Equipment Racks
Frame and System Configuration
Integrator Series Routing Switchers

December 2005

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- eCustomer Portal: http://support.imaginetechnologies.com
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Preface

Manual Information

Purpose

This manual details the features, configuration details, and specifications for the Integrator data routing switcher system.

Audience

This manual is written for technicians and operators responsible for installation, setup, maintenance, and/or operation of the product, and is useful to operations personnel for purposes of daily operation and reference.

Revision History

Table P-1. Revision History of Manual

<table>
<thead>
<tr>
<th>Edition</th>
<th>Date</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Edition A</td>
<td>January 1999</td>
<td>Initial production release</td>
</tr>
<tr>
<td>Edition B</td>
<td>December 2000</td>
<td>Replaced signal flow diagrams and front loading/back panel views</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Removed Theory of Operation for publication in separate service manual</td>
</tr>
<tr>
<td>Edition C</td>
<td>August 2001</td>
<td>Added information concerning DC power supply</td>
</tr>
<tr>
<td>Edition D</td>
<td>March 2002</td>
<td>Various editorial changes and corrections</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Removed reference to frame accurate deterministic switching</td>
</tr>
<tr>
<td>Edition E</td>
<td>February 2003</td>
<td>Added AES (auto-detect) to Sync 2 description</td>
</tr>
<tr>
<td>Edition F</td>
<td>December 2005</td>
<td>Added RoHS and WEEE directive information</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Added index</td>
</tr>
</tbody>
</table>
Applications

The Integrator platform is ideal for space-constrained operations demanding full local and remote control capabilities in a routing solution.

Integrator products are perfect for
- Television production facilities
- Cable operators
- Production and post-production facilities
- Outside broadcast vans/trucks
- DBS satellite operations
- Webcasters
- Telcos where professional end-users require a small, flexible, high quality routing matrix with the ability to mix and match signal formats and/or signal processing functions within the same frame

Writing Conventions

To enhance your understanding, the authors of this manual have adhered to the following text conventions:

Table P-2. Writing Conventions

<table>
<thead>
<tr>
<th>Term or Convention</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bold</strong></td>
<td>Indicates dialog boxes, property sheets, fields, buttons, check boxes, list boxes, combo boxes, menus, submenus, windows, lists, and selection names</td>
</tr>
<tr>
<td><em>Italics</em></td>
<td>Indicates email addresses, the names of books or publications, and the first instances of new terms and specialized words that need emphasis</td>
</tr>
<tr>
<td>CAPS</td>
<td>Indicates a specific key on the keyboard, such as ENTER, TAB, CTRL, ALT, or DELETE</td>
</tr>
<tr>
<td><strong>Code</strong></td>
<td>Indicates variables or command-line entries, such as a DOS entry or something you type into a field</td>
</tr>
<tr>
<td>&gt;</td>
<td>Indicates the direction of navigation through a hierarchy of menus and windows</td>
</tr>
<tr>
<td>hyperlink</td>
<td>Indicates a jump to another location within the electronic document or elsewhere</td>
</tr>
<tr>
<td>Internet address</td>
<td>Indicates a jump to a Web site or URL</td>
</tr>
<tr>
<td><img src="image" alt="Note" /></td>
<td>Indicates important information that helps to avoid and troubleshoot problems</td>
</tr>
</tbody>
</table>
Obtaining Documents

Technical documents can be viewed or downloaded from our Premier website. Alternatively, contact your Customer Service representative to request a document.

Unpacking/Shipping Information

Unpacking a Product

This product was carefully inspected, tested, and calibrated before shipment to ensure years of stable and trouble-free service.

1. Check equipment for any visible damage that may have occurred during transit.
2. Confirm that you have received all items listed on the packing list.
3. Contact your dealer if any item on the packing list is missing.
4. Contact the carrier if any item is damaged.
5. Remove all packaging material from the product and its associated components before you install the unit.

Keep at least one set of original packaging, in the event that you need to return a product for servicing.

Returning a Product

In the unlikely event that your product fails to operate properly, please contact Customer Service to obtain a Return Authorization (RA) number, then send the unit back for servicing.

Keep at least one set of original packaging in the event that a product needs to be returned for service. If the original package is not available, you can supply your own packaging as long as it meets the following criteria:

- The packaging must be able to withstand the product’s weight.
- The product must be held rigid within the packaging.
- There must be at least 2 in. (5 cm) of space between the product and the container.
- The corners of the product must be protected.

Ship products back to us for servicing prepaid and, if possible, in the original packaging material. If the product is still within the warranty period, we will return the product prepaid after servicing.
Standards

There are three different types of standards listed: product standards, compliance standards, and safety standards.

Product Standards

Product standards for each routing switcher type can be found in its respective Configuration manual.

Compliance and Safety Standards


Network Equipment Building System (NEBS) Compliance

The Integrator series routing switcher system has been tested to the GR-63-Core and GR-1089-Core Standards by a Nationally Recognized Test Lab (NRTL) and Certified to be NEBS (Network Equipment Building System) Level 3 Compliant. The Integrator series routing switcher system is therefore approved by Bellcore/Telcordia for use by the Regional Bell Operating Companies (RBOCS) or other telecommunications environments.¹

The Integrator series routing switcher system also meets the SBC Level 1 Special Requirements listed in Document TP76200MP.

See the Network Equipment Building System (NEBS) Declaration of Conformity for complete information concerning NEBS compliance.

Restriction on Hazardous Substances (RoHS) Compliance

Directive 2002/95/EC—commonly known as the European Union (EU) Restriction on Hazardous Substances (RoHS)—sets limits on the use of certain substances found in electrical and electronic equipment. The intent of this legislation is to reduce the amount of hazardous chemicals that may leach out of landfill sites or otherwise contaminate the environment during end-of-life recycling. The Directive, which took effect on July 1, 2006, refers to the following hazardous substances:

- Lead (Pb)
- Mercury (Hg)
- Cadmium (Cd)
- Hexavalent Chromium (Cr-V1)
- Polybrominated Biphenyls (PBB)
- Polybrominated Diphenyl Ethers (PBDE)

¹ Appendix B contains special instructions for telecommunications installations.
According to this EU Directive, all products sold in the European Union will be fully RoHS-compliant and “lead-free.” (See our website for more information on dates and deadlines for compliance.) Spare parts supplied for the repair and upgrade of equipment sold before July 1, 2006 are exempt from the legislation. Equipment that complies with the EU directive will be marked with a RoHS-compliant emblem, as shown in Figure P-1.

![RoHS Compliant](image)

**Figure P-1. RoHS Compliance Emblem**

**Waste from Electrical and Electronic Equipment (WEEE) Compliance**

The European Union (EU) Directive 2002/96/EC on Waste from Electrical and Electronic Equipment (WEEE) deals with the collection, treatment, recovery, and recycling of electrical and electronic waste products. The objective of the WEEE Directive is to assign the responsibility for the disposal of associated hazardous waste to either the producers or users of these products. Effective August 13, 2005, producers or users will be required to recycle electrical and electronic equipment at end of its useful life, and may not dispose of the equipment in landfills or by using other unapproved methods. (Some EU member states may have different deadlines.)

In accordance with this EU Directive, companies selling electric or electronic devices in the EU will affix labels indicating that such products must be properly recycled. (See our website for more information on dates and deadlines for compliance.) Contact your local sales representative for information on returning these products for recycling. Equipment that complies with the EU directive will be marked with a WEEE-compliant emblem, as shown in Figure P-2.

![WEEE Compliance Emblem](image)

**Figure P-2. WEEE Compliance Emblem**
Safety

Carefully review all safety precautions to avoid injury and prevent damage to this product or any products connected to it. You will find a complete list of safety precautions in Appendix A. Any user-serviceable components (such as fuses or batteries) are only replaceable by those components listed in the manual.

**IMPORTANT!** Only qualified personnel should perform service procedures.

**Safety Terms and Symbols in this Manual**

- **Warning**
  - Statements identifying conditions or practices that may result in personal injury or loss of life. High voltage is present.

- **Caution**
  - Statements identifying conditions or practices that can result in damage to the equipment or other property.
Overview

The Integrator is Leitch’s premier signal routing switcher series. The Integrator series routing switcher system is an expandable, modular system with the capability to meet the multiple format signal switching requirements of today’s market.

This chapter covers the following topics:

• “Control Features” on page 13
• “Frame Sizes and Types” on page 3
• “Front Panel LED Indicators” on page 12
• “Main Features” on page 2
• “Module Features” on page 6
Main Features

The Integrator’s frame design accommodates routing matrices from 16×16 to 128×128. The Integrator allows multiple routing matrices within the same frame, including matrices of different signal formats. The system’s modularity allows each Integrator to be customized to meet individual switching needs. Some of the main features offered in the Integrator’s frame are listed below.

