synergy switcher. Refer to the documentation for your device to learn more on its specific remote control communications port.

4. Ensure that you have set up a communications port on the Synergy switcher for a router. Refer to the section, "**Setting up the Switcher**" in the *Synergy Series Installation Guide*, for instructions.

5. Ensure that the desired BNC is configured for a router on the Synergy switcher. Refer to the section, "**Setting Up Router BNCs**" the *Synergy Series Installation Guide* for instructions.

This completes the procedure to install the **Routing Switcher Interface Option**.

Installing the Character Generator Interface

This section provides general instructions for installing the **Character Generator Interface Option**, which allows you to control your device directly from the Synergy switcher. You can connect a number of character generators to your Synergy Switcher. The procedure for connecting the character generator will depend on the type of Character Generator you have. Refer to the *Synergy Series Installation Guide* for setup details.

Use the following procedure to install the **Character Generator Interface Option**:

1. Install the **Character Generator Interface Option**. Refer to the section "**Installing Software Options**" on page 8–7 for instructions.

2. Ensure that one of the serial ports on your character generator is properly set up to communicate with the Synergy switcher.

3. Ensure that the serial ports on your character generator are properly connected to a remote port on the Synergy switcher. Refer to the documentation for your device to learn more on its specific remote control communications port.

4. Ensure that you have set up a communications port on the Synergy switcher for a character generator. Refer to the section, "**Setting up the Switcher**" in the *Synergy Series Installation Guide*, for instructions.

5. Ensure that the desired BNC is configured for a character generator on the Synergy switcher. Refer to the section, "**Setting Up Character Generator BNCs**" in the *Synergy Series Installation Guide* for instructions.

This completes the procedure to install the **Character Generator Interface Option**.

Installing the VTR Remote Control Option

This section provides instructions for installing the **VTR Remote Control Option**, which controls up to eight VTRs, disk recorders, or other devices compatible with the Betacam serial control protocol — directly from the Synergy switcher. For more information on setting up your device with the Synergy switcher, refer to the *Synergy Series Installation Guide*

Use the following procedure to install the **VTR Remote Control** option:

1. Install the **VTR Remote Control Option**. Refer to the section "**Installing Software Options**" on page 8–7 for instructions.

2. Ensure that the serial port of your VTR is properly set up to accept commands via its remote port.

   • Many VTRs have a switch labeled **Local/Remote**. This switch should be set to the **Remote** position when the VTR is under control of the Synergy switcher.

   • Refer to the documentation for your VTR to learn more on its specific remote control communications port.

3. Ensure that you have set up a communications port on the Synergy switcher for a VTR (Betacam) device. Refer to the section, "**VTR Communications Setup**" in the *Synergy Series Installation Guide*, for instructions.

4. Ensure that the desired BNC is configured as a VTR on the Synergy switcher. Refer to the section, "**Setting up VTR BNCs**" in the *Synergy Series Installation Guide* for instructions.

This completes the procedure to install the **VTR Remote Control Option**. Refer to the section, "**Programming Clips**" in the *Synergy Series Operation Guide*, for detailed operating instructions.

Installing the Audio Server Control Option

This section provides general instructions for installing the **Audio Server Control Option**, which can control up to eight audio servers, such as the Digicart II, that use the Digicart control protocol — directly from the Synergy switcher. For more information on setting up your device with the Synergy switcher, refer to the *Synergy Series Installation Guide*

Use the following procedure to install the **Audio Server Control Option**:

1. Install the software registration key for the **Audio Server Control Option**. Refer to the section "**Installing Software Options**" on page 8–7 for instructions.

2. Ensure that the serial port of your Audio Server is properly set up to accept commands via its remote port. Refer to the documentation for your device to learn more on its specific remote control communications port.

3. Set up a communications port on the Synergy switcher for your audio server. Refer to the section, "**Setting up the Switcher**" in the *Synergy Series Installation Guide*, for instructions.

This completes the procedure to install the **Audio Server Control Option**. Refer to the section, "**Programming Audio Server Custom Controls**" in the *Synergy Series Installation Guide*, for detailed operating instructions.

Installing the Video Server Control Option

This section provides general instructions for installing the **Video Server Control Option**, which can control up to eight video servers, disk recorders, or other devices that use the Louth VDCP control protocol — directly from the Synergy control panel. For more information on setting up your device with the Synergy switcher, refer to the *Synergy Series Installation Guide*.

Use the following procedure to install the **Video Server Control Option**:

1. Install the software registration key for the **Video Server Control Option**. Refer to the section "**Installing Software Options**" on page 8–7 for instructions.

2. Ensure that the serial port of your video server is properly set up to accept commands via its remote port. Refer to the documentation for your device to learn more on its specific remote control communications port.

3. Ensure that you have set up a communications port on the Synergy switcher for a video server (VDCP) device. Refer to the section "**Setting Up the Switcher**" in the *Synergy Series Installation Guide*, for instructions.

4. Assign a BNC to your video server (VDCP) device. Refer to the section "**Setting Up Video Server BNCs**" in the *Synergy Series Installation Guide*, for instructions.

This completes the procedure to install the **Video Server Control Option**. Refer to the section, "**Programming Clips**" in the *Synergy Series Operation Guide*, for detailed operating instructions.

Installing the Robotic Camera System Interface

This section provides general instructions for installing the **Robotic Camera System Interface Option**, which enables serial control over robotic camera systems including pan, tilt, zoom, focus, and scene recalls — directly from the Synergy switcher. For more information on setting up your device with the Synergy switcher, refer to the *Synergy Series Installation Guide*

Use the following procedure to install the **Robotic Camera System Interface** option:

1. Install the **Robotic Camera System Interface** software option. Refer to the section "**Installing Software Options**" on page 8–7 for instructions.

2. Ensure that the serial port of your robotic camera is properly set up to accept commands via its remote port. Refer to the documentation for your device to learn more on its specific remote control communications port.

3. Ensure that you have set up a communications port on the Synergy switcher for a robotic camera. Refer to the section, "**Setting up the Switcher**" in the *Synergy Series Installation Guide*, for instructions.

4. Ensure that the desired BNC is configured as a robotic camera on the Synergy switcher. Refer to the section, "**Setting Up Robotic Camera BNCs**" in the *Synergy Series Installation Guide* for instructions.

This completes the procedure to install the **Robotic Camera System Interface** option. Refer to the section, "**Remote Camera Control Interface**" in the *Synergy Series Operation Guide*, for detailed operating instructions.

Installing the Monitor Wall Interface

This section provides general instructions for installing the **Monitor Wall Interface Option**, which allows you to interface between the Synergy switcher and a multi-image display system. You can perform functions such as loading a preset layout, changing the input channel on a particular monitor, or editing dynamic text. Refer to the *Synergy Series Installation Guide*, for setup details.

Use the following procedure to install the **Monitor Wall Interface Option**:

1. Install the **Monitor Wall Interface Option**. Refer to the section "**Installing Software Options**" on page 8–7 for instructions.

2. Ensure that one of the serial ports on your monitor wall is properly set up to communicate with the Synergy switcher.

3. Ensure that the serial ports on your monitor wall are properly connected to a remote port on the Synergy switcher. Refer to the documentation for your device to learn more on its specific remote control communications port.

4. Ensure that you have set up a communications port on the Synergy switcher for a monitor wall. Refer to the section, "**Setting up the Switcher**" in the *Synergy Series Installation Guide*, for instructions.

This completes the procedure to install the **Monitor Wall Interface Option**. Refer to Chapter 8, "**Custom Controls**" in the *Synergy Series Installation Guide*, for details on programming macros for your monitor wall.

Installing the Editor Interface Option

The **Editor Interface Option** allows a Synergy switcher to interface with all popular editing systems. The option itself is comprised of software plus security codes. For more information on setting up your device with the Synergy switcher, refer to the *Synergy Series Installation Guide*

Use the following procedure to install the **Editor Interface Option**:

1. Install the **Editor Interface Option**. Refer to the section "**Installing Software Options**" on page 8–7 for instructions.

2. Ensure that one of the serial ports on your editing system is properly set up to control the Synergy switcher.

3. Ensure that the serial ports on your editing system is properly connected to the **Editor Port** on the Synergy switcher. Refer to the documentation for your edit controller to learn more on its specific remote control communications port.

4. Ensure that communications with your editing system is properly set up. Refer to the section, "**Setting up the Switcher**" in the *Synergy Series Installation Guide*, for detailed instructions.

This completes the procedure to install the **Editor Interface Option** for your Synergy switcher.

Control Panel Hardware Options

In This Chapter

This chapter provides instructions for installing Synergy control panel hardware options.

The following topics are discussed:

- Installing the Extended Tallies Option
- Installing the Mnemonic Display Option (for 2003 Edition Panels)
- Synergy 2 USB Controller Installation
- Synergy 3 USB Controller Installation
- Synergy 4 USB Controller Installation

Installing the Extended Tallies Option

This section provides instructions for installing the **Extended Tallies** option, which provides an additional 36 tallies (bringing the total number to 72). The diagram below illustrates the **Extended Tallies Board** (4000A-038).
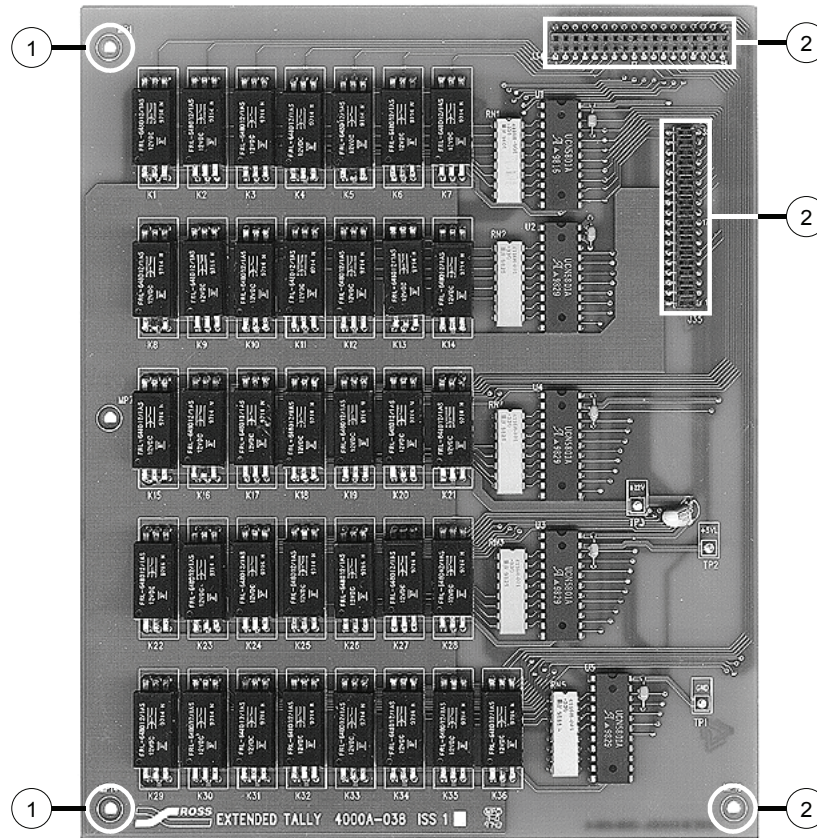
Extended Tallies Board

1) Mounting Holes	2) Connector Sockets

Each component is discussed in the following section.

1. Mounting Holes

Three holes are provided for mounting the **Extended Tallies Board** on the **Control Panel CPU Board**, where three permanent standoffs are provided.

2. Connector Sockets

Two multi-pin female connector sockets are provided on the **Extended Tallies Board**. When the board is mounted on the connectors below (on the **Control Panel CPU**

Board), the pins push up from underneath, through the board itself, and into the socket from below.

	Note	There are no DIP switches, jumpers, LEDs, or user serviceable areas on the **Extended Tallies Board**.

Installing the Extended Tallies Option

With the **Extended Tallies** option properly installed, you will have 36 additional tallies (providing a total of 72 tallies) to program and use, and tally connectors **3** and **4** on the rear of the Synergy control panel will be active. The procedure is universal for all three Synergy switchers.

Use the following procedure to install the **Extended Tallies** option:

	Caution	Static discharge can cause serious damage to sensitive semiconductor devices. Avoid handling the switcher circuit boards in high static environments such as carpeted areas and when synthetic fiber clothing is worn. Touch the frame to dissipate static charge before removing boards from the frame and exercise proper grounding precautions when working on circuit boards.

1. Power off the Synergy control panel.

2. Lift the top of the Synergy control panel to reveal the electronics bay inside.

3. Remove the protective cover from the electronics bay, and set the screws in a safe place for later re-installation.

4. In the upper left corner of the **Control Panel CPU Board**, locate the **Extended Tallies Section**, as shown below. You will find two connectors and three standoffs in this region.
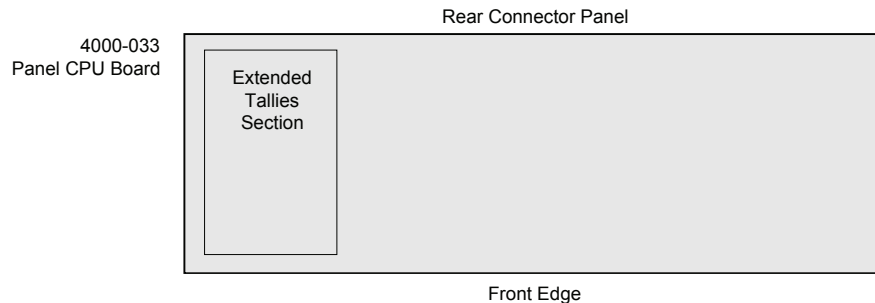
Control Panel CPU Board — Extended Tallies Section

5. Unpack the Extended Tallies kit.

6. Align the **Extended Tallies Board** with the connectors on the **Control Panel CPU Board**.

7. Slowly press the board down onto the connectors (which will mate with holes on the bottom of the **Extended Tallies Board**). Ensure that there are no bent or misaligned pins. Continue pressing down, until there is a positive snap — as the board seats fully.

8. Secure the board with screws, into the three mounting holes and standoffs.

9. Power on the Synergy control panel.

10. Verify the extended tallies by performing the tally diagnostic test. Refer to the section "**Tally Test**" on page 11–13 for complete instructions.

11. Complete the installation as follows:

   • With the test complete, turn off Synergy control panel.

   • Replace the protective cover over the electronics bay.

   • Secure all screws around the edges of the top cover.

   • Lower the top of the Synergy control panel.

This completes the procedure to install the **Extended Tallies** option. Refer to the section, "**Setting Up Tallies**" of the *Synergy Series Installation Guide* for instructions on programming tallies through the menu system. For information on connecting tallies, refer to the section "**Tally Connections**" of the *Synergy Series Installation Guide*.

Installing the Mnemonic Display Option (for 2003 Edition Panels)

This installation procedure allows you to install **Mnemonic Displays** on your 2003 Edition Synergy control panel. The installation procedure is identical regardless of the model of 2003 Edition Synergy panel you have. Mnemonics Display modules are available for the PGM bus, the Custom Control bus, and each MLE on your switcher.

Installing the Mnemonics Display option is a three-step process:

- Removing the Cover Plates
- Installing Mnemonics Display Modules
- Installing Mnemonic Controller Board(s)

Each step is outlined in the following sections.You will require the **Mnemonics Displays**, the **Mnemonics Controller Boards**, and a Phillips #1 screwdriver to fully install your **Mnemonic Display** option.

	Caution	Static discharge can cause serious damage to sensitive semiconductor devices. Avoid handling the switcher circuit boards in high static environments such as carpeted areas and when synthetic fiber clothing is worn. Touch the frame to dissipate static charge before removing boards from the frame and exercise proper grounding precautions when working on circuit boards.

Removing the Cover Plates

Use the following procedure to remove cover plates from your Synergy Series 2003 Edition panel:

1. Power down the Synergy control panel.

2. Open the panel top as wide as possible.

3. Locate the **Crosspoint (or XPT) Switch Circuit Board** as follows:

   - **Synergy 2** — If you have a Synergy 2 panel, this board is on the left side of the panel top as you view it from the inside (4317A-130).

   - **Synergy 3** — If you have a Synergy 3 panel, there are *two* circuit boards, the Upper Crosspoint Switch Board (4530A-130) and the Lower Crosspoint Switch Board (4530A-131).