- Field expandable from 16×16 to 128×128 in a single frame, and 512×512 in multiple frames
- Three distinct frame sizes: 4RU, 6RU, and 8RU
- Front loading modules with matching backplane input/output modules
- Mixed signal formats routed in the same frame: analog audio, analog video, serial digital video, AES audio, HDTV, D3, E3, etc.
- Virtual crosspoint mapping for improved input/output utilization
- Soft matrix partitioning of hardware matrices
- Two serial ports for diagnostics, software control packages, and integrated control of or by other vendor’s equipment
- Dynamic routing fabric management
- Flash memory storage of all configurations
- Failure alarms for power supplies, fans and control.
- DC power supply module (optional)
- Redundant, hot-swappable power supply modules (optional)
- Redundant, hot-swappable logic control modules (optional)
- Dual outputs (optional)
- Output monitoring (optional)
Frame Sizes and Types

The Integrator series has three frame sizes: 4RU, 6RU, and 8RU. Each size can accommodate any signal format or combination of signal formats and has different options available for customizing. (Some aspects of frame customization and matrix size specifics will be discussed in detail in each signal format’s individual manual).

Table 1-1. Integrator Series Architectural Information

<table>
<thead>
<tr>
<th>Architecture</th>
<th>4RU</th>
<th>6RU</th>
<th>8RU</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Width (in./cm)</td>
<td>19/48.3</td>
<td>19/48.3</td>
<td>19/48.3</td>
</tr>
<tr>
<td>Depth (in./cm)</td>
<td>15.83/40.2</td>
<td>15.83/40.2</td>
<td>15.83/40.2</td>
</tr>
<tr>
<td>Height (in./cm)</td>
<td>6.97/17.7</td>
<td>10.47/26.52</td>
<td>13.97/35.48</td>
</tr>
<tr>
<td>Cabinet size (in./cm)</td>
<td>19/48.3</td>
<td>19/48.3</td>
<td>19/48.3</td>
</tr>
<tr>
<td>Matrix module capacity</td>
<td>4</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td>Signal capacity</td>
<td>No. matrix sizes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>One signal type</td>
<td>64×64</td>
<td>128×64</td>
<td>128×128</td>
</tr>
<tr>
<td>Two signal types</td>
<td>(2) 32×32</td>
<td>(1) 64×64</td>
<td>(2) 64×64 or (1) 128×64 (1) 32×32</td>
</tr>
<tr>
<td>Three signal types</td>
<td>—</td>
<td>(2) 32×32</td>
<td>Sum of sizes ≤ 128×128</td>
</tr>
<tr>
<td>Four signal types</td>
<td>—</td>
<td>—</td>
<td>(4) 32×32</td>
</tr>
<tr>
<td>Standard equipment</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Power supply</td>
<td>1</td>
<td>1-2</td>
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</tr>
<tr>
<td>Fan</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Logic control module</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Upgrade options</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Redundant power supply</td>
<td>•</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Redundant logic control module</td>
<td>•</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Expandability</td>
<td>•</td>
<td>•</td>
<td>•</td>
</tr>
</tbody>
</table>
Figure 1-1. Four Rack Unit (4RU) Formats

Figure 1-2. Six Rack Unit (6RU) Formats
Figure 1-3. Eight Rack Unit (8RU) Formats
Module Features

There are six module types installed in the Integrator frame:

- Input Modules (many with crosspoint daughter cards installed)
- Output Modules (many with daughter cards installed)
- Back Panel Input/Output (I/O) Modules
- Logic Control Modules
- Power Supply Modules
- Fan Modules

The front panel of the Integrator frame functions as a door. The front panel handle is on the right-hand side. By sliding this handle to the left, the door locking mechanism is released and the front panel opens on hinges to the left. By opening the front panel door, the frame provides access to the front loading modules. Also, the front panel door may be easily removed by lifting the panel door off the hinges. The opened front panel door and the frame’s modular components are highlighted in Figure 1-4.

![Figure 1-4. Integrator 4RU Frame Showing Open Front Panel Door](image)
The matrix input and output modules are located on the left side of the frame and are visible from the front when the front panel door is opened.

- The back panel I/O modules mount to the rear of the frame (behind the input and output modules) and provide input and output connections for the system.
- The logic control module and optional redundant logic control module are located in the top right corner of the frame and are visible when the front panel door is opened.
- The power supply modules are located on the right side of the frame below the logic control module(s).
- The fan module is located directly behind the power supply and logic control module(s) and is accessible from the rear of the frame.

Input Module

The basic input module provides 32 inputs buffered and driven into a crosspoint array ranging in size from $32 \times 32$ to $32 \times 128$. The crosspoint array is located on the input modules. Depending on the signal format, part or all of the crosspoint array is contained on a daughter card that plugs on to the input card. Some crosspoint daughter cards mount to the top and bottom of the main input module board.

An active LED and a power LED are present on all input and output modules.

- The active LED is illuminated yellow when the board is identified by the logic control module. This is provided so that you can determine if a module has been correctly identified and is communicating to the logic control module.
- The power LED is illuminated green when the power used on the input or output module is valid (within specifications). If the power LED is not lit, one or more of the supply rails on the module is invalid. The location of these LEDs is shown in Figure 1-5. For information on installing an input or output module, see Chapter 2 of this manual.

![Figure 1-5. LED Indicators on Input and Output Modules](image-url)
Output Module

The basic output module provides 32 outputs. An optional output monitoring daughter card may be plugged onto the output card to provide an additional output for monitoring purposes.

Active and power LEDs are also present on the output card. These are located in the same position as those on the input module (see Figure 1-5).

Back Panel Input/Output (I/O) Modules

The back panel I/O modules provide input and output connectors for the signals to be routed by the Integrator. These back panel I/O modules are designed to interface the source and destination cables to the corresponding input and output modules. Each back panel I/O module provides the proper connectors for each signal format. Examples of these back panel I/O modules are shown in Figure 1-6.

---

**Figure 1-6. Back Panel I/O Modules**
Logic Control Module

The logic control module provides control logic for the Integrator frame. There is room in all frame sizes for installing a redundant control logic control module. See page 24 for information about installing and configuring the logic control module.

Power Supply Modules

AC Power Supply Module

The 400W universal input (85-250VAC) Integrator power supply provides two isolated 24VDC rails and one 5VDC rail to the frame. For more information on the Integrator’s power supply modules, see page 30 of this manual.
DC Power Supply Module

The 400W universal input (–40 to –50 VDC input) Integrator power supply provides two isolated 24VDC rails and one isolated 5VDC rail to the frame. For more information on the Integrator’s power supply modules, see page 30 of this manual.

Figure 1-9. INT-PS-DC Integrator DC Power Supply Module
Fan Module

The Integrator’s 4RU frame comes with 2 fans in the fan assembly, while the 6RU and 8RU frames contain 3 and 4 fans respectively. The fan module is located behind the power supplies. These fans are responsible for cooling the input and output modules, the elevator cards and the logic controller modules. The fans draw air from the front of the frame and exhaust the air to the side. The fan module is removed from the rear of the frame. See page 31 for details on fan module replacement.

Figure 1-10. Fan Module
Chapter 1: Introduction

Front Panel LED Indicators

The front panel LED indicators originate on the logic control module(s) and power supply module(s). The LEDs on the front of these two module types shine through a lens in the front panel door. These LED indicators are outlined in Figure 1-11.

There are additional power supply LED indicators on the 6RU and 8RU Integrator frames if a third power supply is installed.

These front panel LED indicators reflect the status of subsystems inside the frame. The indicators for each power supply provide information on each voltage rail and the power supply’s fan. The indicators from each logic control module provide status information of the frame’s logic control module and the frame’s fan module. These indicators are lit green when the system is functioning properly, red if there is a failure, and black if the subsystem is either not receiving power, is not properly installed or is physically not installed.
Control Features

Your Integrator makes use of the most innovative control systems available on the market today. The operating system used for the Integrator Series is a real-time embedded operating system that uses an interrupt-driven and priority-based task scheduling algorithm to control the operations of the router. This means that switches will occur in a timely manner, which allows the Integrator to be used in broadcast facilities where timing is crucial to the success of the facility.

The Integrator can operate in two modes:

- **DIP switch mode**: used for basic matrix switching on the X-Y bus with Leitch protocol
- **Program mode**: used when other protocols, matrix partitioning, or a variety of starting levels is desired

These two modes allow the Integrator to be a part of virtually any signal routing system. The configuration utility for programming the Integrator for operation in programmed mode is called RouterMapper™. RouterMapper is a Microsoft® Windows®1-based utility that allows the user to select not only the protocol of operation, but select the levels of each matrix and configure the matrix(es) for customized operation.

There are many options available to control your Integrator. Leitch offers a software control system called RouterWorks®, a Windows®-based 32 bit control system. RouterWorks uses a graphic user interface to improve the manageability and ease of use of the control system. Leitch also offers EventWorks™, a Windows®-based software program designed to automate routing switcher and simple machine control events. Visit the Leitch Web site at www.leitch.com for more information or a demonstration copy of RouterWorks.

Leitch also offers a wide variety of programmable control panels that can be used to control your Integrator. The Programmable Panel Series uses RouterMapper to program the panel for customization. Visit the Leitch Web site, see your Leitch dealer, or contact Leitch for more information on the Programmable Panel Series of control panels.

For more information on the control and configuration of the Integrator and other Leitch routing systems, see Chapter 2 of this manual.

---

1 “Windows” is a registered trademark of Microsoft Corporation.
Chapter 2

Configuration and Installation

Overview

**Warning**
Potentially lethal voltages are present within the Integrator frame during normal operation. Disconnect all power cords from the frame before you remove the top panel. Do not apply power to the frame while the top is open unless the unit is being serviced by properly trained personnel.

**Caution**
Leitch recommends that you test your system before its final installation. Make sure you verify its configuration, cabling, and proper system operation.

This chapter includes information necessary for installation of the Integrator series routing switcher system. It includes the following topics:

- “Configuring the DIP Switches and Toggle Switch on the Logic Control Module” on page 26
- “Configuring the Logic Control Module” on page 24
- “Determining the In-Frame Architecture” on page 16
- “Field Upgrading the Integrator” on page 49
- “Installing Back Panel I/O Modules” on page 23
- “Installing Input and Output Modules” on page 18
- “Installing the Integrator” on page 48
Determining the In-Frame Architecture

The Integrator is made of modular building blocks, which are as follows:

- Input modules (with crosspoint daughter cards)
- Output modules
- Back panel I/O modules
- Logic control module
- Power supply module
- Fan module

All modules and power supplies ordered will be installed in the Integrator frame before it is shipped.

Many signal format types, matrix sizes, and frame sizes are available to choose from in the Integrator Series routing switchers. The basic concept for understanding the installation of switching modules is that each signal format needs at least one input module and one output module. The exception to this is the High Definition Television (HDTV) video format, which has a combination card that includes inputs, crosspoints, and outputs on one module. Additional modules may be added to create different matrix sizes within the frame size limitations.

The input signals travel from the back panel I/O module to the input module. They travel from the input module across the elevator module to the output module. Finally, they travel from the output module to the back panel I/O module. Figure 2-1 on page 17 shows this signal path within the frame for one signal format.
Figure 2-1. Signal Path for a Single Signal Format
When there is more than one signal format, the Integrator uses separate elevator modules for each. When the input and output modules are installed into a frame with separate elevator modules, the input and output modules must be installed so that they match the signal format of the elevator module.

For serial video, analog video, and AES digital audio formats, the same type of elevator module is used. This is a valuable feature because it allows the Integrator to be upgraded from analog video to serial digital video by swapping the analog video input and output modules with the serial digital input and output modules. The procedure for installing input or output modules is shown and discussed in the following section. Follow the installation procedure in reverse order for removing input and output modules from the Integrator frame.

The elevator module signal format sizes are shown in Figure 2-2. The matrix size will determine where the input and output modules must be placed within the boundaries of that particular signal format’s elevator module.

![Figure 2-2. Elevator Module Signal Sizes](image)

**Installing Input and Output Modules**

Once you determine where to position the input and output modules within the frame, the follow proper method of installing the modules. Please refer to Figure 2-3 and Figure 2-4 for installation procedures.
It is important to perform the installation and removal properly to ensure that the modules will not be damaged and all the connections between the frame and the module are made properly and securely.

There are three mechanical features that are used in locking the modules into place in the frame: ZIF handles, inserter/extractor levers, and locking tabs.

- **Zero Insertion Force (ZIF) handles** on the frame that secure or release the “gold fingers”: connectors on each module to the ZIF connectors on the elevator module(s).

- **Two inserter/extractor levers** on each input and output module used for installing and removing them from the frame.

- **Locking tabs**, which are small black rectangular pieces that rotate and serve to hold/lock the ZIF handles and inserters/extractors in place.

The installation procedure is outlined in the following series of illustrations.

![Figure 2-3. Installing an Input or Output Module: Serial Video System Example](image-url)
Figure 2-4. Installing an Input or Output Module: Analog Audio System Example
1. For analog audio
   - Align the edges of the card of the input or output module with the grooves in the opened ZIF handle.
   - Make sure the inserters/extractors are in the Neutral position and that the locking tabs are in the Open position.

For all other signal formats
   - On the left side of the module, align the edges of the card of the input or output module with the groove in the opened ZIF handle.
   - On the right side of the module, align the metal board support shield with the black plastic card guide.
   - Make sure sides are properly aligned, the inserters/extractors are in the Neutral position (30° – 70° from module edge), and the locking tabs are in the Open position.

2. Start sliding in the board.
3. Slide the module the rest of the way into the slot.
4. Make sure the module slides in the grooves, connects to the rear module in the back, and to the ZIF connectors on the left side (all modules) and on the right side (analog audio modules only).
5. As the module becomes attached to the rear module in the frame, the inserters/extractors will start to close. Make sure the inserters/extractor levers are in the Neutral position (30° – 70° from module edge) or about ¾ open. This allows the inserter/extractor to engage automatically as the module is properly inserted.
6. Close the inserter/extractor on both sides of the module to secure the module in the slot. The module should fit snug into the frame.

**Note**

Because of different tolerances in different board builds, it may be necessary to loosen the back panel screws, reinsert the module, then retighten the screws.

**Note**

Some modules have locking tabs. You may have to press down the ZIF handles when you open or close the locking tabs.

7. Close the ZIF handles on the module to secure the module’s connections to the elevator modules.

**Do not force the module!** If it resists or seems to repel itself from the frame, remove the module from the frame and start again.

8. Close the locking tabs on the module to lock the module in position.
Installing Back Panel I/O Modules

There is a back panel I/O module for each input and output module installed in the Integrator. Back panel I/O modules are listed in Table 2-1.

Table 2-1. Back Panel I/O Modules

<table>
<thead>
<tr>
<th>Input/Output Module</th>
<th>Back Panel I/O Modules</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analog Audio Input Module</td>
<td>64 Inputs - Numbered 1 to 32 Channels A&amp;B</td>
</tr>
<tr>
<td></td>
<td>64 Inputs - Numbered 33 to 64 Channels A&amp;B</td>
</tr>
<tr>
<td></td>
<td>64 Inputs - Numbered 65 to 96 Channels A&amp;B</td>
</tr>
<tr>
<td></td>
<td>64 Inputs - Numbered 97 to 128 Channels A&amp;B</td>
</tr>
<tr>
<td></td>
<td>32 Inputs - Numbered 1 to 32 Mono Audio</td>
</tr>
<tr>
<td></td>
<td>32 Inputs - Numbered 33 to 64 Mono Audio</td>
</tr>
<tr>
<td></td>
<td>32 Inputs - Numbered 65 to 96 Mono Audio</td>
</tr>
<tr>
<td></td>
<td>32 Inputs - Numbered 97 to 128 Mono Audio</td>
</tr>
<tr>
<td>Analog Audio Output Module</td>
<td>64 Outputs - Numbered 1 to 32 Channels A&amp;B</td>
</tr>
<tr>
<td></td>
<td>64 Outputs - Numbered 33 to 64 Channels A&amp;B</td>
</tr>
<tr>
<td></td>
<td>64 Outputs - Numbered 1 to 64 Mono Audio</td>
</tr>
<tr>
<td></td>
<td>64 Outputs - Numbered 65 to 128 Mono Audio</td>
</tr>
<tr>
<td>Analog Video Input Module</td>
<td>32 Inputs - Numbered 1 to 32</td>
</tr>
<tr>
<td></td>
<td>32 Inputs - Numbered 33 to 64</td>
</tr>
<tr>
<td></td>
<td>32 Inputs - Numbered 65 to 96</td>
</tr>
<tr>
<td></td>
<td>32 Inputs - Numbered 97 to 128</td>
</tr>
<tr>
<td>Analog Video Output Module</td>
<td>32 Outputs - Numbered 1 to 32</td>
</tr>
<tr>
<td></td>
<td>32 Outputs - Numbered 33 to 64</td>
</tr>
<tr>
<td>Analog Video Dual Output Module</td>
<td>32 Dual Outputs - Each pair numbered 1 to 32</td>
</tr>
<tr>
<td></td>
<td>32 Dual Outputs - Each pair numbered 33 to 64</td>
</tr>
<tr>
<td>Serial Digital Video Input Module</td>
<td>32 Inputs - Numbered 1 to 32</td>
</tr>
<tr>
<td></td>
<td>32 Inputs - Numbered 33 to 64</td>
</tr>
<tr>
<td></td>
<td>32 Inputs - Numbered 65 to 96</td>
</tr>
<tr>
<td></td>
<td>32 Inputs - Numbered 97 to 128</td>
</tr>
<tr>
<td>Serial Digital Video Dual Output</td>
<td>32 Dual Outputs - Each pair numbered 1 to 32</td>
</tr>
<tr>
<td>Module</td>
<td>32 Dual Outputs - Each pair numbered 33 to 64</td>
</tr>
<tr>
<td>Serial Digital Video Output Module</td>
<td>32 Outputs - Numbered 1 to 32</td>
</tr>
<tr>
<td></td>
<td>32 Outputs - Numbered 33 to 64</td>
</tr>
</tbody>
</table>

Caution

Properly match the back panel I/O modules with the proper input and output modules.