   - **Synergy 4** — If you have a Synergy 4 panel, there is a Left Crosspoint Switch Board (4735A-130) and a Right Crosspoint Switch Board (4735A-131).

4. On the **Crosspoint (XPT) Switch Circuit Board(s)**, locate the screw positions for the cover plates you are removing. The positions are marked with a screw icon and an arrowhead on the silk screening.

   - For screw position icons and labels, refer to the diagram "**Typical Mnemonics Display Silk Screening on Crosspoint (XPT) Switch Board**" on page 15–6.

   - For the position numbers of the screws on the **Crosspoint Switch Boards**, refer to the table "**Mnemonics Display Screw Position Labels (from left to right)**" on page 15–6.

5 UNIT MNEMONICS DISPLAY
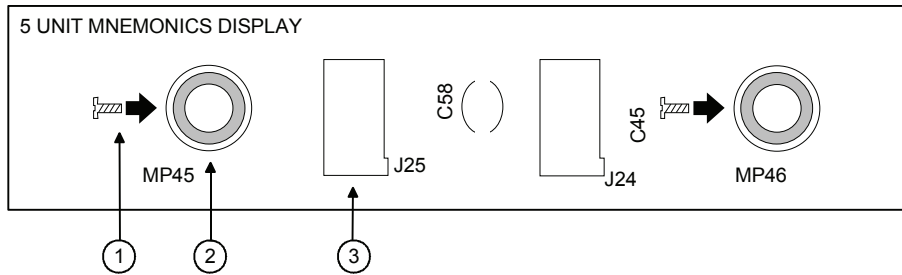
Typical Mnemonics Display Silk Screening on Crosspoint (XPT) Switch Board

1) Screw Icon	2) Screw Position	3) Display Module Pin Socket

Mnemonics Display Screw Position Labels (from left to right)

Mnemonics Display Row	Synergy 2	Synergy 3 (on Lower & Upper XPT boards)	Synergy 4 (on Left & Right XPT boards)
Cust Ctrl	MP 45-51	MP 69-82	MP 76, 75, 73-70, 74, 36, 80,79, 83-81, 56, 31
MLE 1	MP 52-58	MP 43-51, 61, 52, 9, 60, 28	MP 91, 92, 94-97, 93, 34, 20, 100, 7, 8, 19, 106, 105
MLE 2	MP 38-44	MP 83-96	MP 84, 85, 87-90, 86, 32, 94, 93, 97-95, 99, 98
MLE 3		MP 55-68	MP 83, 82, 80-77, 81, 38, 87, 86, 90-88, 92, 91
MLE 4			MP 63, 64, 66-69, 65, 30, 72-76, 78,77

5. Using a Phillips #1 screwdriver, remove the slot cover plate screws and place them in a handy spot. You will need these screws to install the mnemonic display components.

6. On the topside of the panel, lift the unscrewed cover plate away, and store it in a safe place with your Synergy hardware accessories.

✓ **Operating Tip**

To facilitate removal of the cover plate, with a small screwdriver, gently push up through one of the holes from which you removed a screw.

7. Repeat steps 5 and 6 for each display row you wish to install.

8. Once all the required cover plates have been removed, close the panel top.

This completes the procedure to remove cover plates from your Synergy Series 2003 Edition panel. Next you will install the Mnemonic Display Modules.

Installing Mnemonics Display Modules

Use the following procedure to install **Mnemonic Display Modules** (4000A-438) in your Synergy Series 2003 edition panel:

⚠️ **Caution**

> In the following steps, failure to reinstall a module with a precise 1:1 pin-to-socket orientation will damage the **Crosspoint (XPT) Switch Board**, the selected module — or both! Double-check your work!

1. Carefully remove the **Mnemonic Display Modules** from their shipping packages as follows:

   • **Synergy 2** — These panels use modules with 5, 5, and 7 displays each, per row, from left to right, to fill 17 row spaces.

   • **Synergy 3** — These panels use modules with 8, 7, 8, and 7 displays each, per row, from left to right, to fill 30 row spaces.

   • **Synergy 4** — These panels use modules with 5, 5, 8, 5, 7, and 5 displays each, per row, from left to right, to fill 35 row spaces.

2. Based on the configurations described in step 1, select the leftmost display module and align it over the slot with the pin connectors over the pin sockets. When properly aligned, the arrows above the standoff labels (**MP1**, **MP2** etc.) on the underside of the module will point upward.

3. Gently press the module pins onto the pin sockets on the **Crosspoint (XPT) Switch Circuit Board(s)**.

4. Working from left to right, repeat steps 2 and 3 to align and insert each module into each row socket until all modules are installed on the panel.

5. Open the panel top as wide as possible.

6. Using a Phillips #1 screwdriver, fasten the screws (from the cover plate removal procedure) to their corresponding positions as outlined in the table.

⚠️ **Caution**

> Do not over tighten the screws. Over tightening the screws will damage the **Crosspoint (XPT) Switch Board**, the selected module — or both! Double-check your work!

Mnemonics Display Screw Position Labels (from left to right)

Mnemonics Display Row	Synergy 2	Synergy 3 (on Lower and Upper XPT boards)	Synergy 4 (on Left and Right XPT boards)
Cust Ctrl	MP 45-51	MP 69-82	MP 76, 75, 73-70, 74, 36, 80,79, 83-81, 56, 31
MLE 1	MP 52-58	MP 43-51, 61, 52, 9, 60, 28	MP 91, 92, 94-97, 93, 34, 20, 100, 7, 8, 19, 106, 105
MLE 2	MP 38-44	MP 83-96	MP 84, 85, 87-90, 86, 32, 94, 93, 97-95, 99, 98
MLE 3		MP 55-68	MP 83, 82, 80-77, 81, 38, 87, 86, 90-88, 92, 91
MLE 4			MP 63, 64, 66-69, 65, 30, 72-76, 78,77

This completes the procedure to install **Mnemonic Display Modules** (4000A-438) in your Synergy Series 2003 edition panel. When all screws are inserted, you will install the **Mnemonic Controller Board(s)**.

Installing Mnemonic Controller Board(s)

Depending on the control panel you have, you will be installing either one or two **Mnemonic Controller Boards** as outlined in the section "**Installing Mnemonics Display Modules**" on page 15–7.

Use the following procedure to install **Mnemonic Controller Board(s)** in your Synergy Series 2003 Edition panel:

1. Carefully remove the **Mnemonic Controller Board(s)** from the shipping package.

    • **Synergy 2** — This panel uses one Mnemonic Controller Board (4000A-430A).

    • **Synergy 3** — This panel uses *two* Mnemonic Controller Board (4000A-430B).

    • **Synergy 4** — This panel uses *two* Mnemonic Controller Board (4000A-430B).

⚠ **Caution**

> In the following steps, failure to reinstall a Mnemonic Controller Board with a precise 1:1 pin-to-socket orientation will damage the Crosspoint (XPT) Switch Board, the Mnemonic Controller Board — or both! Double-check your work!

2. With the panel top still open, locate the three light gray socket rows on the **Crosspoint (XPT) Switch Circuit Board(s)** as follows:

    • **Synergy 2** — The input sockets are on the lower right edge of the **Crosspoint Switch Board**. The Mnemonic Controller board installs edge to edge with the Crosspoint Switch board.

    • **Synergy 3** — The input sockets for the two cards are on the left edge of the **Lower Crosspoint Switch Board** and the lower right edge of the **Upper Crosspoint Switch Board**. The Mnemonic Controller boards install piggyback style onto the Crosspoint Switch boards, resting fully over the Crosspoint board in both cases.

    • **Synergy 4** — The input sockets for the two cards are on the lower left edge of both the Left and the Right Crosspoint Switch boards. The Mnemonic Controller boards install piggyback style onto the Crosspoint Switch boards, resting fully over the Crosspoint board in both cases.

3. On the Crosspoint (XPT) or, in the case of the Synergy 2 panel, Key Switch circuit boards, locate the standoffs which correspond to the mounting holes labeled on the solder side of the **Mnemonic Controller Boards**, and remove all screws from the standoffs if there are any present.

4. Based on the configurations described in step 3, hold the **Mnemonic Controller Board** with the component side away from you, and carefully align the three connectors with their corresponding pin sockets.

✳ **Important**

> On the **Mnemonic Controller Board** for the Synergy 3 and 4 control panels (4000A-430B), an alignment block as been secured between the middle and rightmost connectors (**J101** and **J102**) to ensure proper pin-to-socket alignment. As this safety feature does not currently exist on the Synergy 2 **Mnemonic Controller Board** (4000A-430A), make certain great care is taken to secure a precise 1:1 pin-to-socket orientation. Failure to do so may result in damage to the Crosspoint Board and all Mnemonics circuit boards. Double-check your work!

5. Gently press the Mnemonic Controller Board pins onto the pin sockets on the **Crosspoint (XPT) Switch Circuit Board**.

6. Using a Phillips #1 screwdriver and the supplied mounting screws, fasten the **Mnemonic Controller Board(s)** to the host **Crosspoint (XPT) Switch Board** (**Key Switch** board on the **Synergy 2** control panel) at the standoff positions.

  Caution | Do not over tighten the screws. Over tightening the screws will damage the **Crosspoint (XPT) Switch Board** (**Key Switch Board**), the **Mnemonic Controller Board** — or both! Double-check your work!

This completes the procedure to install **Mnemonic Controller Board(s)** in your Synergy Series 2003 Edition panel. Please contact Ross Video Technical Support if any further assistance is required.

This completes the installation of the Mnemonics Display option. For configuration information, refer to the section, "**Standard Mnemonics**" of the *Synergy Series Operation Guide*. Refer to Chapter 6, "**BNC Configuration and Check**" of the *Synergy Series Installation Guide* for information on BNC names in mnemonics displays. To learn more about Custom Control names in mnemonics displays, refer to the section "**Standard Mnemonics**" of the *Synergy Series Installation Guide*.

Synergy 2 USB Controller Installation

This installation procedure allows you to replace the floppy disk drive in your Synergy 2 switcher with a USB controller.

There are three main steps:

- Replacing the EEPROM
- Removing the Floppy Disk Drive
- Installing the USB Controller

⚛	**Important**	USB support requires **Synergy Software version 16** or later and a **version 10** or later **Panel CPU Board**. If your switcher does not meet *both* of these requirements, contact Ross Video Technical Support for information on a switcher software and panel upgrade.

Once you begin the upgrade process, ensure that you fully complete each of the steps before returning your switcher to service. You may also find it useful to have the *Synergy Series Installation* and *Operation Guides* with you while performing the upgrade.

⚠	**Caution**	Static discharge can cause serious damage to sensitive semiconductor devices. Avoid handling the switcher circuit boards in high static environments such as carpeted areas and when synthetic fiber clothing is worn. Touch the frame to dissipate static charge before removing boards from the frame and exercise proper grounding precautions when working on circuit boards.

✓	**Installation Tip**	Your Synergy switcher may have shipped with a **USB Data Cable** pre-installed. If so, you can skip certain steps of the upgrade procedure. Look for tips like this one that describe which steps may be skipped.

Required Materials and Tools

This section lists the materials and tools you require to complete the USB installation. Contact Ross Video Technical Support if you are missing any materials.

You will need the following materials to complete the USB installation:

- one USB Controller Kit (4000K-441A)
- one 50-pin USB Data Cable (4317C-300A-01)
- one Boot EEPROM (4000E-03301 revision 6 or later)
- one USB key

You will also need the following tools:

- one medium Phillips screwdriver
- DIP Extraction Tool or small flat-head screwdriver.

Replacing the EEPROM

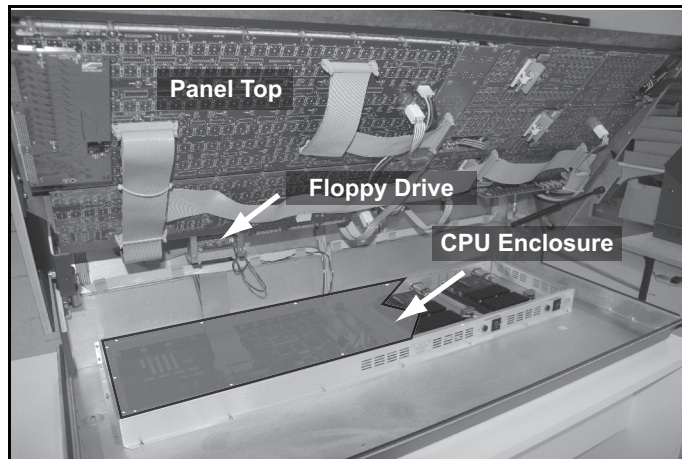The first step in the USB controller upgrade is to replace the EEPROM, a process that requires you to:

- Open the switcher panel
- Replace the EEPROM

Opening the Synergy 2 Switcher Panel

Use the following procedure to open your Synergy 2 switcher:

1. Create a backup of all your Synergy memory registers. Refer to the section "**Saving Registers**" in the *Synergy Series Operation Guide* for information on saving memory registers to a floppy disk.

2. Lift the switcher panel's top (grasp the front of the panel top and rotate it up and back), and lock it in the open position.

3. Turn off the switcher panel power supply (if your panel has dual power supplies, make sure that both are turned off).

4. Disconnect the power cable(s).

5. The circuit boards in the bottom of the switcher panel are housed in the **CPU Enclosure**. You must remove the top of this enclosure to access the circuit boards (see diagram below). Remove all the screws from the **CPU Enclosure** and then lift off the top.


Removing the CPU Enclosure

This completes the procedure for opening the Synergy 2 switcher. Next you will replace the EEPROM in your Synergy 2 switcher.

Replacing the EEPROM

The EEPROM that needs to be replaced is located on the **Panel CPU Board** (4000-033). This board is located on the switcher panel bottom.

Use the following procedure to replace the EEPROM in your Synergy 2 switcher:

1. Locate the EEPROM on the **Panel CPU Board** (4000-033). It is located near the red reset button and is marked **U62**.

Locating the EEPROM

2. Using the DIP Extraction tool, carefully remove the old EEPROM from its socket.

⚠	**Caution**	Be careful not to damage any of the surrounding electronic components when you remove the EEPROM. **DO NOT USE ANY OF THE OTHER COMPONENTS FOR LEVERAGE**. If you are not comfortable removing the EEPROM, please contact **Ross Video Technical Support** for assistance.

3. Insert the new EEPROM into the EEPROM socket paying careful attention to polarity. The EEPROM has one end notched so that it will only fit in the socket in the correct orientation (refer to the diagram below).

⚠	**Caution**	**DO NOT FORCE THE EEPROM INTO THE SOCKET.**
		If it does not fit easily into the socket, you may be attempting to install it in the wrong orientation. Match the notch cutout on the EEPROM with the notch of the socket.
		If you are still having trouble, place the EEPROM on its side on a hard, flat surface and gently push down, bending the pins slightly inward. Repeat this on both sides of the EEPROM and then attempt to reinsert it.
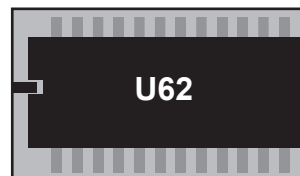
Synergy 2 EEPROM

This completes the procedure for replacing the EEPROM. Next you will remove the floppy disk drive.

Removing the Floppy Disk Drive

The next step in the USB controller upgrade is to remove the floppy disk drive. Removing the floppy disk requires the following steps:

- Remove the floppy disk drive cabling
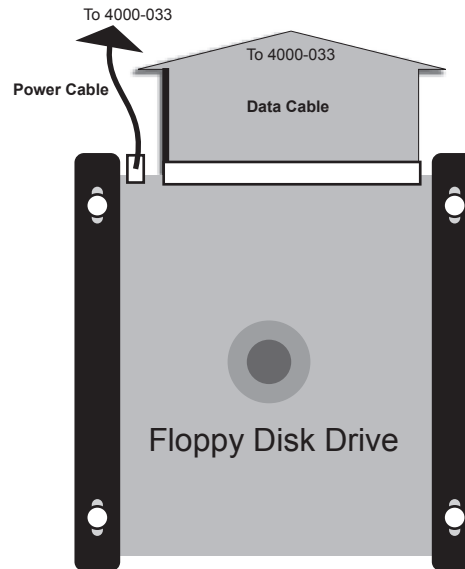
- Remove the control cable

•   Remove the floppy disk drive

The steps are discussed in the following sections.