Back panel I/O modules are easily attached with four screw to the rear of the Integrator frames.
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Figure 2-5. Installing Back Panel I/O Modules

Configuring the Logic Control Module

There are two items that may need to be configured before operating the logic control module (if settings other than the defaults are desired:

- Two DIP switches on the front of the logic control module
- Two jumper packs at the back.

The jumper packs, located in the back left corner of the logic control module, set the communications signal format for each serial port. Unless otherwise noted, the logic control module is shipped from the factory with both serial ports configured for RS-232 operation. To switch one of the serial ports from RS-232 to RS-422, simply turn the jumper pack around so that pin one on the jumper pack is no longer next to socket one on the logic control module. Jumper pack positions are shown in Figure 2-6 on page 25.

Note

The jumper packs must be configured before the logic control module is installed in the Integrator frame.
Figure 2-6. Configuration of Jumper Packs for Serial Ports
Chapter 2: Configuration and Installation

Configuring the DIP Switches and Toggle Switch on the Logic Control Module

Toggle Switch on the Logic Control Module

The toggle switch assigns the primary and backup logic control module in a system with a redundant logic control module installed. If there is not a redundant logic control module installed in the system the toggle switch has no function, because in either the primary or active position, it will become the primary logic control module. If there is a redundant logic control module installed and both are set to primary or both set to back-up, the logic control module in slot 1 becomes the primary and the logic control module in slot 2 becomes the backup. If either logic control module fails, the error is reported and the working logic control module becomes for the primary.

DIP Switches on the Logic Control Module

Caution

In systems with redundant logic control modules, the DIP switch setting for the operating mode must be set identically in both logic control modules.

DIP Switch Mode

Note

DEFAULT settings are all OFF: DIP switch mode on starting level 0 with the both serial ports set for Leitch (auto detect) protocol at 9600 baud rate.

DIP switch mode can be used when the user does not wish to partition matrix(es) into smaller sections (software matrix partitioning) or to assign non-consecutive levels to matrices in the same frame. DIP switch mode can only be used in systems where the X-Y bus uses Leitch protocol.

Using only the DIP switches on the front of each logic control module, users can specify the starting level and destination offset for the matrix(es) in the frame and what protocol and baud rate each serial port is to support. (See “Serial Ports” on page 40 for more information about configuring and using the serial ports.) To configure the Integrator for DIP switch mode operation, set the logic control module DIP switches as shown in Figure 2-7 on page 27.
Figure 2-7. DIP Switch Mode Configuration

Operating Procedure in DIP Switch Mode

- Reads DIP switch mode on the DIP switch
- Reads Destination Offset and Starting Level
- Detects modules installed in the frame starting at slot 1 (top slot)
- Establishes the first matrix and signal type on the starting level and assigns every new matrix found to the next consecutive level.
  (There is an exception to this last step. If the signal type and matrix size of the next matrix found are the same as the first matrix, then the levels will be married as in RGB video — the red matrix, green matrix, and B matrix will all be assigned the same level. This applies if it is YUV, Y/C or Quad audio as well.)

Power Up Scenario in DIP Switch Mode

There is a flash configuration stored in the Integrator’s logic control module. When the integrator is first powered up, the logic control module compares the modules it physically detects installed in the frame with the flash configuration. Three conditions could exist:
• If the detected physical configuration matches the flash configuration, then the Integrator begins normal operations and no errors are reported to the alarm port. Once running, the Integrator will check for missing modules, status and alarm situations, and report errors if they occur.

• If the detected physical configuration does not match the flash configuration, then the Integrator will store the new configuration into flash memory. An error message is generated reporting the mismatch and the Integrator will begin normal operations using the detected configuration.

• If the detected physical configuration is a subset of the current flash configuration, then the Integrator will report the missing module or non-equivalent subset of the configuration and begin normal operations using the detected configuration. If the configuration in the flash memory is 64×64 serial digital video and the detected configuration is 64×32 because an output module had been removed, Integrator will operate as a 64×32 but will not store this new configuration.

**Caution**

In DIP switch mode, the matrices operate as physically installed.

---

**Program Mode**

Program mode is used when you want to partition matrix(es) into smaller sections (software matrix partitioning) or to assign non-consecutive levels to matrices in the same frame. Program mode must be used in systems where the X-Y bus uses anything other than Leitch protocol. Program mode is best suited for more complex configurations because the user can define particular (non-consecutive) levels for each matrix, partition the matrix to singularly define inputs (in RGB blocks for example) and share inputs on different levels. Program mode allows the customization of the matrix and takes advantage of flexible configuration features.

Program mode requires router configuration to be done via a computer. RouterMapper, the Windows-based router configuration utility software program, will configure the Integrator in Program mode. (Refer to the *RouterMapper Configuration Utility Reference Guide* for information on configuring the Integrator.) To configure the Integrator for Program mode operation, set the logic control module’s DIP switches as shown in Figure 2-8 on page 29.
Operating Procedure in Program Mode

- Reads Program mode on the DIP switch
- Checks validity of Flash configuration. If invalid, an error is reported and all operations stop. If valid, go to next step.
- Compares Flash to the physically detected modules installed in the frame.
  - If Flash = detected or detected as a subset of the Flash, the discrepancy is reported as an error and normal operation begins.
  - If Flash ≠ detected, an error is reported and the Integrator waits for a download.

Installing the Logic Control Module

One logic control module comes standard with every Integrator frame. You may add an additional logic control module to the frame as a redundant option. Figure 2-9 shows how to install an additional logic control module.
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Power Supply Module

One power supply module is included as standard equipment in the 4RU Integrator frame. Two power supply modules are included as standard equipment in the 6RU and 8RU Integrator frames.1 Adding another power supply module provides redundancy. No configuration settings are needed for the power supply module(s). Figure 2-10 on page 30 shows the installation of an additional power supply.

Note

Unless specified otherwise, all illustrations will show an AC power supply module.

1 Five or more modules require a second power supply module.
Fan Module

A fan module is supplied with every Integrator frame. The fan module is easily replaced in the field in the event of a fan failure. There are no configuration settings needed for the fan module. However, the in-line locking 2-pin connectors must be disconnected from the fans when removing the fan module, and must be reconnected when installing the fan module. The in-line locking 2-pin connector is a male and female set. The female of the set has the locking mechanism and is connected to the frame side of the wire. The 6RU and 8RU frame sizes have more in-line locking 2-pin connectors, but the replacement procedure will be the same. Fan module replacement is shown in Figure 2-11.

Figure 2-11. Installing the Fan Module
Back Panel Connections

The control and power section of the rear panel includes these items:

- AC power receptacles or DC terminal blocks
- 15-pin alarm port
- Two 9-pin serial ports
- 6-pin audio monitor port
- Two pairs of BNC X-Y ports
- Two pairs of BNC sync ports (Sync 1 for NTSC and Sync 2 for PAL or AES [auto-detect])
- BNC video monitor port
- Two RJ-45 Ethernet connections

![Figure 2-12. AC Power and Control Section, 4RU Integrator Back Panel](image-url)
Figure 2-13. DC Power and Control Section, 4RU Integrator Back Panel
Figure 2-14. AC Power and Control Section, 6RU Integrator Back Panel
Figure 2-15. DC Power and Control Section, 6RU Integrator Back Panel
Figure 2-16. AC Power and Control Section, 8RU Integrator Back Panel
Figure 2-17. DC Power and Control Section, 8RU Integrator Back Panel
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Power Receptacles

The AC power receptacles/DC terminal blocks provide the power connections to the Integrator. In the 4RU frame the first (or bottom) slot for the power supply module corresponds to the left AC power receptacle/DC terminal block and is labeled PS1 as viewed from the rear of the frame (see Figure 2-12 on page 32 and Figure 2-13 on page 33.) The second (or top) slot for the redundant power supply module corresponds to the right AC power receptacle/DC terminal block. If a redundant power supply module is not installed, the right AC power receptacle/DC terminal block serves no purpose.

The 6RU AC power receptacles/DC terminal blocks provide the power connections to the 6RU Integrator. The first (or bottom) slot for the power supply module corresponds to the bottom AC power receptacle/DC terminal block and is labeled PS1 as viewed from the rear of the frame (see Figure 2-14 on page 34 and Figure 2-15 on page 35.) The second (or middle) slot for the power supply module corresponds to the second (or center) AC power receptacle/DC terminal block. The third (or top) slot for the power supply module corresponds to the third (or top) AC power receptacle/DC terminal block. This third power supply module is always a redundant power supply. If a redundant power supply module is not installed, the third AC power receptacle/DC terminal block serves no purpose.

The 8RU AC power receptacles/DC terminal blocks provide the power connections to the 8RU Integrator. The first (or bottom) slot for the power supply module corresponds to the bottom AC power receptacle/DC terminal block and is labeled PS1 as viewed from the rear of the frame. (See Figure 2-16 on page 36 and Figure 2-17 on page 37.) The second (or middle) slot for the power supply module corresponds to the second (or center) AC power receptacle/DC terminal block. The third (or top) slot for the power supply module corresponds to the third (or top) AC power receptacle/DC terminal block. This third power supply module is always a redundant power supply. If a redundant power supply module is not installed, the third AC power receptacle/DC terminal block serves no purpose.