Removing the Floppy Disk Drive Cabling

The floppy disk drive is connected to the **Panel CPU Board** by two cables: a data cable and a power cable. Both cables must be removed.

Use the following procedure to remove the data and power cables:

1. Locate the floppy disk drive and the two cables (data and power).

Floppy Disk Drive and Cabling

2. Remove the data cable from the back of the drive by grasping the connector and pulling it straight out.

3. Remove the power cable from the back of the drive by grasping the connector and pulling it up slightly away from the disk drive base and then straight out.

| ✓ | **Operating Tip** | The data and power cables fit snugly into their sockets. You may have to wiggle the cable connectors from side to side to unseat them. |

4. Locate the other end of the floppy disk drive data cable (it is plugged into the panel CPU board (4000-033)). The socket is labeled **Floppy Disk**.

✓	**Installation Tip**	If your Synergy switcher has a USB data cable pre-installed, it will be plugged into the CPU Board very near the floppy disk drive data cable, in a socket labeled **Panel Switch**. **DO NOT UNPLUG THE USB DATA CABLE.**
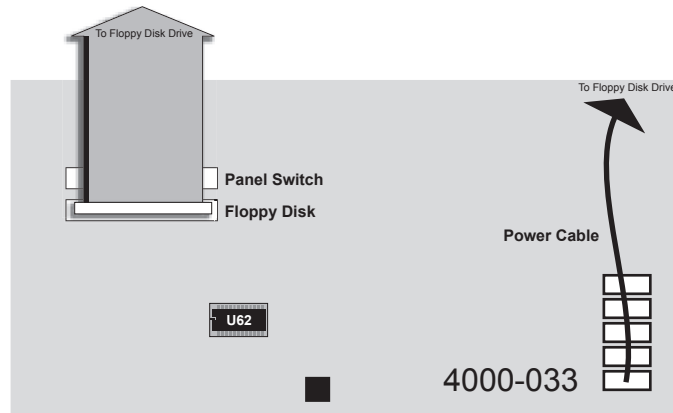
Data Cable Plugged into the Panel CPU Board

5. Remove the data cable from the **Panel CPU Board** (4000-033) by unlatching the data cable connector from the socket and pulling the connector. Also, cut any tie wraps that may be securing the data cable.

⚠	**Caution**	The latches that hold the data cable are fragile. Be careful when opening and closing them.

6. Locate the other end of the floppy disk drive power cable. It is plugged into the **Panel CPU Board** (4000-033) with all the other power cables (see previous diagram).

7. Remove the power cable from the **Panel CPU Board** by pulling the power cable connector. Also, cut any tie wraps that may be securing the power cable.

✓	**Installation Tip**	If your Synergy switcher has a USB data cable pre-installed, proceed to the section "**Removing the Floppy Disk Drive**" on page 15–15.

This completes the procedure for removing the floppy disk drive cabling. Next you will remove the control cable.

Removing the Control Cable

Use the following procedure to remove the control cable:

1. Locate the end of the **Controller Cable** that is plugged into the **Panel CPU Board** (4000-033). It is plugged into the socket labeled **Panel Switch** (refer to the diagram, "**Removing the Controller Cable**" on page 15–15).
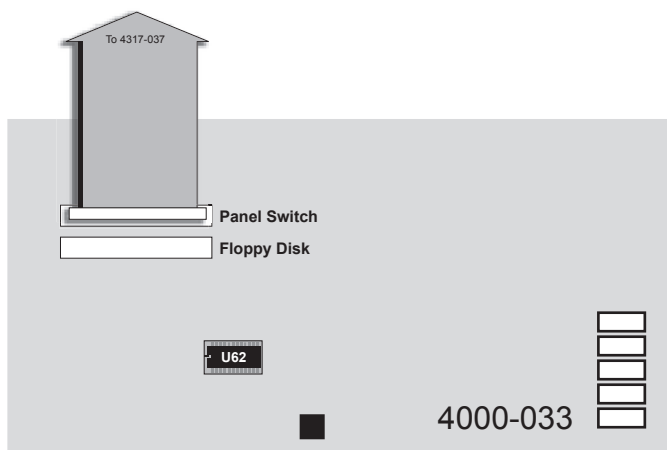
Removing the Controller Cable

2. Remove the **Controller Cable** by unlatching the data cable connector from the socket and pulling the connector.

3. Follow this cable and remove it from the four other sockets it is plugged into. Also, cut any tie wraps that may be securing the cable.

> ✓ **Installation Tip**
>
> The data, power, and control cables fit quite snugly into their sockets. You may have to wiggle the cable connectors from side to side to unseat them.
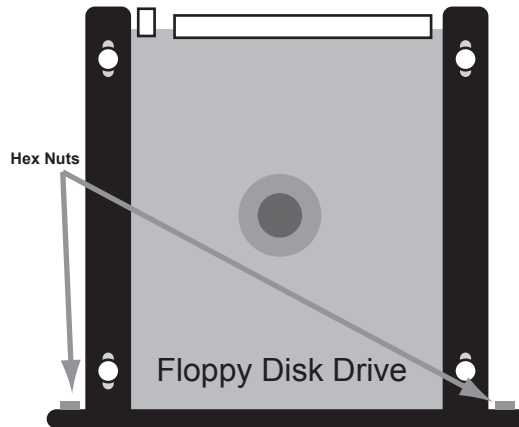
This completes the procedure for removing the control cable. Next you will remove the floppy disk drive from its bracket.

Removing the Floppy Disk Drive

Now that the floppy disk drive cabling has been removed, you can remove the floppy disk drive from its bracket.

Use the following procedure to remove the floppy disk drive:

1. Remove the four screws securing the floppy disk drive to the drive bracket. Ensure that you are holding onto the floppy disk drive when you remove the final screw so that it does not fall out of the bracket and damage any of the switcher components.
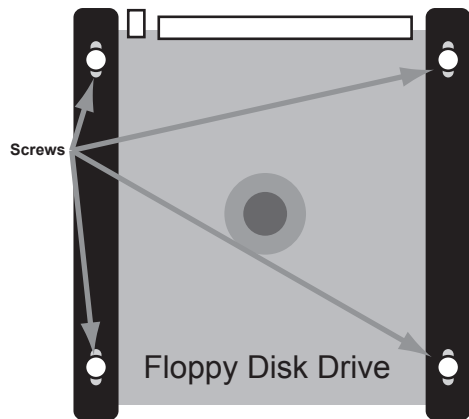
Screws Holding Floppy Disk Drive to Bracket

2. Slide the floppy disk drive out of the bracket to remove it from the switcher.

This completes the procedure for removing the floppy disk drive. Continue on to the next section to install the USB controller.

Installing the USB Controller

After removing the floppy disk drive, you will install the **USB Controller**. There are three steps:

- Install the USB controller
- Install the USB data and power cables
- Close the switcher panel

The steps are discussed in the following sections.

Installing the USB Controller

The **USB Controller** attaches to the bracket that was used to hold the floppy disk drive.

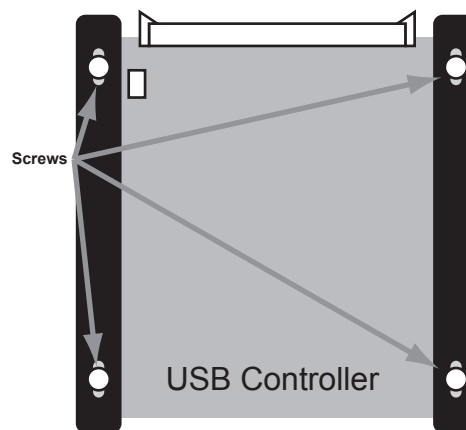Use the following procedure to install the **USB Controller**:

1. Slide the **USB Controller** into the bracket so that the screw-holes in the **USB Controller** match the screw holes in the bracket.

2. Secure the controller card to the bracket with the four provided screws. Before fully tightening the screws, once again check that the **USB Controller** face plate is flush with the front of the switcher panel.
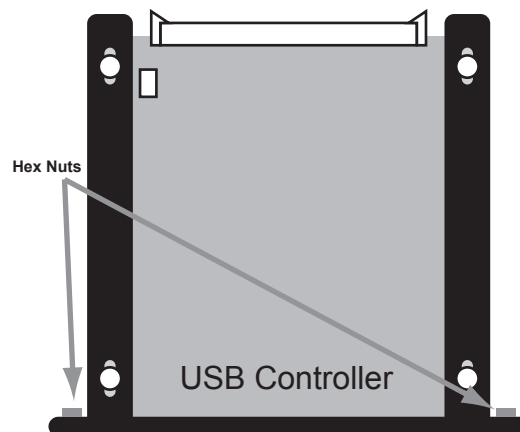
✓ **Installation Tip**

The screw holes in the bracket are elongated to allow some adjustment in the controller card installation. Slide the controller card as far as necessary to ensure that its faceplate sits flush with the switcher panel while still maintaining alignment between the screw holes on the controller card and the screw holes on the bracket.
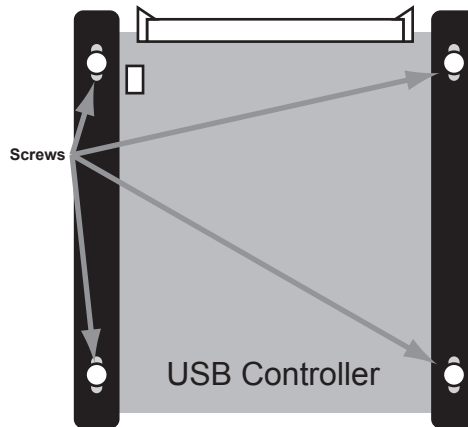
Installed USB Controller

If you are still having trouble getting the **USB Controller** faceplate flush with the switcher panel, do the following:

• Use a 5/16-inch nut driver to loosen the four hex nuts on the front of the **USB Controller** bracket.

• Slide the controller until the faceplate is flush with the switcher panel.

• Tighten the hex nuts with the nut driver.

This completes the procedure to install the **USB Controller**. Next you will install the USB Controller Cabling.

Installing the USB Controller Cabling

The **USB Controller** is connected to the Synergy 2 switcher by two cables: a data cable and a power cable. This section outlines how to connect the **USB Controller Cabling**.

✓	**Installation Tip**	If your Synergy switcher has a USB data cable pre-installed, proceed to the section "**USB Controller Power Cable**" on page 15–21.

Overview

The following diagram is an overview of the **USB Controller** cabling installation. The circled letters in the diagram correspond to the major steps in the installation process. The letters will aid you in referring to the overview diagram during the installation process.

✎	**Note**	Some board numbers will be labeled differently depending on your switcher version. Where there are different possible board numbers, they will be listed in parentheses. For example, Board **4317-131 (031)** refers to either Board **4317-131** or Board **4317-031**.
		YOUR SWITCHER WILL ONLY HAVE ONE OF THE TWO BOARDS.
		Some boards may also have a letter after the first four digits of their label such as **4317A-034**. These boards are referred to throughout this document without the letter (i.e. **4317-034**).

Panel Top

C — 4317-130 (030)

D — 4317-034

USB Controller

B — 4317-037 — Large Display

E — 4317-036

A — Panel Switch

F

Panel Bottom

U62

4000-033
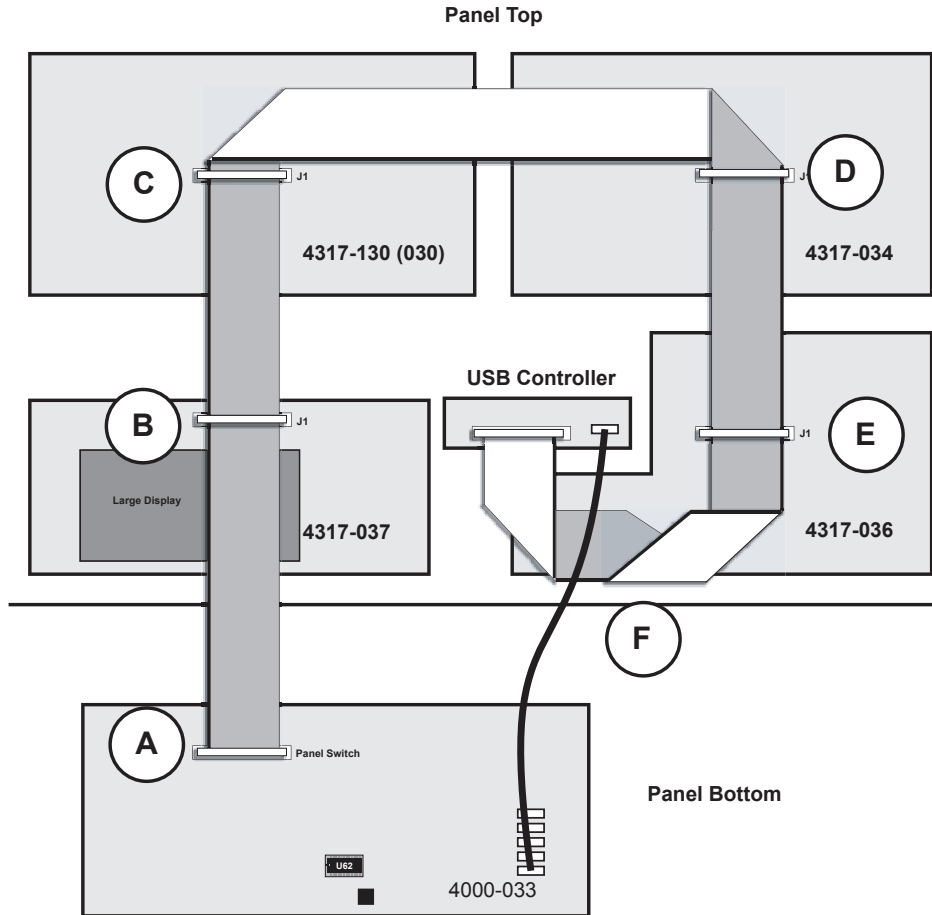
Synergy 2 USB Installation Overview

USB Data Cable Overview

The **USB Data Cable** plugs into the panel boards in five places and the **USB Controller** once. The data cable has six connectors spaced along its length and will only reach all the necessary sockets if it is installed correctly. One end of the cable is marked to indicate it is to be installed into the CPU Board. Ensure that you start with this end of the data cable.

Notice the red line running the length of the data cable along one edge. This line denotes pin 1 of the cable and is used to verify cable polarity during installation. Keep this in mind when installing the **USB Data Cable**.

Use the following procedure to install the **USB Data Cable**:

A

1. Determine which end of the **USB Data Cable** plugs into the **Panel CPU Board** (4000-033). Plug this end into the CPU Board socket labeled **Panel Switch** and secure the latches around the cable connector. The socket is located on the CPU Board next to the **Floppy Disk** socket.

To 4317-037

Panel Switch

U62

4000-033
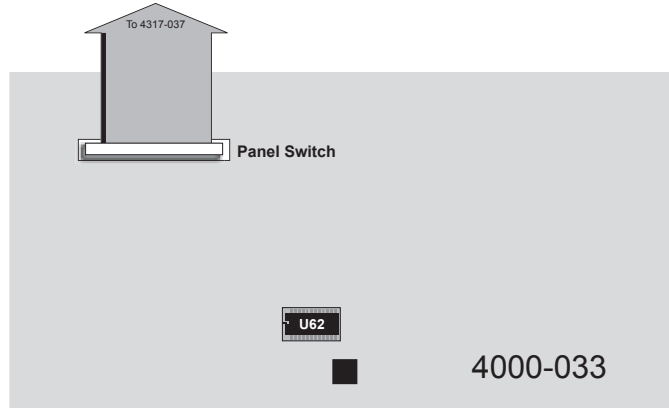
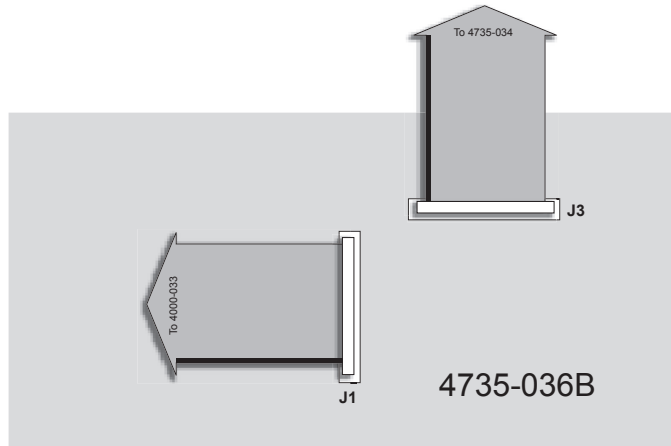*Data Cable Plugged into Panel Switch Socket*

⚠	**Caution**	**DO NOT FORCE THE DATA CABLE INTO THE SOCKET.**
		If it does not fit easily into the socket, you may be attempting to install it in the wrong orientation. Match the notch in the center of the cable connector with the notch cutout in the **Panel Switch** socket.

⚠	**Caution**	The latches that hold the data cable are fragile. Be careful when opening and closing them.

B

2. Run the cable to the socket labeled **J1** on board **4317-037** and plug the next connector into it, securing the latches around the connector.

To
4317-130 (030)

J1

Large Display

4317-037

From 4000-033
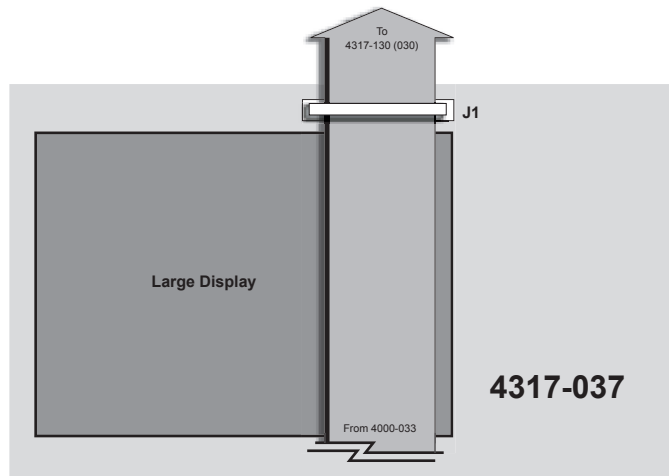
Running the Data Cable to the First Socket

C

3. Run the cable to the socket labeled **J1** on Board **4317-130 (030)** and plug the next connector into it, securing the latches around the connector. Then, make a fold with a twist to change the cable's direction by 90 degrees as shown in the diagram below.

To 4317-034

J1

From 4317-037

4317-130 (030)
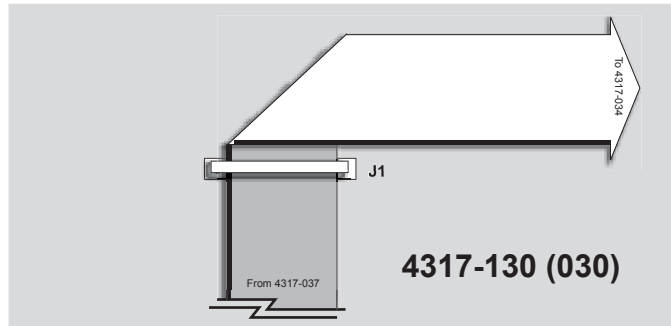
Running the Data Cable to Board 4317-030

D

4. Run the cable to the socket labeled **J1** on Board **4317-034** and plug the next connector into it, securing the latches around the connector. Then, make a fold with a twist to change the cable's direction by 90 degrees as shown in the diagram below.

From 4317-130 (030)

J1
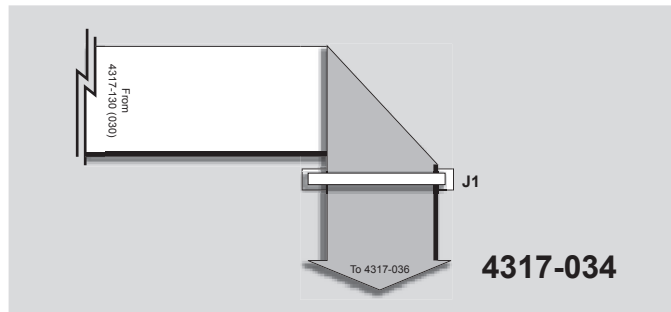
To 4317-036

4317-034

Running the Data Cable to Board 4317-034

E

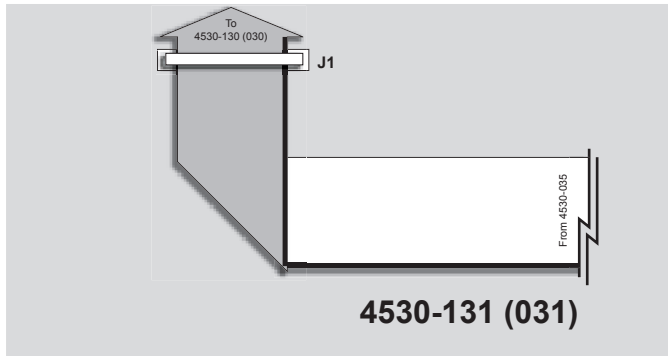5. Run the cable to the socket labeled **J1** on Board **4317-036** and plug the next connector into it, securing the latches around the connector. Then, make a fold with a twist to change the cable's direction by 90 degrees.
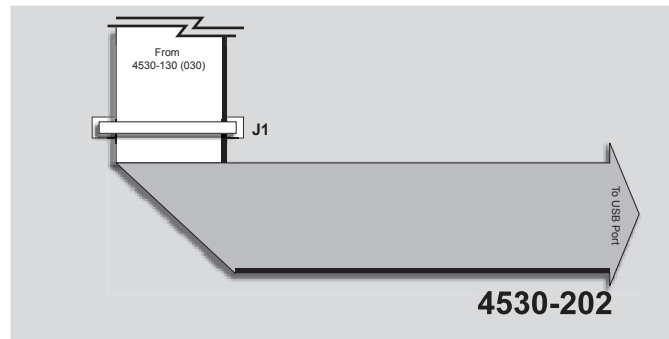

From 4317-034

J1

To USB Port
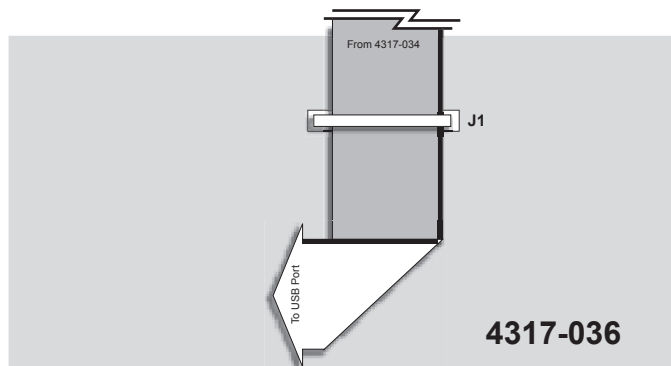
4317-036

Running the Data Cable to Board 4317-036

F   6. You must now connect the data cable to the **USB Controller**. However, the socket on the **USB Controller** is reversed from socket **J1** on Board **4317-036**, so the cable needs to be flipped before plugging into the **USB Controller**.

- Twist the cable so it is upside-down but running in the same direction (see diagram below). Notice how the red stripe is now on the other side of the cable indicating reversed polarity.

- Make a fold with a twist to change the cable's direction by 90 degrees and run it to the **USB Controller**. Plug the final connector into the **USB Controller** and secure the latches around it.
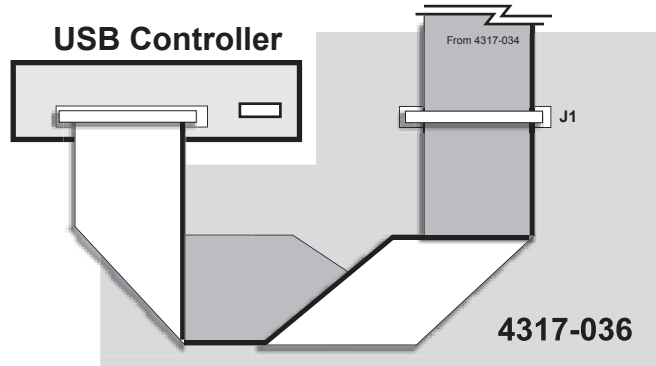
Running the Data Cable to the USB Controller

This completes the procedure for installing the **USB Data Cable**.

USB Controller Power Cable

Important | If you skipped the last section because your switcher had a **USB Data Cable** pre-installed, you will have to plug the data cable into the **USB Controller**. Locate the unsecured connector on the data cable (it should be near the **USB Controller**) and plug it into the **USB Controller**. Secure the latches around the connector.

The **USB Controller** power cable has one connector which is smaller than the other. The smaller connector plugs into the **USB Controller** while the larger connector plugs into the CPU Board.

Use the following procedure to install the **USB Power Cable**:

1. Plug the small connector of the **USB Power Cable** into the **USB Controller**.

To 4317-036

Power Cable

Data Cable
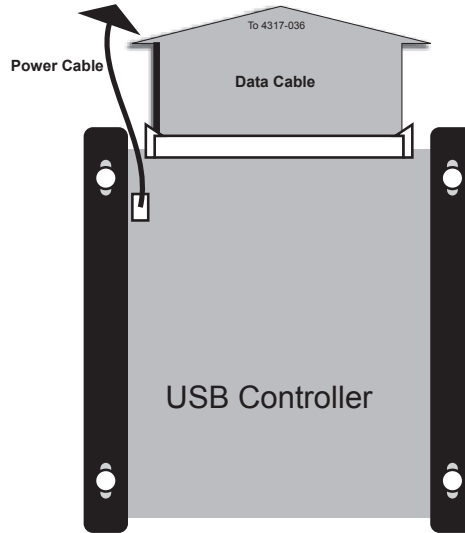
USB Controller

Plugging the USB Power Cord into the USB Controller

2. Plug the other end of the **USB Controller** into the **Panel CPU Board** (**4000-033**). It plugs into the same socket that the floppy disk drive power cable was plugged into.

To USB Port

To USB Port

Panel Switch

Power Cable

U62

4000-033
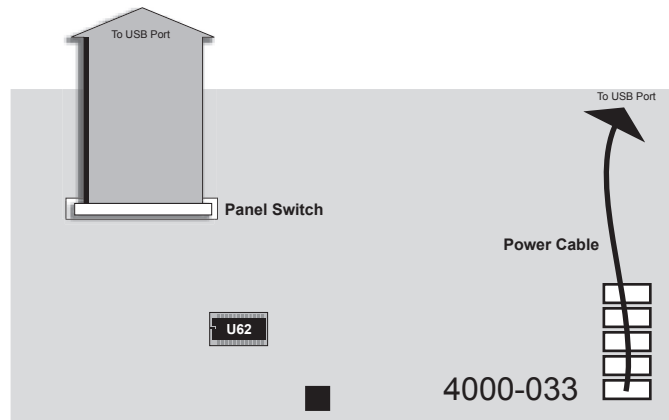
Plugging the USB Power Cord into the CPU Panel

3. Secure the data and power cables with tie wraps as appropriate to keep them from interfering with any other cables or components.

This completes the procedure for installing the **USB Controller Power Cable**. Next you will close the Synergy 2 switcher panel.

Closing the Synergy 2 Switcher Panel

Use the following procedure to close the Synergy 2 switcher panel.

1. Replace the **CPU Enclosure** lid and secure it with screws.

2. Attach the power cord(s).

3. Turn the switcher panel supply on (if your switcher has dual power supplies, turn them both on).

4. Lower the switcher panel top.

	Important	Be careful not to pinch any cables as you are closing the panel top. If any cables interfere with the closing of the panel top, secure them safely out of the way with tie wraps.

5. Follow any on-screen instructions.

This completes the procedure to close the Synergy 2 switcher panel.

Transferring Files to a USB Key

If you wish to recall any memory registers that you previously saved to floppy disk, you need to transfer them to a USB key via a computer with both a floppy disk drive and a free USB port.

Use the following procedure to transfer your files to a USB key:

1. With your computer running, insert a USB key into an available USB port. It should appear on your desktop as a removable storage device.

	Note	USB keys are accessed in various ways depending on the computer's operating system. Consult your operating system documentation or I.T. department if you are unsure how to access a USB key.

2. Insert the floppy disk containing the Synergy files you wish to copy into the floppy disk drive of the computer.

3. Copy the files from the floppy disk to the root directory of the USB key.

	Note	If you are unsure how to copy files, consult your operating system documentation or I.T. department.

4. Ensure that the light on the floppy disk drive is not on, then eject the floppy disk.

5. Safely remove the USB key from the USB port.

	Important	Failure to safely remove the USB key may result in data-corruption or data-loss. Consult your operating system documentation or I.T. department for instructions on safely removing a USB key.

This completes the procedure for copying Synergy files from a floppy disk to a USB key. You can now use the USB key in your Synergy switcher. Refer to the section "**Working with Storage Devices**" of the *Synergy Series Operation Guide* for information on using a USB key with the switcher.

This completes the procedure for replacing the Synergy 2 floppy disk drive with a **USB Controller**.

Synergy 3 USB Controller Installation

This installation procedure allows you to replace the floppy disk drive in your Synergy 3 switcher with a **USB Controller**. This procedure is required should you wish to make use of the **USB Controller** functionality, which is available with version 16 and higher of the Synergy 3 SD software.

There are three main steps:

- Replace the EEPROM

- Remove the floppy disk drive

- Install the USB controller

⊛ **Important**	USB support requires **Synergy Software version 16** or later and a **version 10** or later **Panel CPU Board**. If your switcher does not meet *both* of these requirements, contact Ross Video Technical Support for information on a switcher software and panel upgrade.

Once you begin the upgrade process, ensure that you fully complete each of the steps before returning your switcher to service. You may also find it useful to have the *Synergy Series Installation* and *Operation Guides* with you while performing the upgrade.

Caution	Static discharge can cause serious damage to sensitive semiconductor devices. Avoid handling the switcher circuit boards in high static environments such as carpeted areas and when synthetic fiber clothing is worn. Touch the frame to dissipate static charge before removing boards from the frame and exercise proper grounding precautions when working on circuit boards.

✓ **Installation Tip**	Your Synergy switcher may have shipped with a **USB Data Cable** pre-installed. If so, you can skip certain steps of the upgrade procedure. Look for tips like this one that describe which steps may be skipped.

Required Materials and Tools

This section lists the required materials and tools to complete the USB installation. Contact Ross Video Technical Support if you are missing any materials.

You will need the following materials to complete the USB installation:

- one USB Controller Kit (4000K-441A)

- one 50-pin USB Data Cable (4317C-300A-01)

- one Boot EEPROM (4000E-03301 revision 6 or later)

- one USB key

You will also need the following tools:

- one medium Phillips screwdriver

- DIP Extraction Tool

- one 5/16" Hollow Shaft Nut Driver
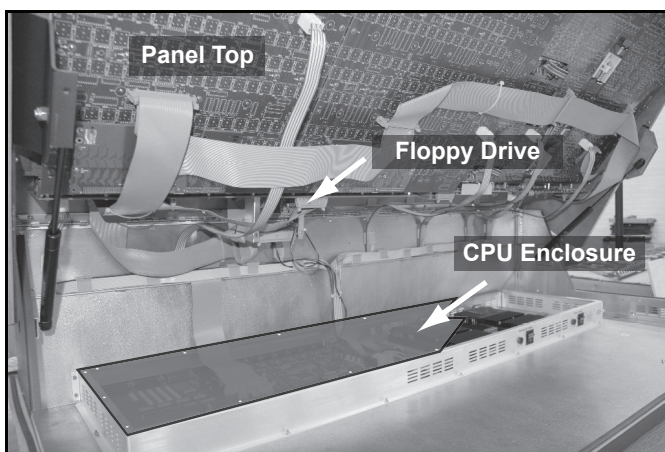
Replacing the EEPROM

The first step in the USB controller upgrade is to replace the EEPROM, a process that requires you to:

- Open the switcher panel
- Replace the EEPROM

Each step is outlined in the sections below.

Opening the Synergy 3 Switcher Panel

Use the following procedure to open your Synergy 3 switcher:

1. Create a backup of all your Synergy memory registers. Refer to the section "**Saving Registers**" of the *Synergy Series Operation Guide* for information on saving memory registers to disk.