Chassis Safety Ground

The chassis safety ground protects equipment users from electrocution in the event of an electrical catastrophe by providing a direct electrical path from the equipment chassis to earth ground. Whether the electrical catastrophe takes the form of an electrical fault within the Integrator or an external source such as a lightning strike, any potentially lethal voltage will be diverted away from personnel and directly to earth ground. The Integrator chassis safety ground uses a dual-bolt mount designed to be mated to a dual-hole compression lug. The dual-hole compression lug is crimped to stranded wire that is 8 gauge in size, which has its other end securely attached to the nearest earth ground point. See Figure 2-12 through Figure 2-17 for the location of the chassis safety ground on the 4RU, 6RU, and 8RU Integrators.
Alarm Port

The 15-pin alarm port reports alarms as they occur in the frame. Figure 2-18 shows pin assignments for the alarm port.

Figure 2-18. Alarm Port Pin Assignments

The alarm port provides contact closure for these alarm conditions:

### Table 2-2. Alarm Conditions

<table>
<thead>
<tr>
<th>Alarm Condition</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PS Fail</td>
<td>Alarm asserted in the event of a power supply failure. (In systems with multiple power supplies, the alarm will be asserted if any power supply fails.)</td>
</tr>
<tr>
<td>Fan (Module) Fail</td>
<td>Alarm asserted in the event of a failure of one of the frame cooling fans. (A power supply fan failure is indicated as a PS FAIL.)</td>
</tr>
<tr>
<td>AUX 1</td>
<td>Reserved for future use.</td>
</tr>
<tr>
<td>AUX 2</td>
<td>Reserved for future use.</td>
</tr>
</tbody>
</table>

For convenience, the alarm port provides both normally open and normally closed contacts for each alarm condition. The normally open connection is shorted with the common (closed) when the alarm does not exist and the frame is powered. The normally closed connection is shorted with the common (closed) when the alarm condition exists.

The alarm relay circuitry has been designed so the relays are energized when the alarm condition does not exist. If a relay fails or if the circuit controlling a relay fails, the relay will de-energize causing the corresponding alarm to be asserted. If the frame loses power, all four alarm relays will become de-energized, and all four alarm conditions will be asserted.

Note: The relay is energized when power is applied to detect when power is lost and to allow the alarm to be asserted.
Serial Ports

The serial ports allow external control of the Integrator by a computer, editing or automation system via a serial connection using RS-232 or RS-422. Pin assignments for each signal format are provided below. The ports are configured for RS-232 or RS-422 using jumper packs on the logic control module. See “Configuring the Logic Control Module” on page 24 for details.

Table 2-3. Pin Assignments for RS-232 and RS-422 Functions

<table>
<thead>
<tr>
<th>Pin</th>
<th>RS-232 Function</th>
<th>RS-422 Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Frame Ground</td>
<td>Frame Ground</td>
</tr>
<tr>
<td>2</td>
<td>RxD (Data received by router)</td>
<td>Ts (Data Sent by router)</td>
</tr>
<tr>
<td>3</td>
<td>TxD (Data sent by Router)</td>
<td>Rb (Data Received by Router)</td>
</tr>
<tr>
<td>4</td>
<td>Data Terminal Ready*</td>
<td>Rc Receiver Common</td>
</tr>
<tr>
<td>5</td>
<td>Ground</td>
<td>Ground</td>
</tr>
<tr>
<td>6</td>
<td>Data Set Ready (DSR)*1vt</td>
<td>Tc Transmit Common</td>
</tr>
<tr>
<td>7</td>
<td>Request to Send (RTS)**</td>
<td>Tb (Data sent by router)</td>
</tr>
<tr>
<td>8</td>
<td>Clear to Send (RTS)**</td>
<td>Ra (Data Received by Router)</td>
</tr>
<tr>
<td>9</td>
<td>Frame Ground</td>
<td>Frame Ground</td>
</tr>
</tbody>
</table>

* Pins 4 and 6 connected internally.
** Pins 7 and 8 connected internally

One of the many powerful features of the Leitch router control system is its ability to use a serial port to access the entire system. The serial port is in effect the control gateway to the entire routing system.
Dual serial ports are an added feature on the Integrator that allows the use of different protocols, as well as multiple control ports for using different control and automation systems. Each serial port is configured separately. The baud rate and protocol type used by each serial port is set on the DIP switches on the front of the logic control module.

All Leitch protocols currently use 8 data bits, no parity and 1 stop bit.

Audio Monitor Port

The audio monitor port provides audio monitoring for any audio output. Audio monitoring is optional with any Integrator audio system. If added, output monitoring provides true output monitoring of any audio output from the Integrator. The monitoring output is stereo for stereo systems and mono for mono systems. The audio monitoring option is a basic monitoring matrix submodule mounted to each audio output module inside the Integrator.

The audio monitor is controlled using any of the available control methods for the Integrator, including software control via the serial port(s), Ethernet, or control panel via the X-Y bus. Audio monitor connector pin assignments are shown in Table 2-4.

Table 2-4. Audio Monitor Pin Assignments

<table>
<thead>
<tr>
<th>Stereo Systems</th>
<th>Mono Systems</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pin</strong></td>
<td><strong>Function</strong></td>
</tr>
<tr>
<td>1</td>
<td>A+</td>
</tr>
<tr>
<td>2</td>
<td>A−</td>
</tr>
<tr>
<td>3</td>
<td>A GND</td>
</tr>
<tr>
<td>4</td>
<td>B+</td>
</tr>
<tr>
<td>5</td>
<td>B−</td>
</tr>
<tr>
<td>6</td>
<td>B GND</td>
</tr>
</tbody>
</table>
X-Y Ports

The X-Y control bus is a high speed serial interface by which Leitch routers and control panels are interconnected. The X-Y control bus links multiple routers and control panels in a bus topology. Figure 2-20 highlights the control line (the bus) that daisy-chains each device together. The extreme ends of the bus are terminated.

![Figure 2-20. X-Y Control Bus Interface](image)

While all X-Y communications on either bus is repeated on the other bus, each is fully isolated from the other. If one bus is shorted, the other should remain functional. While this topology provides isolation, it also introduces a very small processing delay in communications from one X-Y bus to another. Consequently, you should place all devices that MUST process a message at the same time on the same bus (i.e., 3 separate frames switching RGB or YUV signals).

The X-Y coaxial control port allows control panels and router frames to be interconnected using standard 75Ω video coax cable. The ends of the X-Y bus must be terminated using standard 75Ω video terminators.

The Integrator features two independent X-Y control ports: X-Y1 and X-Y2. Each port is internally wired for loop-through operation. The looped through pair is one port. Essentially, both of these X-Y ports provide access to a single X-Y bus.

It is important to note that if either of the BNCs in either of the X-Y ports is used, the other associated X-Y port connection must be terminated with a 75Ω BNC terminator or connected to another device’s X-Y port. For example, it is not necessary to terminate either of the BNCs in the X-Y2 Connector port if neither is used. See Chapter 3 for more information on system configurations.
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Sync Ports

Note
Sync 1 is used for an NTSC reference and Sync 2 is used for a PAL or AES (auto-detect) reference.

The Sync 1 and Sync 2 ports are the input connections for a synchronization signal. A sync signal is typically an external NTSC or PAL composite video reference signal or a 4 Vp-p composite sync signal. Locking the routing switcher to a valid sync signal is necessary if vertical interval switching is required.

The sync ports can be used together or separately if two separate types of synchronization signals are present. These are loop-through connections, so if one half of the sync pair of Sync 1 or Sync 2 is used, it is necessary to terminate the unused sync connector within the pair of connectors or connect to another 75Ω device. For example, if the Sync 1 pair is used and only the top half of the Sync 2 pair is used, the Sync 2 bottom half must be terminated using a 75Ω BNC terminator. If Sync 2 is not used, there is no need to terminate these two connectors.

Video/AES Monitor Port

The video monitor port provides video monitoring or AES unbalanced monitoring of any video output. Video/AES monitoring is optional but provides true output monitoring of any video output from the Integrator.

The video/AES monitoring option is a basic monitoring matrix submodule mounted to each output module inside the Integrator. The video monitor is controlled using software control via the serial port(s), Ethernet, or control panel via the X-Y bus.

Ethernet Connection

The Ethernet connection provides high-speed links for configuration, control, and monitoring of the complete routing system. One Ethernet port is provided per logic control module. If the Integrator has a redundant logic control module installed, then there are two Ethernet connections; however, only one Ethernet connection is available for control. The other Ethernet connection is used so that monitoring applications can communicate with the standby redundant logic control module to verify its operating status. The Ethernet connections use 10BASE-T wiring. The pin assignments to each Ethernet connection are listed in Table 2-5.