2. Lift the switcher panel's top (grasp the front of the panel top and rotate it up and back), and lock it in the open position.

3. Turn off the switcher panel power supply (if your panel has dual power supplies, make sure that both are turned off).

4. Disconnect the power cable(s).

5. The circuit boards in the bottom of the switcher panel are housed in the **CPU Enclosure**. You must remove the top of this enclosure to access the circuit boards (see diagram below). Remove all the screws from the **CPU Enclosure** and then lift off the top.

Removing the CPU Enclosure

This completes the procedure for opening the Synergy 3 switcher. Next, you will replace the EEPROM in your Synergy 3 switcher.

Replacing the EEPROM

The EEPROM that needs to be replaced is located on the panel **CPU Board** (4000-033). This board is located on the switcher panel bottom.

Use the following procedure to replace the EEPROM in your Synergy 3 switcher:

1. Locate the EEPROM on **Panel CPU Board** (4000-033). It is located near the red reset button and is marked **U62**.
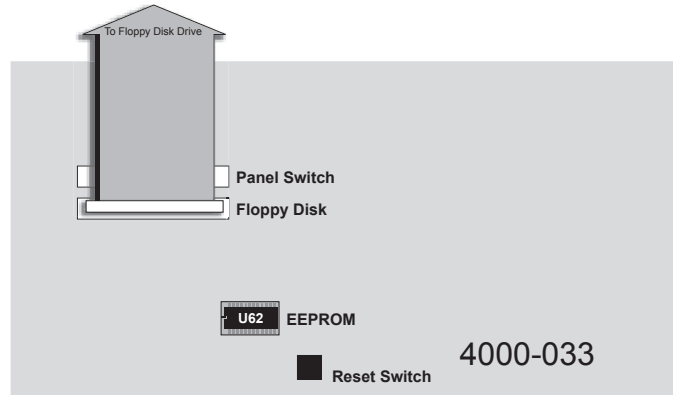
Locating the EEPROM

2. Using the DIP extraction tool, carefully remove the old EEPROM from its socket.

⚠️ **Caution** | Be careful not to damage any of the surrounding electronic components when you remove the EEPROM. **DO NOT USE ANY OF THE OTHER COMPONENTS FOR LEVERAGE**. If you are not comfortable removing the EEPROM, please contact **Ross Video Technical Support** for assistance.

3. Insert the new EEPROM into the EEPROM socket paying careful attention to polarity. The EEPROM has one end notched so that it will only fit in the socket in the correct orientation (refer to the diagram, "**Synergy 3 EEPROM**" on page 15–26).

⚠️ **Caution** | **DO NOT FORCE THE EEPROM INTO THE SOCKET.** If it does not fit easily into the socket, you may be attempting to install it in the wrong orientation. Match the notch cutout on the EEPROM with the notch of the socket. If you are still having trouble, place the EEPROM on its side on a hard, flat surface and gently push down, bending the pins slightly inward. Repeat this on both sides of the EEPROM and then attempt to reinsert it.
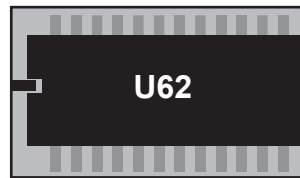
Synergy 3 EEPROM

This completes the procedure for replacing the EEPROM. Next, you will remove the floppy disk drive.

Removing the Floppy Disk Drive

The next step in the USB controller upgrade is to remove the floppy disk drive. Removing the floppy disk requires you to:

*   Remove the floppy disk drive cabling

*   Remove the control cable

- Remove the floppy disk drive

The steps are discussed in the following sections.

Removing the Floppy Disk Drive Cabling

The floppy disk drive is connected to the **Panel CPU Board** by two cables: a data cable and a power cable. Both cables must be removed.

Use the following procedure to remove the data and power cables:

1. Locate the floppy disk drive and the two cables (data and power).

Floppy Disk Drive and Cabling

2. Remove the data cable from the back of the drive by grasping the connector and pulling it straight out.

3. Remove the power cable from the back of the drive by grasping the connector and pulling it up slightly away from the disk drive base and then straight out.

✓ **Operating Tip**

> The data and power cables fit quite snugly into their sockets. You may have to wiggle the cable connectors from side to side to unseat them.

4. Locate the other end of the floppy disk drive data cable (it is plugged into the **Panel CPU Board** (4000-033)). The socket is labeled **Floppy Disk**.

⚹ **Important** | DO NOT UNPLUG THE DATA CABLE IN THE **Panel Switch** SOCKET.
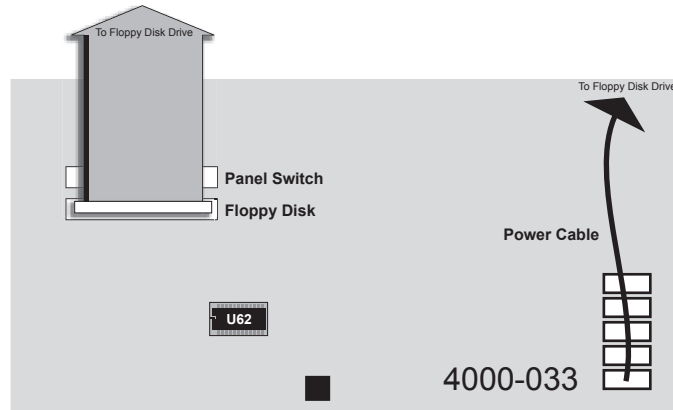
Data Cable Plugged into CPU Board

5. Remove the data cable from the **Panel CPU Board** (4000-033) by unlatching the data cable connector from the socket and pulling the connector. Also, cut any tie wraps that may be securing the data cable.

⚠ **Caution** | The latches that hold the data cable are fragile. Be careful when opening and closing them.

6. Locate the other end of the floppy disk drive power cable. It is plugged into the **Panel CPU Board** (4000-033) with all the other power cables (see above diagram).

7. Remove the power cable from the **Panel CPU Board** by pulling the power cable connector. Also, cut any tie wraps that may be securing the power cable.

✓ **Installation Tip** | If your Synergy switcher has a **USB Data Cable** pre-installed, proceed to the section "**Removing the Floppy Disk Drive**" on page 15–29.

This completes the procedure for removing the floppy disk cabling.

Removing the Control Cable

Use the following procedure to remove the control cable:

1. Locate the end of the **Controller Cable** that is plugged into Board **4735-036B**. It is plugged into the socket labeled **J3** (see diagram below).
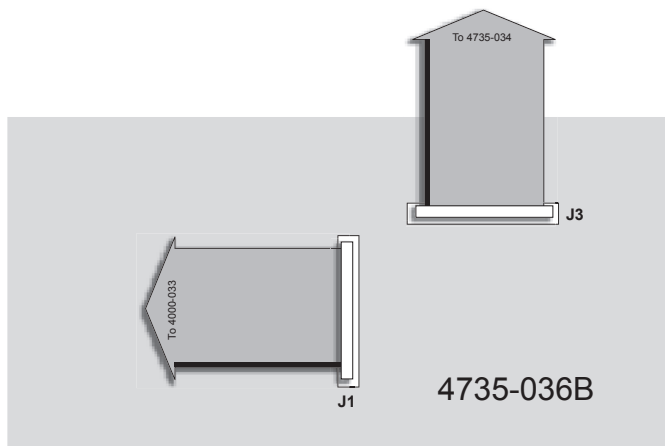
Removing the Controller Cable

2. Remove the **Controller Cable** by unlatching the **Data Cable** connector from the socket and pulling the connector. Follow this cable and remove it from the five other sockets it is plugged into. Also, cut any tie wraps that may be securing the cable.
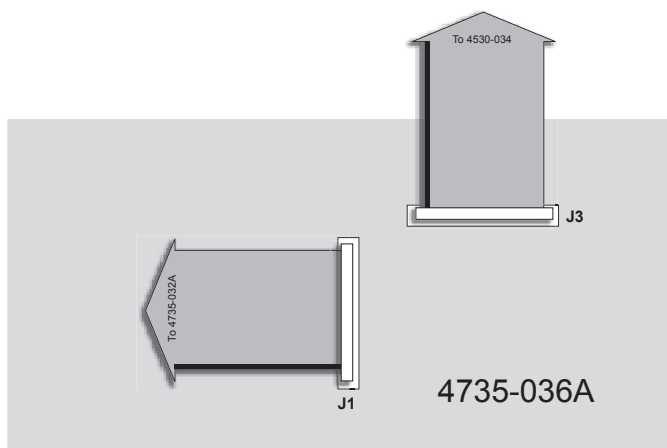
✓ **Installation Tip**

> The data, power, and control cables fit quite snugly into their sockets. You may have to wiggle the cable connectors from side to side to unseat them.

This completes the procedure for removing the control cable.

Removing the Floppy Disk Drive

Now that the floppy disk drive cabling has been removed, you can remove the floppy disk drive from its bracket.

Use the following procedure to remove the floppy disk drive:

1. Use the hollow-shaft nut driver to remove the four hex nuts on the front of the floppy disk drive bracket (the back of the faceplate). Ensure that you hold the bracket as you remove the hex nuts to prevent it from falling and damaging any switcher components.

Removing the Bracket Hex Nuts

2. Slide the bracket down and out to gain access to the four screws holding the floppy disk drive to the bracket.

3. Remove the four screws. Ensure that you are holding onto the floppy disk drive when you remove the final screw so that it does not fall out of the bracket.
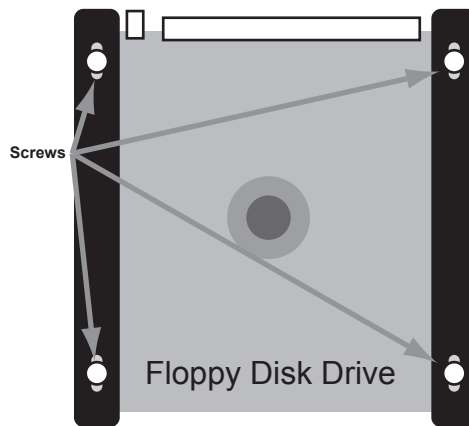
Screws Holding Floppy Disk Drive to Bracket

4. Slide the floppy disk drive out of the bracket to remove it from the switcher.

This completes the procedure for removing the floppy disk drive. Next you will install the **USB Controller**.

Installing the USB Controller

Installing the **USB Controller** requires the following steps:

• Install the USB Controller

• Install the USB Data and Power Cables

• Close the switcher panel

Each step is discussed in the following sections.

Installing the USB Controller

The **USB Controller** attaches to the bracket that was used to hold the floppy disk drive.

Use the following procedure to install the **USB Controller**:

1. Slide the **USB Controller** into the bracket so that the screw-holes in the controller card match the screw holes in the bracket.

✓ **Installation Tip**

> The screw holes in the bracket are elongated to allow some play in the controller card installation. Slide the controller card as far as necessary to ensure that its faceplate sits flush with the switcher panel while still maintaining alignment between the screw holes on the controller card and the screw holes on the bracket.

2. Secure the controller card to the bracket with the four provided screws but do not fully tighten the screws.

Installed USB Controller

3. Slide the bracket back into the switcher panel so that the **USB Controller** faceplate sits flush with the front of the switcher panel.

4. Tighten screws, ensuring that the **USB Controller** face plate remains flush with the front of the switcher panel.

5. Replace the hex nuts on the front of the bracket (the back of the faceplate) and use the hollow-shaft nut driver to tighten them as shown in the diagram below.

Installed USB Controller

If you are still having trouble getting the **USB Controller** faceplate flush with the switcher panel, do the following:

- Loosen the four hex nuts on the front of the **USB Controller** bracket.
- Slide the controller until the faceplate is flush with the switcher panel.
- If necessary, loosen the screws holding the **USB Controller** to the bracket and adjust the controller position.
- Tighten the bracket screws.
- Tighten the hex nuts with the nut driver.

This completes the procedure for installing the **USB Controller**. Next you will install the **USB Controller** cabling.

Installing the USB Controller Cabling

The USB controller is connected to the switcher by two cables: a data cable and a power cable.

✓	**Installation Tip**	If your Synergy switcher has a **USB Data Cable** pre-installed, proceed to the section "**USB Controller Power Cable**" on page 15–37.

Overview

The following diagram is an overview of the **USB Controller** cabling installation. The circled letters in the diagram correspond to the major steps in the installation process. The letters will aid you in referring to the overview diagram during the installation process.

✎	**Note**	Some board numbers will be labeled differently depending on your switcher version. Where there are different possible board numbers, they will be listed in parentheses. For example, Board **4530-131 (031)** refers to either Board **4530-131** or Board **4530-031**. **YOUR SWITCHER WILL ONLY HAVE ONE OF THE TWO BOARDS.** Some boards may also have a letter after the first four digits of their label such as **4530A-035**. These boards are referred to throughout this document without the letter (i.e. **4530-035**).

Panel Top

D

C

B

4530-131 (031)

4530-034

J1

J1

J1

4530-035

A

4530-130 (030)

J1

USB Controller

E

F

J1

4530-202

4735-036B

To 4735-036B

J1

To 4000-033
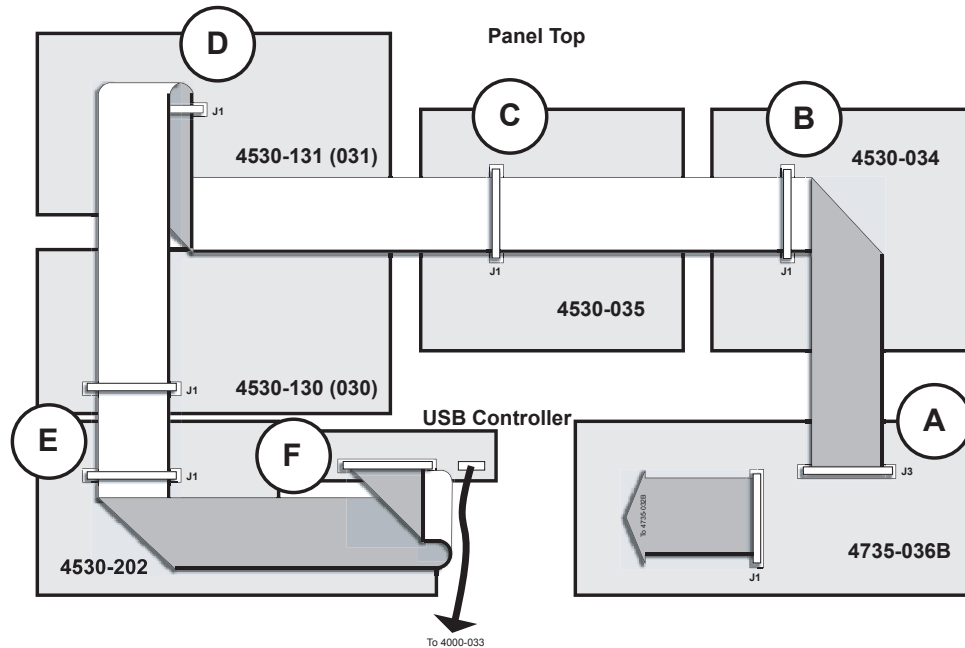
Synergy 3 USB Installation Overview

USB Data Cable Overview

The **USB Data Cable** plugs into the panel boards in six places and the **USB Controller** once. The data cable has seven connectors spaced along its length and will only reach all the necessary sockets if it is installed correctly. One end of the cable is marked to indicate it is to be installed into the **USB Controller**. Ensure that you start with the **other end** of the data cable.

Notice the red line running the length of the data cable along one edge. This line denotes pin 1 of the cable and is used to verify cable polarity during installation. Keep this in mind when installing the **USB Data Cable**.

Installing the USB Data Cable

Use the following procedure to install the **USB Data Cable**:

A

1. Determine which end of the **USB Data Cable** plugs into Board **4735-036B**. Plug this end into the socket labeled **J3** and secure the latches around the cable connector.

⚠	**Caution**	**DO NOT FORCE THE DATA CABLE INTO THE SOCKET.** If it does not fit easily into the socket, you may be attempting to install it in the wrong orientation. Match the notch in the center of the cable connector with the notch cutout in the **Panel Switch** socket.
⚠	**Caution**	The latches that hold the data cable are fragile. Be careful when opening and closing them.