Table 2-5. Pin Assignments to Ethernet Connections

<table>
<thead>
<tr>
<th>Pin</th>
<th>Function</th>
<th>Pin</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Transmit Data +</td>
<td>5</td>
<td>Not used</td>
</tr>
<tr>
<td>2</td>
<td>Transmit Data -</td>
<td>6</td>
<td>Receive Data -</td>
</tr>
<tr>
<td>3</td>
<td>Receive Data +</td>
<td>7</td>
<td>Not used</td>
</tr>
<tr>
<td>4</td>
<td>Not used</td>
<td>8</td>
<td>Not used</td>
</tr>
</tbody>
</table>
Chapter 2: Configuration and Installation

**Analog Audio Back Panel I/O Modules**

The analog audio back panel I/O modules use 4 or 8 D-Type 25-pin connectors. Figure 2-21 shows the back panel input modules for analog audio sources, which are listed in Table 2-1 on page 23.

![Figure 2-21. Analog Audio Back Panel Input Modules](image)

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Figure 2-22 shows the back panel output modules for analog audio destinations, which are listed in Table 2-1 on page 23.

**Back Panel Pin Assignments**

**Analog Audio Connector Pin Assignments**

The audio back panel I/O modules use the same pin assignments for both the input and output modules as well as for Channel A, Channel B, and mono audio options.

<table>
<thead>
<tr>
<th>Pin</th>
<th>Output 1-8 or Input 1-8</th>
<th>Output 9-16 or Input 9-16</th>
<th>Output 17-24 or Input 17-24</th>
<th>Output 25-32 or Input 25-32</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Unused</td>
<td>Unused</td>
<td>Unused</td>
<td>Unused</td>
</tr>
<tr>
<td>2</td>
<td>8 GND</td>
<td>16 GND</td>
<td>24 GND</td>
<td>32 GND</td>
</tr>
<tr>
<td>3</td>
<td>7-</td>
<td>15-</td>
<td>23-</td>
<td>31-</td>
</tr>
<tr>
<td>4</td>
<td>7+</td>
<td>15+</td>
<td>23+</td>
<td>31+</td>
</tr>
<tr>
<td>5</td>
<td>6 GND</td>
<td>14 GND</td>
<td>22 GND</td>
<td>30 GND</td>
</tr>
<tr>
<td>6</td>
<td>5-</td>
<td>13-</td>
<td>21-</td>
<td>29-</td>
</tr>
<tr>
<td>7</td>
<td>5+</td>
<td>13+</td>
<td>21+</td>
<td>29+</td>
</tr>
<tr>
<td>8</td>
<td>4 GND</td>
<td>12 GND</td>
<td>20 GND</td>
<td>28 GND</td>
</tr>
<tr>
<td>9</td>
<td>3-</td>
<td>11-</td>
<td>19-</td>
<td>27-</td>
</tr>
<tr>
<td>10</td>
<td>3+</td>
<td>11+</td>
<td>19+</td>
<td>27+</td>
</tr>
<tr>
<td>11</td>
<td>2 GND</td>
<td>10GND</td>
<td>18 GND</td>
<td>26 GND</td>
</tr>
</tbody>
</table>

*Note* Offset the connector pin assignment for the Input/Output numbers by: 32 for channels 33-64; 64 for channels 65-96; and 96 for channels 97-128.
Table 2-6. Analog Audio Connector Pin Assignments (Continued)

<table>
<thead>
<tr>
<th>Pin</th>
<th>Output 1-8 or Input 1-8</th>
<th>Output 9-16 or Input 9-16</th>
<th>Output 17-24 or Input 17-24</th>
<th>Output 25-32 or Input 25-32</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>1-</td>
<td>9-</td>
<td>17-</td>
<td>25-</td>
</tr>
<tr>
<td>13</td>
<td>1+</td>
<td>9+</td>
<td>17+</td>
<td>25+</td>
</tr>
<tr>
<td>14</td>
<td>8-</td>
<td>16-</td>
<td>24-</td>
<td>32-</td>
</tr>
<tr>
<td>15</td>
<td>8+</td>
<td>16+</td>
<td>24+</td>
<td>32+</td>
</tr>
<tr>
<td>16</td>
<td>7 GND</td>
<td>15 GND</td>
<td>23 GND</td>
<td>31 GND</td>
</tr>
<tr>
<td>17</td>
<td>6-</td>
<td>14-</td>
<td>22-</td>
<td>30-</td>
</tr>
<tr>
<td>18</td>
<td>6+</td>
<td>14+</td>
<td>22+</td>
<td>30+</td>
</tr>
<tr>
<td>19</td>
<td>5 GND</td>
<td>13 GND</td>
<td>21 GND</td>
<td>29 GND</td>
</tr>
<tr>
<td>20</td>
<td>4-</td>
<td>12-</td>
<td>20-</td>
<td>28-</td>
</tr>
<tr>
<td>21</td>
<td>4+</td>
<td>12+</td>
<td>20+</td>
<td>28+</td>
</tr>
<tr>
<td>22</td>
<td>3 GND</td>
<td>11 GND</td>
<td>19 GND</td>
<td>27 GND</td>
</tr>
<tr>
<td>23</td>
<td>2-</td>
<td>10-</td>
<td>18-</td>
<td>26-</td>
</tr>
<tr>
<td>24</td>
<td>2+</td>
<td>10+</td>
<td>18+</td>
<td>26+</td>
</tr>
<tr>
<td>25</td>
<td>1 GND</td>
<td>9 GND</td>
<td>17 GND</td>
<td>25 GND</td>
</tr>
</tbody>
</table>

Analog Video Back Panel I/O Modules Pin Assignments

The analog video back panel I/O modules use 32 BNC connectors each. These BNCs are positioned as shown Figure 2-23.

Serial Digital Video Rear Back Panel I/O Module Pin Assignments

The serial digital video back panel I/O modules use 32 BNC connectors each. These BNCs are positioned as shown in Figure 2-24 on page 47.
Figure 2-24. Serial Digital Video Back Panel I/O Module Pin Assignments

HD Video Back Panel I/O Module Pin Assignments

The HD video back panel I/O module uses 32 BNC connectors, 16 for the inputs and 16 for the outputs. These BNCs are positioned as shown in Figure 2-25.

Figure 2-25. HD Video Back Panel I/O Module Pin Assignments
Installing the Integrator

The Integrator routing switcher can be installed anywhere within a routing system and can be controlled in a variety of ways, including remote control panels, PC-based software control, serial port control, or GPIs. Because the flexibility of the Integrator allows for many possible configurations, the installation procedures will depend on the desired configuration and system design. General installation procedures are outlined below.

1. Connect all sources to the appropriate input connection on the back panel I/O module(s).
2. Connect all destinations to the appropriate output connection on the back panel I/O module(s).
3. Connect the control device(s) to the appropriate port (XY1, SERIAL1, SERIAL2, etc.) on the frame’s rear panel.
4. If the router is to be used in a multiple frame system, connect the additional frames using the X-Y1 or X-Y2 ports.
5. If the router is at the end of the X-Y bus, terminate the other end of the pair of X-Y connectors with a coaxial 75Ω termination.
6. Connect the SYNC 1 (for NTSC) or SYNC 2 (for PAL or AES [auto-detect]) input connector to a valid reference signal if vertical interval switching is desired.
7. Connect the 15-pin alarm port to the appropriate alarm device(s), as necessary.
8. Connect the video monitor connector to the video monitoring device (if the video monitoring option is installed).
9. Connect the audio monitor to the audio monitoring device (if the audio monitoring option is installed).
10. Connect the AC power input receptacles/DC terminal blocks to the power source.

Note
When the Integrator is first powered-up, Input 1 will be routed to all outputs. The Starting Level in the video matrix will be set to 0 and Starting Level in the audio matrix will be set to 1, if the frame starting level is set to 0. However, if the Integrator is specifically ordered in a particular configuration, then the Integrator frame will be custom configured to those specifications.
Field Upgrading the Integrator

Field upgrading an Integrator frame with more input and output modules is a simple process of installing the input and output modules into the proper slot along with the correct back panel modules, as long as the signal format and in-frame configuration can be supported with the elevator module in the frame. If this is the case, follow the steps listed in “Power Receptacles” on page 38 and “Alarm Port” on page 39. If a different elevator module must be ordered, please contact your Leitch dealer or the Leitch Sales Department.

Upgrading the Integrator with redundant logic control modules or power supplies is as simple as installing them and properly configuring the logic control module. Refer to the appropriate sections of this chapter for installation and configuration information.
Leitch Routing System
Configuration Guidelines

Overview

All Leitch routing systems share a common control system and can use the configuration descriptions provided in this section. Examples of some of these routers are as follows:

- Integrator™ series (including Integrator Gold™)
- Panacea series
- MixBox and card routers
- HD16X
- XPlus™ series
- VIA 32 series
- Prophecy™ series

The common control system in Leitch routers allows you to configure routing systems that include frames from any or all of these series. Control panels developed for a specific series may be used with any Leitch router.

Note
Control system configuration is only covered in general terms. Please refer to the manual supplied with individual router series for more specific information.
Control Options

The Leitch router control system includes a variety of control options. (See Figure 3-1.) Each control type is described in the sections that follow.

Control Panel Styles

Leitch offers a variety of control panel styles, including the following:

- Single bus, button per crosspoint
- Multi-bus (X-Y) button per crosspoint
- Numeric and alphanumeric panels with breakaway capability
- A programmable series with X-Y button per crosspoint operation
- Ethernet control panels

Control panels interface with router frames using the X-Y control bus. (See Figure 3-3 on page 55.) In the XPlus, MixBox and HD16X series, the control panels may be local to the router frame (built into frame) or remote (located up to 2,000 feet [609.6 meters] from the frame). All panels in the VIA32 series and Integrator series are external to the router frame and are thus considered remote.
Chapter 3: Leitch Routing System Configuration Guidelines

GPI Contact Closure Control/Tally Interface

Leitch provides the option of General Purpose Interface (GPI) control/tally for applications that require a simple contact closure control or tally. The GPI interface functions like a control panel. The interface issues control commands in response to a contact closure on any one of its GPI inputs, and provides status by asserting a GPI contact closure output (tally) whenever a specified crosspoint is selected.

Serial Port

Leitch routers can also be controlled from a standard RS-232 or RS-422 control port. This can be used to interface the routing system to external PCs, automation systems, and editors. The MixBox series and 1302 card router series routers do not have built-in serial ports but can be interfaced to an external serial port.

RouterWorks® PC-Based Control Software

The XPlus, HD16X, and VIA series routers support RouterWorks, a Windows®-based control and status software. This powerful, easy-to-use program allows the user to control and monitor the status of a router from a PC connected to the system via a serial port. RouterWorks includes three interface styles (single bus, multibus, and matrix) for control and monitoring.

Note
MixBox and 1302 series routers can be controlled via RouterWorks software if the router is interfaced to an external serial port.
X-Y Control Bus

The X-Y control bus is a high speed serial interface through which Leitch routers and control panels are interconnected. The X-Y control bus links multiple routers and control panels in a bus topology. As shown in Figure 3-2, the control line or bus is daisy-chained through each of the devices. The extreme ends of the bus are terminated.

Figure 3-2. Router Control Connections

The X-Y bus is available in two formats:

- A twisted pair interface using mini-XLR connectors
- A coaxial interface using BNC connectors.

Older router frames include only the twisted pair interface, while some control panels may include either the twisted pair interface or the coaxial interface; the ANXY and GPI control panels include both.

Both X-Y control port styles are described in detail in the following pages.
Figure 3-3. Router Frame X-Y Control Interfaces

Figure 3-4. Control Panel X-Y Control Interfaces
Chapter 3: Leitch Routing System Configuration Guidelines

X-Y Twisted Pair Control Port

The X-Y twisted pair port uses a mini-XLR connector. Control panels use a 3-pin mini-XLR and router frames use a 5-pin mini-XLR. The pinouts for the two connectors are shown in Figure 3-5. (A pinout of the cable required to link a 3-pin mini-XLR to a 5-pin mini-XLR is also shown).

The 5-pin mini-XLR ports on the router frames carry both the twisted pair X-Y communications bus and the inter-frame synchronizing READY line. The READY line provides inter-frame synchronization to coordinate switching on multiple frames.

![Figure 3-5. Mini-XLR Pinouts](image-url)
In multiframe systems, where switching in each of the frames must be synchronized, the 5-pin mini-XLR twisted pair interface must be used to link the router frames. The X-Y twisted pair control bus must be properly terminated at both ends.

To terminate the control bus, slide the termination switch located near the XLR connectors to the TERM position. The location and orientation of the termination switch varies from unit to unit. (See Figure 3-7 on page 58.)
Chapter 3: Leitch Routing System Configuration Guidelines

Figure 3-7. Terminating the Mini-XLR Port

X-Y Coaxial Control Port

The coaxial control port allows multiple control panels to be connected to router frames using standard 75Ω video coaxial cable. The coaxial bus can be daisy-chained into and out of the control panel’s looping BNCs. (See Figure 3-8 on page 59.) Alternatively, each panel can be spliced into the coaxial bus using a BNC “T” and a stub up to 12 in. (30.48 cm) long. (See Figure 3-9 on page 60.) Whether daisy-chained or stubbed, the two extreme ends of the coaxial control bus must be terminated using a standard 75Ω video termination. If a panel is spliced into the bus using a stub and BNC “T,” it must be terminated only if it is the last device on the bus.

A single leg of the coaxial X-Y bus can be up to 1,500 ft (457 m) long, and can support up to 40 control panels. In an installation using BNC “T”s and cable stubs, the total length includes the length of all the individual stubs. If greater distances or more panels are required, a new bus leg can be formed by interfacing to a device which includes both XLR and coaxial X-Y bus interfaces (typically a router frame). For examples of multi-leg systems, see Figure 3-8 on page 59 and Figure 3-9 on page 60.
Figure 3-8. X-Y Coaxial Control Port Interfaces
Each X-Y control port (mini-XLR and BNC) operates as an electrically independent, double terminated party line. When multiple devices are interconnected via the X-Y control ports, only the unused port on the devices at either end of the line should be terminated. Do not terminate the ports on devices which are in-between the ends of the line. If neither port of the loop-through pair is used, termination is not an issue, and the ports may be either terminated or unterminated.

**System Wiring Guidelines**

The X-Y bus is extremely flexible and allows many different combinations of the two interfaces types, X-Y coax and X-Y twisted pair. Wiring guidelines are shown in Figure 3-10 on page 61.
If the switching matrices of a routing system span more than one frame and synchronized switching is required, the 5-pin twisted pair X-Y interface must be used to interconnect the frames. If the switch must occur in the vertical interval, all frames must be given the same reference signal via the frame’s Sync Input. For synchronized switching in the vertical interval, all frames must have the same reference signal and be interconnected with the 5-pin twisted pair X-Y interface.

**Figure 3-10. Typical Router Installation**

*Note*
Integrator series routing switchers do not have twisted pair control connectors.
Invalid Configuration Examples

Panels may be interconnected with either the coaxial or twisted-pair interface. However, control panels using the 3-pin mini-XLR interface must not be installed between two routers using the 5-pin mini-XLR interface. In such a configuration, the READY line will be interrupted, and inter-frame synchronization will be lost.

Note
Because the coaxial interface does not include the READY line, using a coaxial interface between frames will prevent synchronized switching.
Figure 3-12. Three-Pin XLR Interface Does Not Include Interframe Synchronization

Make sure you avoid a closed loop when mixing both coaxial and twisted pair interfaces. Closed loops create conflicts which will lead to failure of the X-Y control bus (see Figure 3-13 on page 64).
A CLOSED LOOP appears in X-Y bus. To remove illegal loop remove either Cable A or Cable B identified below.

**Figure 3-13.** Closed Loop Appears in X-Y Bus
Chapter 3: Leitch Routing System Configuration Guidelines

Serial Control Port

The serial control port is used to control the router from an external computer, automation system, or editor. Serial control ports are available on XPlus series, VIA 32 series, and Integrator series routers; and on the ANXY control panel and the Remote Serial Control Interface (RSCE).

The serial control port can be used to monitor the system configuration, determine the current status of crosspoint connections, change crosspoint connections in any matrix, and setup pre-programmed crosspoint takes sequences (salvos). In a system involving multiple frames the commands entered into the serial port on one frame will appear on all other frames in the system via the X-Y control bus.

The serial control port may be configured for RS-232 or RS-422 operation. See Figure 3-14 for the pinout for both RS-232 and RS-422 configurations.

Note
Any serial control port in the routing system can be used for control or status of the entire system.

![Serial Control Port Pinout](image)

<table>
<thead>
<tr>
<th>RS-232 Configuration</th>
<th>RS-422 Configuration</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pin</strong></td>
<td><strong>Function</strong></td>
</tr>
<tr>
<td>1</td>
<td>Frame ground</td>
</tr>
<tr>
<td>2</td>
<td>RxD (data received by router)</td>
</tr>
<tr>
<td>3</td>
<td>TxD (data sent by router)</td>
</tr>
<tr>
<td>4</td>
<td>*</td>
</tr>
<tr>
<td>5</td>
<td>Ground</td>
</tr>
<tr>
<td>6</td>
<td>*</td>
</tr>
<tr>
<td>7</td>
<td>**</td>
</tr>
<tr>
<td>8</td>
<td>**</td>
</tr>
<tr>
<td>9</td>
<td>Frame ground</td>
</tr>
</tbody>
</table>

* Pins 4 and 6 connected internally
** Pins 7 and 8 connected internally
Ra < Rb is receive “Mark”
Ta < Tb is Transmit “Mark”

Figure 3-14. Serial Control Port Pinout

Data on the serial control port is encoded as 8N1:

- 8 data bits (ASCII data, most significant bit always 0)
- No parity
- 1 stop bit
The baud rate is user selectable and can be set to
- 2400 baud
- 9600 baud
- 19200 baud
- 38400 baud

Although the 38400 baud rate can be used in RS-232 installations using very short cable runs, this rate is mainly recommended for RS-422 installations. (Please refer to the configuration section of the specific router manual for details on setting the serial control port baud rate.)