Data Cable Plugged into Board 4735-036B

2. Run the cable to the socket labeled **J1** on Board **4530-034**, making a fold with a twist to change the cable's direction by 90 degrees as shown in the diagram below. Plug the next connector into it, securing the latches around the connector.
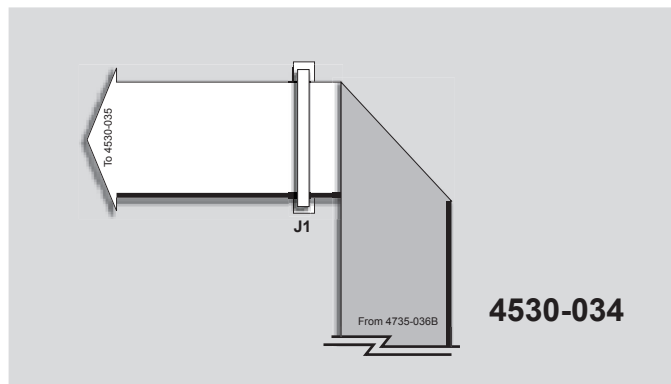
Running the Data Cable to Board 4530-034

3. Run the cable to the socket labeled **J1** on Board **4530-035** and plug the next connector into it, securing the latches around the connector as shown in the diagram below.
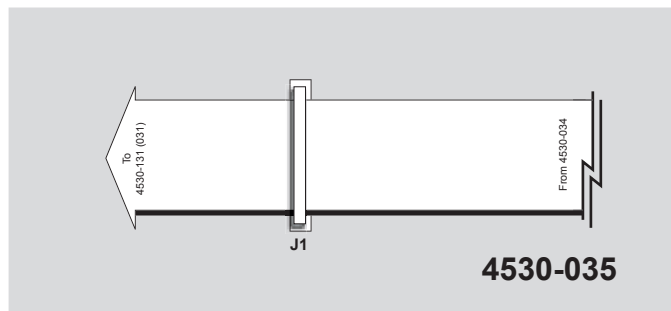
Running the Data Cable to Board 4530-035

(D) 4. Run the cable toward Board **4530-131 (031)**. Make a fold with a twist to change the cable's direction by 90 degrees as shown in the diagram below and run the cable up to socket **J1**. Plug the next connector into it, securing the latches around the connector.

To
4530-130 (030)

J1

From 4530-035

4530-131 (031)

Running the Data Cable to Board 4530-131 (031)

(D) 5. Immediately fold the **Data Cable** back over itself and socket **J1**. Run the cable down toward Board **4530-130 (030)** as shown in the diagram below.

J1

From 4530-035

4530-131 (031)

To
4530-130 (030)
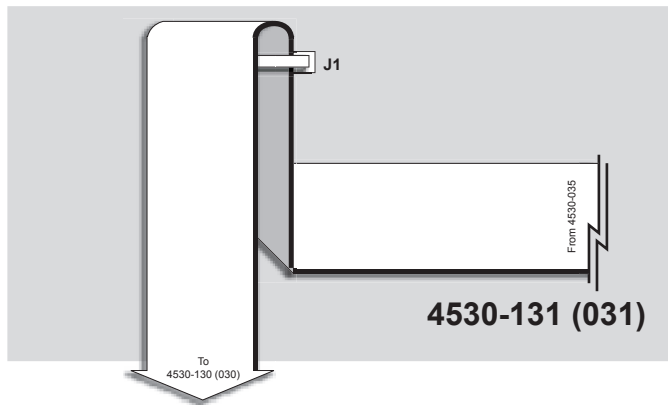
Folding the Data Cable Over Itself

(E) 6. Run the cable to the socket labeled **J1** on Board **4530-130 (030)** and plug the next connector into it, securing the latches around the connector as shown in the diagram below.

From
4530-131 (031)

J1

4530-130 (030)
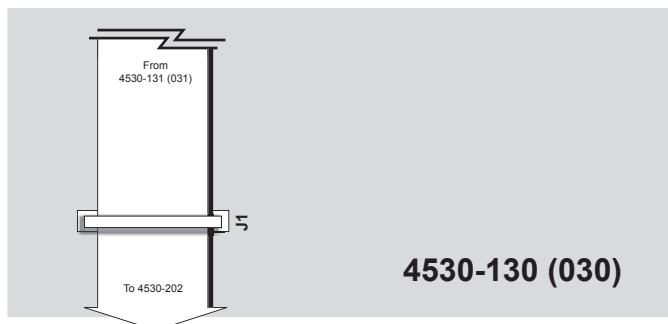
To 4530-202

Running the Data Cable to Board 4530-130 (030)

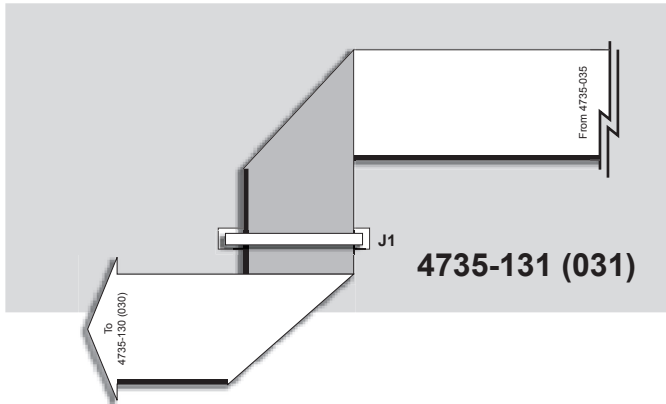7. Run the cable to the socket labeled **J1** on Board **4530-202** and plug the next connector into it, securing the latches around the connector. Then, make a fold with a twist to change the cable's direction by 90 degrees as shown in the diagram below.

Running the Data Cable to Board 4530-202

8. You must now connect the **Data Cable** to the **USB Controller**. However, the socket on the **USB Controller** is reversed from socket **J1** on Board **4530-202**, so the cable needs to be flipped before plugging into the **USB Controller**.

   • Run the cable just past the **USB Controller** and then fold it back upon itself.

   • Then, make a fold with a twist to change the cable's direction by 90 degrees and run it to the **USB Controller** (see diagram below). Notice how the red stripe is now on the other side of the cable indicating reversed polarity. Plug the final connector into the **USB Controller** and secure the latches around it.
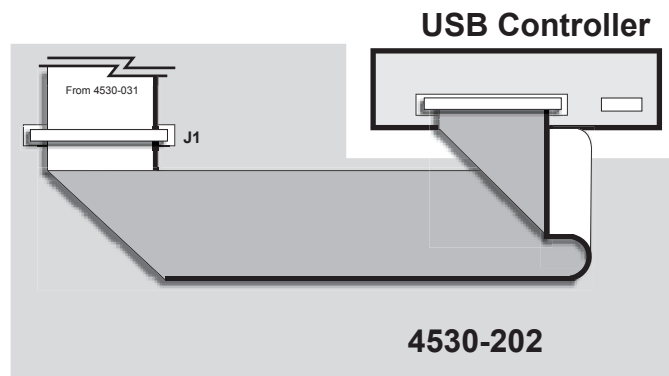
Running the Data Cable to the USB Controller

This completes the procedure for installing the **USB Data Cable**. Next, you will install the **USB Power Cable**.

USB Controller Power Cable

⚠ **Important** | If you skipped the last section because your switcher had a **USB Data Cable** pre-installed, you must still plug the data cable into the **USB Controller**. Locate the unsecured connector on the end of the data cable and plug it into the **USB Controller**. Secure the latches around the connector.

The **USB Controller Power Cable** has one connector which is smaller than the other. The smaller connector plugs into the **USB Controller** while the larger connector plugs into the **Panel CPU Board**.

Use the following procedure to install the **USB Power Cable**:

1. Plug the small connector of the **USB Power Cable** into the **USB Controller**.

Plugging the USB Power Cord into the USB Controller

2. Plug the other end of the **USB Power Cable** into the **Panel CPU Board** (**4000-033**). It plugs into the same socket that the floppy disk drive power cable was plugged into (see diagram below).
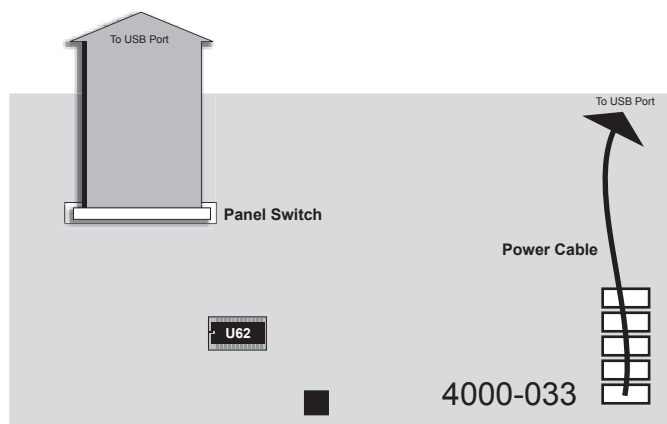
Plugging the USB Power Cord into the CPU Panel

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3. Secure the data and power cables with tie wraps as appropriate to keep them from interfering with any other cables or components.

This completes the procedure for installing the **USB Power Cable**. Next you will close the Synergy 3 switcher panel.

Closing the Synergy 3 Switcher Panel

Use the following procedure to close the Synergy 3 switcher panel:

1. Replace the **CPU Enclosure** lid and secure it with screws.

2. Attach the power cord(s).

3. Turn the switcher panel supply on (if your switcher has dual power supplies, turn them both on).

4. Lower the switcher panel top.

Important	Be careful not to pinch any cables as you are lowering the panel top. If any cables interfere with the lowering of the panel top, secure them safely out of the way with tie wraps.

5. Follow any on-screen instructions.

This completes the procedure to close the Synergy 3 switcher panel.

Transferring Files to a USB Key

If you wish to recall any memory registers that you previously saved to floppy disk, you need to transfer them to a USB key using a computer with both a floppy disk drive and a free USB port.

Use the following procedure to transfer files to a USB key:

1. With your computer running, insert a USB key into an available USB port. It should appear on your desktop as a removable storage device.

Note	USB keys are accessed in various ways depending on the operating system of your computer. Consult your operating system documentation or I.T. department if you are unsure how to access a USB key.

2. Insert the floppy disk containing the Synergy files you wish to copy into the floppy disk drive of the computer.

3. Copy the files from the floppy disk to the root directory of the USB key.

Note	If you are unsure how to copy files, consult your operating system documentation or I.T. department.

4. Ensure that the light on the floppy disk drive is not on.

5. Eject the floppy disk.

6. Safely remove the USB key from the USB port.

Important   Failure to safely remove the USB key may result in data-corruption or data-loss. Consult your operating system documentation or I.T. department for instructions on safely removing a USB key.

This completes the procedure for copying Synergy files from a floppy disk to a USB key. You can now use the USB key in your Synergy switcher. Refer to the section "**Working with Storage Devices**" of the *Synergy Series Operation Guide* for information on using a USB key with the switcher.

This completes the procedure for replacing the Synergy 3 floppy disk drive with a **USB Controller**.

Synergy 4 USB Controller Installation

This installation procedure allows you to replace the floppy disk drive in your Synergy 4 switcher with a **USB Controller**. This procedure is required should you wish to make use of the **USB Controller** functionality, which is available with version 16 and higher of the Synergy 4 SD software

There are three main steps:

- Replace the EEPROM
- Remove the floppy disk drive
- Install the USB controller

	Important	USB support requires **Synergy Software version 16** or later and a **version 10** or later **Panel CPU board**. If your switcher does not meet **both** of these requirements, contact Ross Video Technical Support for information on a switcher software and panel upgrade.

Once you begin the upgrade process, ensure that you fully complete each of the steps before returning your switcher to service. You may also find it useful to have the *Synergy Series Installation* and *Synergy Series Operation Guides* with you while performing the upgrade.

	Caution	Static discharge can cause serious damage to sensitive semiconductor devices. Avoid handling the switcher circuit boards in high static environments such as carpeted areas and when synthetic fiber clothing is worn. Touch the frame to dissipate static charge before removing boards from the frame and exercise proper grounding precautions when working on circuit boards.

	Installation Tip	Your Synergy switcher may have shipped with a **USB Data Cable** pre-installed. If so, you can skip certain steps of the upgrade procedure. Look for tips like this one that describe which steps may be skipped.

Required Materials and Tools

This section lists the materials and tools you require to complete the USB installation. Contact Ross Video Technical Support if you are missing any materials.

You will need the following materials to complete the USB installation:

- one USB Controller Kit (4000K-441A)
- one 50-pin USB Data Cable (4317C-300A-01)
- one Boot EEPROM (4000E-03301 revision 6 or later)
- one USB key

You will also need the following tools:

- one medium Phillips screwdriver
- DIP Extraction Tool
- 5/16" Hollow Shaft Nut Driver

Replacing the EEPROM

The first step in the USB controller upgrade is to replace the EEPROM, a process that requires you to:

- Open the switcher panel
- Replace the EEPROM

Opening the Synergy 4 Switcher Panel

Use the following procedure to open your Synergy 4 switcher:

1. Create a backup of all your Synergy memory registers. Refer to the section "**Saving Registers**" of the *Synergy Operation Guide* for information on saving memory registers to a floppy disk.

2. Lift the switcher panel's top (grasp the front of the panel top and rotate it up and back), and lock it in the open position.

3. Turn off the switcher panel power supply (if your panel has dual power supplies, make sure that both are turned off). Disconnect the power cable(s).

4. The circuit boards in the bottom of the switcher panel are housed in the **CPU Enclosure**. You must remove the top of this enclosure to access the circuit boards (see diagram below). Remove all the screws from the **CPU Enclosure** and then lift off the top.

Removing the CPU Enclosure

This completes the procedure for opening the Synergy 4 switcher. Next you will replace the EEPROM in your Synergy 4 switcher.

Replacing the EEPROM

The EEPROM that needs to be replaced is located on the **Panel CPU Board** (4000-033). This board is located on the switcher panel bottom.

Use the following procedure to replace the EEPROM in your Synergy 4 switcher:

1. Locate the EEPROM on the **Panel CPU Board** (4000-033). It is located near the red reset button and is marked **U62**.

Locating the EEPROM

2. Using the DIP extraction tool, carefully remove the old EEPROM from its socket.

⚠ **Caution** Be careful not to damage any of the surrounding electronic components when you remove the EEPROM. **DO NOT USE ANY OF THE OTHER COMPONENTS FOR LEVERAGE**. If you are not comfortable removing the EEPROM, please contact **Ross Video Technical Support** for assistance.

3. Insert the new EEPROM into the EEPROM socket paying careful attention to polarity. The EEPROM has one end notched so that it will only fit in the socket in the correct orientation (refer to the diagram, "**Synergy 4 EEPROM**" on page 15–42).

⚠ **Caution** **DO NOT FORCE THE EEPROM INTO THE SOCKET.** If it does not fit easily into the socket, you may be attempting to install it in the wrong orientation. Match the notch cutout on the EEPROM with the notch of the socket. If you are still having trouble, place the EEPROM on its side on a hard, flat surface and gently push down, bending the pins slightly inward. Repeat this on both sides of the EEPROM and then attempt to reinsert it.
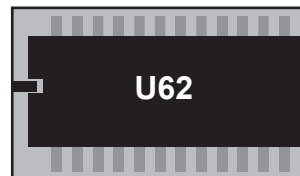
Synergy 4 EEPROM

This completes the procedure for replacing the EEPROM. Next you will remove the floppy disk drive.

Removing the Floppy Disk Drive

The next step in the USB controller upgrade is to remove the floppy disk drive. Removing the floppy disk requires you to:

- Remove the floppy disk drive cabling
- Remove the control cable

- Remove the floppy disk drive

Removing the Floppy Disk Drive Cabling

The floppy disk drive is connected to the panel CPU board by two cables: a data cable and a power cable. Both cables must be removed.

Use the following procedure to remove the data and power cables:

1. Locate the floppy disk drive and the two cables (data and power).

Floppy Disk Drive and Cabling

2. Remove the data cable from the back of the drive by grasping the connector and pulling it straight out.

3. Remove the power cable from the back of the drive by grasping the connector and pulling it up slightly away from the disk drive base and then straight out.

✓ | **Operating Tip** | The data and power cables fit quite snugly into their sockets. You may have to wiggle the cable connectors from side to side to unseat them.

4. Locate the other end of the floppy disk drive data cable (it is plugged into the **Panel CPU Board** (4000-033)). The socket is labeled **Floppy Disk**.

 Installation Tip — DO NOT UNPLUG THE DATA CABLE IN THE **Panel Switch** SOCKET.
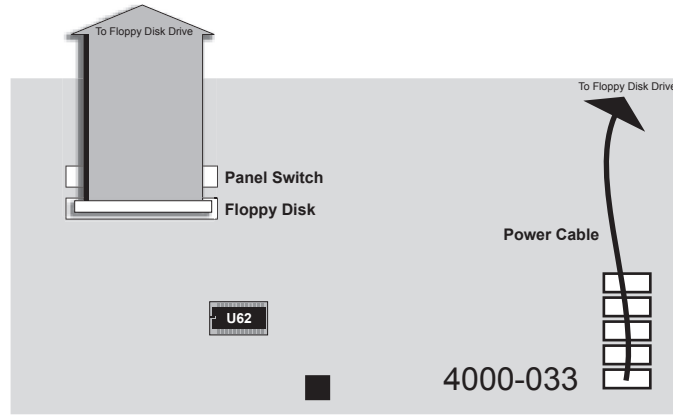
Data Cable Plugged into CPU Board

5. Remove the data cable from the **Panel CPU Board** (4000-033) by unlatching the data cable connector from the socket and pulling the connector. Also, cut any tie wraps that may be securing the data cable.

 Caution — The latches that hold the data cable are fragile. Be careful when opening and closing them.

6. Locate the other end of the floppy disk drive power cable. It is plugged into the **Panel CPU Board** (4000-033) with all the other power cables (refer to the diagram above).

7. Remove the power cable from the CPU Board by pulling the power cable connector. Also, cut any tie wraps that may be securing the power cable.

 Installation Tip — If your Synergy switcher has a USB data cable pre-installed, skip ahead to the section "**Removing the Floppy Disk Drive**" on page 15–45

This completes the procedure for removing the floppy disk cabling.

Removing the Control Cable

Use the following procedure to remove the control cable:

1. Locate the end of the controller cable that is plugged into board **4735-036A**. It is plugged into the socket labeled **J3** (see diagram below).

To 4530-034

J3

To 4735-032A

J1

4735-036A

Removing the Controller Cable

2. Remove the controller cable by unlatching the data cable connector from the socket and pulling the connector.

3. Follow this cable and remove it from the five other sockets it is plugged into. Also, cut any tie wraps that may be securing the cable.

✓ **Installation Tip**

The data, power, and control cables fit quite snugly into their sockets. You may have to wiggle the cable connectors from side to side to unseat them.

This completes the procedure for removing the control cable. Next you will remove the floppy disk drive from its bracket.

Removing the Floppy Disk Drive

Now that the floppy disk drive cabling has been removed, you can remove the floppy disk drive from its bracket.

Use the following procedure to remove the floppy disk drive:

1. Use the hollow-shaft nut driver to remove the two hex nuts on the front of the floppy disk drive bracket (the back of the faceplate).
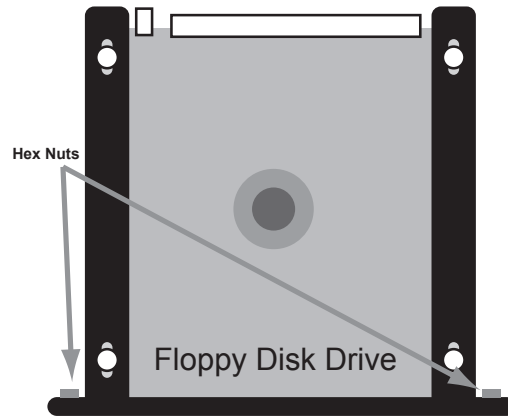
Loosening the Bracket Hex Nuts

2. Slide the bracket back and out to gain access to the four screws holding the floppy disk drive to the bracket.

3. Remove the four screws. Ensure that you are holding onto the floppy disk drive when you remove the final screw so that it does not fall out of the bracket and damage any of the switcher components.

Screws Holding Floppy Disk Drive to Bracket

4. Slide the floppy disk drive out of the bracket to remove it from the switcher.

This completes the procedure for removing the floppy disk drive. Continue on to the next section to install the **USB Controller**.

Installing the USB Controller

Installing the **USB Controller** requires the following steps:

- • Install the USB controller
- • Install the USB data and power cables
- • Close the switcher panel

Each step is discussed in the sections below.

Installing the USB Controller

The **USB Controller** attaches to the bracket that was used to hold the floppy disk drive.

Use the following procedure to install the **USB Controller**:

1. Slide the **USB Controller** into the bracket so that the screw-holes in the controller card match the screw holes in the bracket.

✓ **Installation Tip**

> The screw holes in the bracket are elongated to allow some play in the controller card installation. Slide the controller card as far as necessary to ensure that its faceplate sits flush with the switcher panel while still maintaining alignment between the screw holes on the controller card and the screw holes on the bracket.

2. Secure the controller card to the bracket with the four provided screws but do not fully tighten the screws.

Installed USB Controller

3. Slide the bracket back into the switcher panel so that the **USB Controller** faceplate sits flush with the front of the switcher panel.

4. Tighten screws, ensuring that the **USB Controller** face plate remains flush with the front of the switcher panel.

5. Replace the hex nuts on the front of the bracket (the back of the faceplate) and use the hollow-shaft nut driver to tighten them as shown in the diagram, "**Installed USB Controller**" on page 15–48.

Installed USB Controller

If you are still having trouble getting the **USB Controller** faceplate flush with the switcher panel, do the following:

*   Loosen the four hex nuts on the front of the **USB Controller** bracket.

*   Slide the controller until the faceplate is flush with the switcher panel.

*   If necessary, loosen the screws holding the **USB Controller** to the bracket and adjust the controller position.

*   Tighten the bracket screws.

*   Tighten the hex nuts with the nut driver.

This completes the procedure for installing the **USB Controller**.

Installing the USB Controller Cabling

The USB controller is connected to the switcher by two cables: a data cable and a power cable.

✓ | **Installation Tip** | If your Synergy switcher has a USB data cable pre-installed, skip to the section "**USB Controller Power Cable**" on page 15–53.

Overview

The following diagram is an overview of the **USB Controller** cabling installation. The circled letters in the diagram correspond to the major steps in the installation process. The letters will aid you in referring to the overview diagram during the installation process.

✎ | **Note** | Some board numbers will be labeled differently depending on your switcher version. Where there are different possible board numbers, they will be listed in parentheses. For example, board **4735-131 (031)** refers to either board **4735-131** or board **4735-031**.

YOUR SWITCHER WILL ONLY HAVE ONE OF THE TWO BOARDS.

Some boards may also have a letter after the first four digits of their label such as **4735A-034**. These boards are referred to throughout this document without the letter (i.e. **4735-034**).
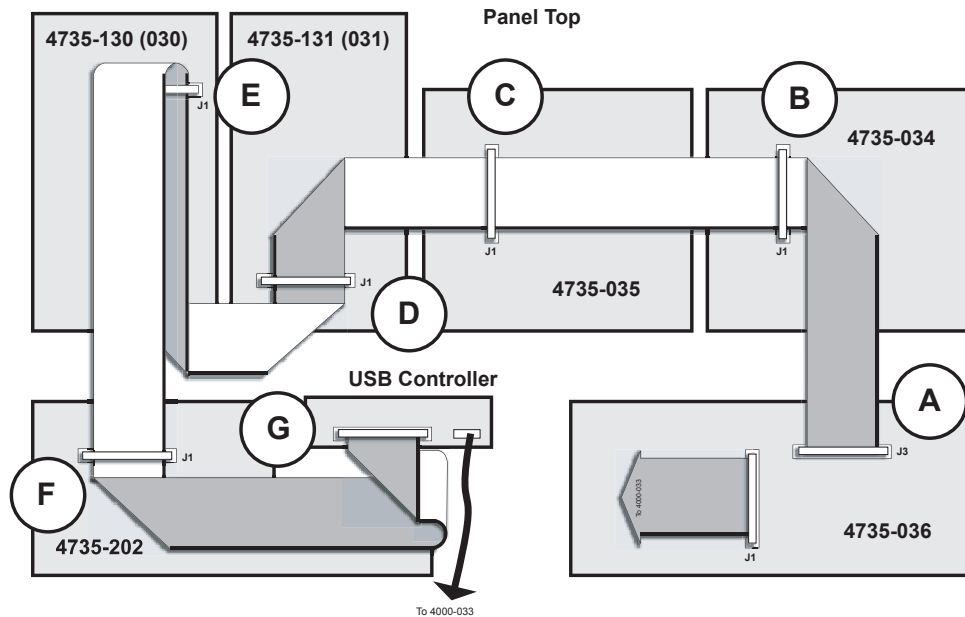
Synergy 4 USB Installation Overview

USB Data Cable Overview

The **USB Data Cable** plugs into the panel boards in six places and the **USB Controller** once. The data cable has seven connectors spaced along its length and will only reach all the necessary sockets if it is installed correctly. One end of the cable is marked to indicate it is to be installed into the **USB Controller**. Ensure that you start with the **other end** of the data cable.

Notice the red line running the length of the data cable along one edge. This line denotes pin 1 of the cable and is used to verify cable polarity during installation. Keep this in mind when installing the **USB Data Cable**.

Use the following procedure to install the **USB Data Cable**:

(A)

1. Determine which end of the **USB Data Cable** plugs into Board **4735-036A**. Plug this end into the socket labeled **J3** and secure the latches around the cable connector.

⚠	**Caution**	**DO NOT FORCE THE DATA CABLE INTO THE SOCKET.** If it does not fit easily into the socket, you may be attempting to install it in the wrong orientation. Match the notch in the center of the cable connector with the notch cutout in the **Panel Switch** socket.

⚠	**Caution**	The latches that hold the data cable are fragile. Be careful when opening and closing them.

Data Cable Plugged into Board 4735-036A

2. Run the cable to the socket labeled **J1** on Board **4735-034**, making a fold with a twist to change the cable's direction by 90 degrees as shown in the diagram below. Plug the next connector into it, securing the latches around the connector.

B
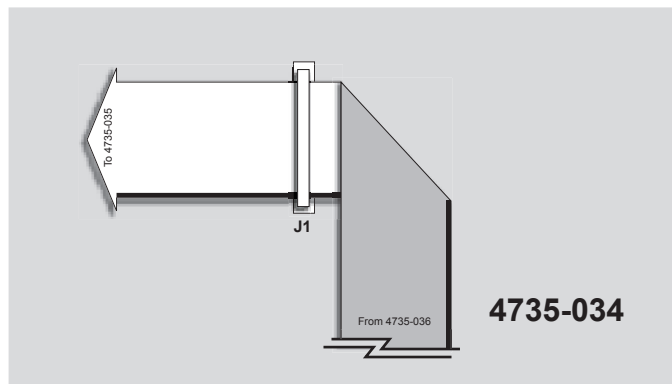
Running the Data Cable to Board 4735-034

3. Run the cable to the socket labeled **J1** on Board **4735-035** and plug the next connector into it, securing the latches around the connector as shown in the diagram below.

C
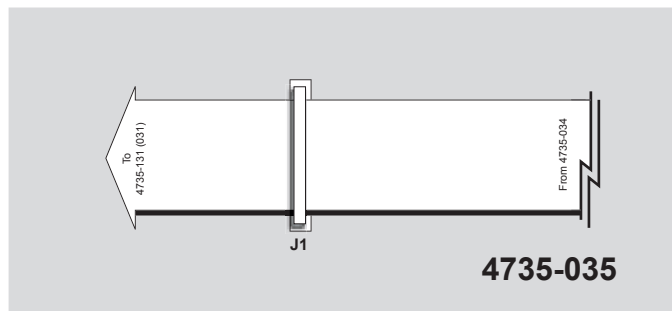
Running the Data Cable to Board 4735-035

D

4. Run the cable toward Board **4735-130 (030)**. Make a fold with a twist to change the cable's direction by 90 degrees as shown in the diagram below.

5. Plug the next connector into the socket labeled **J1** and secure the latches around it.

6. Make another fold with a twist to change the cable direction by 90 degrees and run the cable toward Board **4735-131 (031)**.

Running the Cable to Board 4735-130 (030)

E

7. Run the cable toward Board **4735-131 (031)**. Make a fold with a twist to change the cable's direction by 90 degrees as shown in the diagram below and run the cable up to socket **J1**.

8. Plug the next connector into it, securing the latches around the connector.
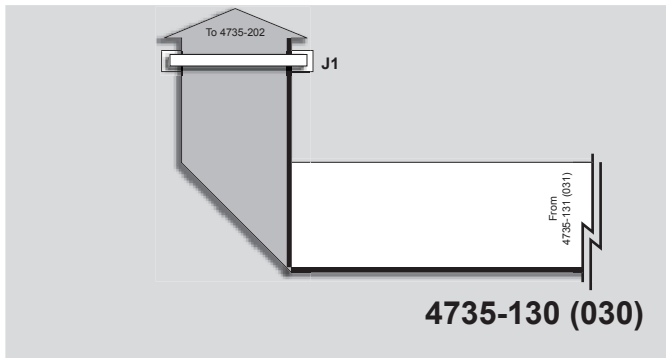
Running the Data Cable to Board 4735-131 (031)

E

9. Immediately fold the data cable back over itself and socket **J1**. Run the cable down toward Board **4735-202**.

J1

From 4735-131 (031)

4735-130 (030)
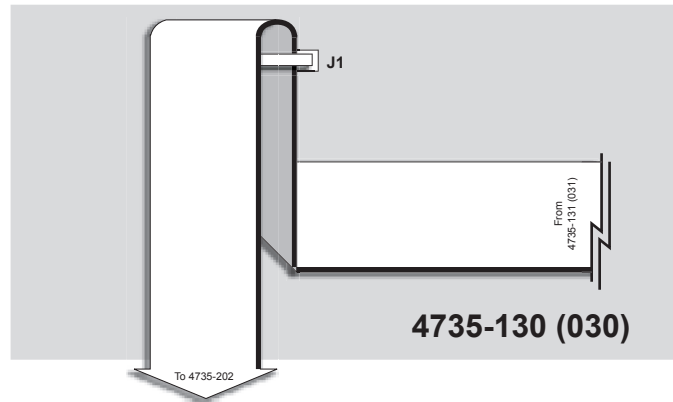
To 4735-202

Folding the Data Cable Over Itself

F

10. Run the cable to the socket labeled **J1** on Board **4735-202** and plug the next connector into it, securing the latches around the connector.

11. Make a fold with a twist to change the cable's direction by 90 degrees as shown in the diagram below.

From 4735-130 (030)

J1

To USB Port
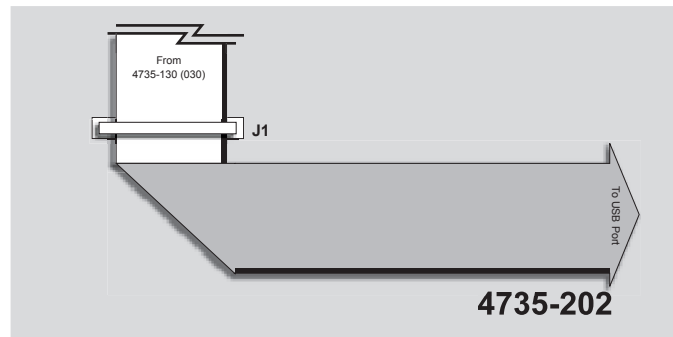
4735-202

Running the Data Cable to Board 4735-202

G

12. You must now connect the data cable to the **USB Controller**. However, the socket on the **USB Controller** is reversed from socket **J1** on board **4735-202**, so the cable needs to be flipped before plugging into the **USB Controller**.

• Run the cable just past the **USB Controller** and then fold it back upon itself.

• Then, make a fold with a twist to change the cable's direction by 90 degrees and run it to the **USB Controller** (refer to the diagram, "**Running the Data Cable to the USB Controller**" on page 15–53). Notice how the red stripe is now on the other side of the cable indicating reversed polarity.

• Plug the final connector into the **USB Controller** and secure the latches around it.

Running the Data Cable to the USB Controller

This completes the procedure for installing the **USB Data Cable**.

USB Controller Power Cable

⚠	**Important**	If you skipped the last section because your switcher had a **USB Data Cable** pre-installed, you must still plug the data cable into the **USB Controller**. Locate the unsecured connector on the end of the data cable and plug it into the **USB Controller**. Secure the latches around the connector.

The **USB Controller Power Cable** has one connector which is smaller than the other. The smaller connector plugs into the **USB Controller** while the larger connector plugs into the CPU Board.

Use the following procedure to install the **USB Controller Power Cable**:

1. Plug the small connector of the **USB Controller Power Cable** into the **USB Controller**.
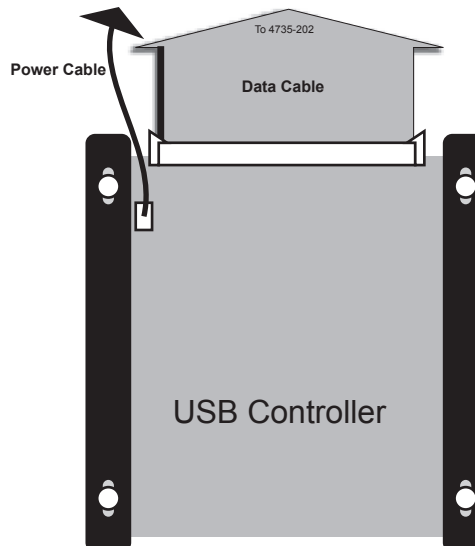
Plugging the USB Power Cord into the USB Controller

2. Plug the other end of the **USB Power Cable** into the **Panel CPU Board** (4000-033). It plugs into the same socket that the floppy disk drive power cable was plugged into.

To USB Port

To USB Port

Panel Switch

Power Cable

U62

4000-033
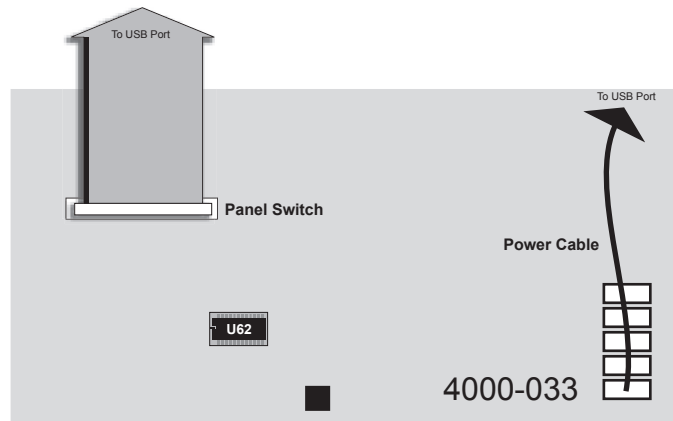
Plugging the USB Power Cord into the CPU Panel

3. Secure the data and power cables with tie wraps as appropriate to keep them from interfering with any other cables or components.

This completes the procedure for installing the **USB Controller Power Cable**.

Closing the Synergy 4 Switcher Panel

Use the following procedure to close the Synergy 4 switcher panel.

1. Replace the **CPU Enclosure** lid and secure it with screws.

2. Attach the power cord(s).

3. Turn the switcher panel supply on (if your switcher has dual power supplies, turn them both on).

4. Lower the switcher panel top.

⚠	**Important**	Be careful not to pinch any cables as you are lowering the panel top. If any cables interfere with the lowering of the panel top, secure them safely out of the way with tie wraps.

5. Follow any on-screen instructions.

This completes the procedure for closing the switcher panel.

Transferring Files to a USB Key

If you wish to recall any memory registers that you previously saved to floppy disk, you need to transfer them to a USB key using a computer with both a floppy disk drive and a free USB port.

Use the following procedure to transfer files to a USB key:

1. With your computer running, insert a USB key into an available USB port. It should appear on your desktop as a removable storage device.

Note USB keys are accessed in various ways depending on the operating system of your computer. Consult your operating system documentation or IT department if you are unsure how to access a USB key.

2. Insert the floppy disk containing the Synergy files you wish to copy into the floppy disk drive of the computer.

3. Copy the files from the floppy disk to the root directory of the USB key.

Note If you are unsure how to copy files between the two drives, consult your operating system documentation or IT department.

4. Ensure that the light on the floppy disk drive is not on, then eject the floppy disk.

5. Safely remove the USB key from the USB port.

Important Failure to safely remove the USB key may result in data-corruption or data-loss. Consult your operating system documentation or I.T. department for instructions on safely removing a USB key.

This completes the procedure for copying Synergy files from a floppy disk to a USB key. You can now use the USB key in your Synergy switcher. Refer to the section "**Working with Storage Devices**" of the *Synergy Series Operation Guide* for information on using a USB key with the Synergy switcher.

This completes the procedure for replacing the Synergy 4 floppy disk drive with a **USB Controller**.

Miscellaneous Options

In This Chapter

This chapter provides instructions and information for several miscellaneous options for the Synergy switcher.

The following topics are discussed:

- Extender Board Option
- Installing a Chassis Board on the Extender Board
- Important Extender Board Usage Notes
- Removing a Chassis Board from the Extender Board
- Remote Port Expander Cabling (BSS4)

Extender Board Option

The **Extender Board** is a printed circuit board with contacts on the front and back ends, but no components. When installed into any board slot in the frame, it provides convenient access to any of the video processing boards of the Synergy switcher — which can then be powered up and serviced while outside of the frame. All of the video processing boards in the Synergy switcher are mounted horizontally, not vertically, making them convenient to work on.

The figure below illustrates the **Extender Board**.
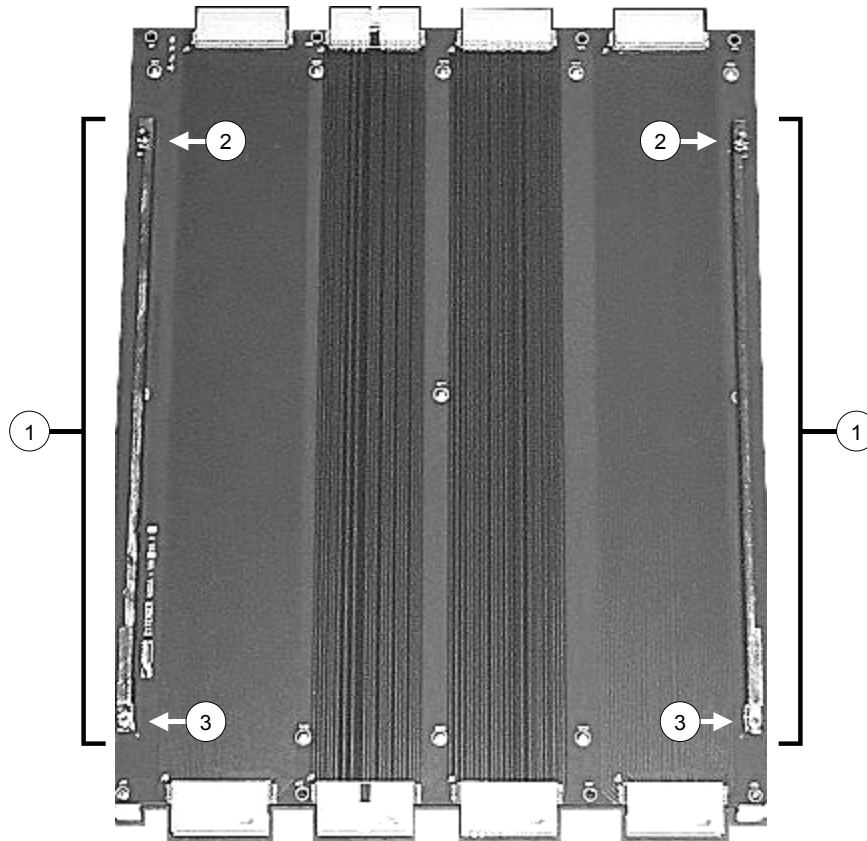
Extender Board

1) Support Arm Assembly	2) Lock-down Screw	3) Hinge

Each component is discussed in the following section.

1. Support Arm Assembly

The **Extender Board** is designed with two support arms that swing out and lock into place on the desired frame board. When not in use (and stored in the top frame slot), the support arms lock into place with screws on the board itself.

2. Lock-down Screw

Each support arm includes a captive screw that connects to a standoff on each full-length chassis board. When not in use, the lock-down screw connects to a standoff on the **Extender Board** itself (for storage).

3. Hinge

Each support arm includes a hinge that allows the arm to swing out, in order to support the desired full-length frame board.

When not in use, the **Extender Board** installs in the top slot of the Synergy frame. Note that when you align and insert the board in the top slot, it does not mate with any connectors — thus there will be no resistance at the end-stops. Secure the **Extender Board** in the top slot with the two side tabs, just like any other full-length board.

Installing a Chassis Board on the Extender Board

Use the following procedure to install a **Chassis Board** on the **Extender Board**:

	Caution	Static discharge can cause serious damage to sensitive semiconductor devices. Avoid handling the switcher circuit boards in high static environments such as carpeted areas and when synthetic fiber clothing is worn. Touch the frame to dissipate static charge before removing boards from the frame and exercise proper grounding precautions when working on circuit boards.

1. Power off the Synergy frame.

2. Remove the **Extender Board** from the top frame slot.

3. Remove the frame board that you wish to place on the **Extender Board**. For example, the **MLE Carrier Board**, or the **Frame CPU Board**.

4. Loosen the two captive **Lock-down Screws** on the support arms of the **Extender Board**, and swing both arms down.

5. Insert the **Extender Board** into the desired frame slot. Ensure that it is properly seated, then secure it in place with the two side tabs.

	Operating Tip	Steps 6 through 8 may require **two** people, to ensure that the desired chassis board is *fully supported* as you connect it to the **Extender Board**.

6. Align the top connectors on the frame board with the bottom connectors on the **Extender Board**, and gently push the frame board into the Extender while still supporting its weight from beneath with your hands.

	Operating Tip	The second connector from the left on the **Extender Board** has an *alignment key* to assist you with this process.

7. Swing a support arm over the standoff in the **Chassis Board**'s edge, and tighten the captive screw to secure the board. You may wish to use a flat-head screw driver for this step.

8. Repeat step 8 for the other support arm.

9. Power on the Synergy frame.

10. Perform the desired troubleshooting or testing procedures.

This completes the procedure to install a **Chassis Board** on the **Extender Board**.

Important Extender Board Usage Notes

Note the following important points regarding **Extender Board** use:

- Do not rest any tools on the **Extender Board**, or place any weight on the board while it is in use.

- The Extender will work in any slot, but it can *not* be used as an extension between the **Frame CPU Board** and the **Aux Bus Carrier Board**.

- Do not place any full-length board on the Extender, when the board's metal support shield has been removed. This shield provides mechanical support for the board and prevents damage to components.

- When either the **MLE Carrier Board** or the **Frame CPU Board** is placed on the Extender Board, the Preview output will experience degraded quality.

- When an **Input/Crosspoint Board** is placed on the Extender, input performance will experience degraded quality.

Removing a Chassis Board from the Extender Board

Use the following procedure to remove a **Frame Board** from the **Extender Board**:

	Caution	Static discharge can cause serious damage to sensitive semiconductor devices. Avoid handling the switcher circuit boards in high static environments such as carpeted areas and when synthetic fiber clothing is worn. Touch the frame to dissipate static charge before removing boards from the frame and exercise proper grounding precautions when working on circuit boards.

1. Power off the Synergy frame.

2. Remove the **Frame Board** as follows:

   - While supporting the **Frame Board**, unscrew each support arm from the standoffs.

   - Gently rock the **Frame Board** out of the Extender and set it aside.

	Operating Tip	Steps 2 and 3 may require **two** people, to ensure that the desired **Frame Board** is *fully supported* as you remove it from the **Extender Board**.

3. Remove the **Extender Board** as follows:

   - Remove the **Extender Board** from the frame slot.

   - Swing the support arms back up.

   - Secure the support arms with the captive lock-down screws.

4. Place the **Extender Board** back in the top frame storage slot.

5. Replace the **Frame Board** back in its appropriate chassis slot.

6. Power on the Synergy frame.

This completes the procedure to remove a **Frame Board** from the **Extender Board**.

Remote Port Expander Cabling (BSS4)

To connect the BSS4 Remote Port Expander to the Synergy switcher, you will have to make a connection from one of the Remote Ports on the back of the control panel to the Master Port on the BSS4.

In order to properly complete this procedure you will need the following:

- **BSS4 Interface Cable** — An RS-422 cable with a male 9-pin, D-type connector on one end, and a female 9-pin, D-type connector on the other end. Refer to the "**Synergy-to-BSS4 Wiring Chart**" on page 16–5 for wiring information.

Note   The BSS4 will only support RS-422 communication. Any device using RS-232 communication will require an RS-232 to RS-422 converter.

- **BSS4 Power Supply** — The 5 Volt, 100mA power supply that was supplied with your BSS4 switch.

The Synergy switcher connects to the BSS4 Remote Port Expander via the remote ports (1-8) on the back of the Synergy control panel, and the Master Port on the BSS4.

- The Synergy control panel remote port requires a 9-Pin, D-Type RS-422 connector.

- The BSS4 Master Port requires a 9-Pin, D-Type RS-422 connector.

Synergy-to-BSS4 Wiring Chart

Synergy Panel			BSS4 Remote Port Switch	
Remote Port	**Signal**		**Master Port**	**Signal**
1	Chassis			
2	RxA (Rx-)	→	2	TxA (Tx-)
3	TxB (Tx+)	→	3	RxB (Rx+)
4	n/c			
5	Ground	→	5	Ground
6	Ground			
7	RxB (Rx+)	→	7	TxB (Tx+)
8	TxA (Tx-)	→	8	RxA (Rx-)
9	Chassis			

n/c = Not Connected

Connecting a Remote Port Expander to a Synergy Switcher

Use the following procedure to connect a BSS4 Remote Port Switch to your Synergy switcher:

1. Connect and secure the male end of the **BSS4 Interface Cable** to one of the **Remote Ports** (1-8) on the back of the Synergy control panel.

2. Connect and secure the female end of the **BSS4 Interface Cable** to the **Master Port** on the BSS4. Refer to the illustration "**Connecting the BSS4 Remote Port Expander to the Synergy Control Panel**" on page 16–6.

⚠ **Caution** | Ensure that you have the correct power supply for your type of power *before* you attempt to plug the BSS4 Power Supply in a power socket.

3. Connect the **BSS4 Power Supply** to the **BSS4** and plug into an appropriate AC outlet.
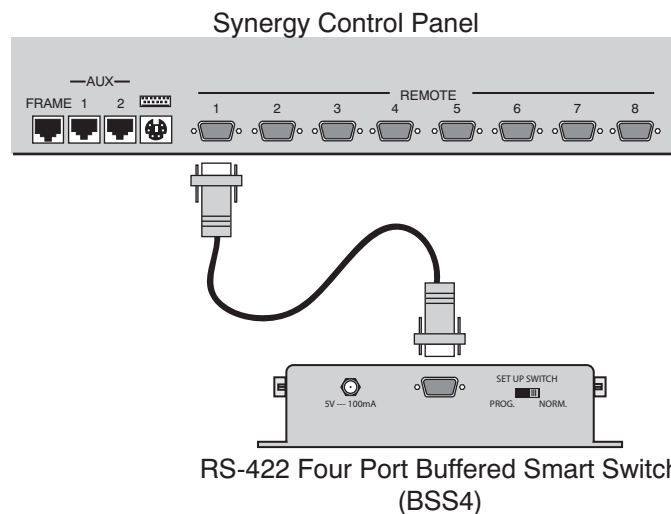
Synergy Control Panel

RS-422 Four Port Buffered Smart Switch
(BSS4)

Connecting the BSS4 Remote Port Expander to the Synergy Control Panel

This completes the procedure for connecting the BSS4 Remote Port Switch to the Synergy switcher. Next you will have to set up the communications protocols in order to use the Extended Remote Ports on the BSS4. Refer to the section "**Remote Port Expander (BSS4)**", of the *Synergy Series Installation Guide* for information on setting up the communications protocols for the BSS4.

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