See Figure 3-15 on page 67 for serial connection cable pinouts.
Chapter 3: Leitch Routing System Configuration Guidelines

Figure 3-15. Serial Connection Cable Pinouts

All connector "sexes" refer to connector on end of cable
Chapter 4

Specifications

Overview

The following specification tables appear in this chapter:

- “Electrical Specifications” on page 70
- “Mechanical Specifications” on page 70
- “Input/Output Signals Specifications” on page 71

All specifications and designs are subject to change without notice.
## Electrical

**Table 4-1. Electrical Specifications**

<table>
<thead>
<tr>
<th>Item</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input</td>
<td>Coaxial communications 1V p-p</td>
</tr>
<tr>
<td>Power</td>
<td>Universal input</td>
</tr>
<tr>
<td></td>
<td>AC: 90-250 VAC</td>
</tr>
<tr>
<td></td>
<td>DC: –40 to –50 VDC</td>
</tr>
<tr>
<td></td>
<td>47-63 Hz, 600 VA, 600 W</td>
</tr>
<tr>
<td>Output</td>
<td>V1 = +5 VDC @ 7A</td>
</tr>
<tr>
<td></td>
<td>V2 = +24 VDC @ 12A</td>
</tr>
<tr>
<td></td>
<td>V3 = –24 VDC @ 12A</td>
</tr>
<tr>
<td>Total power</td>
<td>400Ω</td>
</tr>
<tr>
<td>Current sharing</td>
<td>Active, all outputs</td>
</tr>
<tr>
<td></td>
<td>N+1 hot swappable (diode isolation)</td>
</tr>
<tr>
<td>TRMA (Operating Temperature)</td>
<td>32° F (0° C) to 122° F (50° C) at 100%</td>
</tr>
</tbody>
</table>

## Mechanical

**Table 4-2. Mechanical Specifications**

<table>
<thead>
<tr>
<th>Item</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size</td>
<td>6.969 in. × 19.00 in. × 15.83 in.</td>
</tr>
<tr>
<td></td>
<td>(17.70 cm × 48.26 cm × 40.20 cm)</td>
</tr>
<tr>
<td>4RU</td>
<td>10.469 in. × 19.00 in. × 15.83 in.</td>
</tr>
<tr>
<td></td>
<td>(26.59 cm × 48.26 cm × 40.20 cm)</td>
</tr>
<tr>
<td>6RU</td>
<td>13.99 in. × 19.00 in. × 15.83 in.</td>
</tr>
<tr>
<td></td>
<td>(35.54 cm × 48.26 cm × 40.20 cm)</td>
</tr>
<tr>
<td>8RU</td>
<td>57 lb (25.90 kg) approx.</td>
</tr>
<tr>
<td>Weight (fully loaded)</td>
<td>68 lb (30.84 kg) approx.</td>
</tr>
<tr>
<td>4RU</td>
<td>79 lb (35.83 kg) approx.</td>
</tr>
</tbody>
</table>
Table 4-2. Mechanical Specifications (Continued)

<table>
<thead>
<tr>
<th>Item</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicators</td>
<td></td>
</tr>
<tr>
<td>4RU</td>
<td>CPU2: PWR, ACTV, FAN</td>
</tr>
<tr>
<td></td>
<td>CPU1: PWR, ACTV, FAN</td>
</tr>
<tr>
<td></td>
<td>PS2: 5V, 24V1, 24V2, FAN</td>
</tr>
<tr>
<td></td>
<td>PS1: 5V, 24V1, 24V2, FAN</td>
</tr>
<tr>
<td>6RU, 8RU</td>
<td>CPU2: PWR, ACTV, FAN</td>
</tr>
<tr>
<td></td>
<td>CPU1: PWR, ACTV, FAN</td>
</tr>
<tr>
<td></td>
<td>PS3: 5V, 24V1, 24V2, FAN</td>
</tr>
<tr>
<td></td>
<td>PS2: 5V, 24V1, 24V2, FAN</td>
</tr>
<tr>
<td></td>
<td>PS1: 5V, 24V1, 24V2, FAN</td>
</tr>
<tr>
<td>Cooling</td>
<td>Forced air/convection</td>
</tr>
</tbody>
</table>

Input/Output Signals

Table 4-3. Input/Output Signals Specifications

<table>
<thead>
<tr>
<th>Item</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>RS-232/RS-422 serial communication</td>
<td>DB-9 pin connector</td>
</tr>
<tr>
<td>Alarm port</td>
<td>DB-15 pin connector</td>
</tr>
<tr>
<td>X-Y (coaxial communication)</td>
<td>75Ω BNC</td>
</tr>
<tr>
<td>Audio monitor</td>
<td>6-pin 2-piece removable terminal</td>
</tr>
<tr>
<td>Video/AES monitor</td>
<td>75Ω BNC</td>
</tr>
<tr>
<td>Sync</td>
<td>75Ω BNC</td>
</tr>
<tr>
<td>Ethernet</td>
<td>RJ-45</td>
</tr>
<tr>
<td>Protective ground</td>
<td>Dual-bolt mount chassis safety ground terminal</td>
</tr>
</tbody>
</table>
Appendix A

Safety Precautions, Certifications, and Compliances

Overview

Carefully observe the safety alert symbols below for dangers, warnings, and cautions. They alert installers and operators of possible dangers or important information contained in this manual.

*Keep in mind, though, that warnings alone do not eliminate hazards, nor are they a substitute for safe operating techniques and proper accident prevention measures.*

Any user-serviceable components (such as fuses or batteries) are only replaceable by those components listed in the manual.

*IMPORTANT!* Only qualified personnel should perform service procedures.
Safety Terms and Symbols in this Manual

**Warning**  
Statements identifying conditions or practices that may result in personal injury or loss of life. High voltage is present.

**Caution**  
Statements identifying conditions or practices that can result in damage to the equipment or other property.

Safety Terms and Symbols on the Product

**DANGER:** High voltage and indicates a personal injury hazard immediately accessible as one reads the marking.

**WARNING:** Indicates a personal injury hazard not immediately accessible as one reads the marking.

**CAUTION:** Indicates a hazard to property, including the product, or to pay attention and refer to the manual.

Protective ground (earth) terminal.

**Fuse.** Replace with same type and rating of fuse.

*Zur Vermeidung von Feuer verwenden Sie nur Sicherungen mit der für dieses Produkt geforderten Typ und Stromstärke.*
Preventing Electrostatic Discharge

Observe precautions for handling electrostatic sensitive devices.

**CAUTION:** Electrostatic discharge (ESD) can damage components in the product. To prevent ESD, observe these precautions when directed to do so:

1. **Use a Ground Strap.** Wear a grounded antistatic wrist strap to discharge the static voltage from your body while installing or removing sensitive components.
2. **Use a Safe Work Area.** Do not use any devices capable of generating or holding a static charge in the work area where you install or remove sensitive components. Avoid handling sensitive components in areas that have a floor or benchtop surface capable of generating a static charge.
3. **Handle Components Carefully.** Do not slide sensitive components over any surface. Do not touch exposed connector pins. Handle sensitive components as little as possible.
4. **Transport and Store Carefully.** Transport and store sensitive components in a static-protected bag or container.

Injury Precautions

**WARNING**

Potentially lethal voltages are present within the frame during normal operation. The AC power cord must be disconnected from the frame before the top panel is removed. (In frames with multiple power supplies, remove ALL power cords.) Power should not be applied to the frame while the top is open unless properly trained personnel are servicing the unit.

*Pull out the plug from the main socket before the removal of a cover.*
*Przód zdjeciem pokrywy wyciagnac wtyczke z gniazda sieciowego.*

**WARNING:** **SHOCK HAZARD - DO NOT OPEN.**

*Avis: Risque de choc électrique - Ne pas ouvrir.*
*Mount in rack only*
*Installer sur support de montage seulement.*

Use proper power cord

To avoid fire hazard, use only the power cord specified for this product.

Ground the product

This is a Safety Class 1 product and is grounded through the grounding conductor of the power cord. To avoid electrical shock, the grounding conductor must be connected to earth ground. Before making connections to the product’s input or output terminals, ensure the product is properly grounded.

**WARNING:** **This appliance must be grounded.**

**Warning:** **Apparaten skall anslutas till jordat uttag när den ansluts till ett nätverk.**
Appendix A: Safety Precautions, Certifications, and Compliances

Do Not Operate Without Covers

To avoid electrical shock or fire hazard, do not operate this product with covers or panels removed.

Use Proper Fuse

To avoid fire hazard, use only the fuse type and rating specified for this product.

Do Not Operate in Wet/Damp Conditions

To avoid injury or fire hazard, do not operate this product in wet or damp conditions.

Do Not Operate in an Explosive Atmosphere

To avoid injury or fire hazard, do not operate this product in an explosive atmosphere.

Avoid Exposed Circuitry

To avoid injury, remove jewelry such as rings, watches, and other metallic objects. Do not touch exposed connections and components when power is present.

Product Damage Precautions

CAUTION:

Disconnect power from the frame before removing or installing input/output modules. Removing or installing modules with power applied could cause serious damage to system components.

Use Proper Power Source

Do not operate this product from a power source that supplies more than the specified voltage.

Use Proper Voltage Settings

Before applying power, ensure that the line selector is in the proper position for the power source being used.

Provide Proper Ventilation

To prevent product overheating, provide proper ventilation.

Do Not Operate With Suspected Failures

If you suspect there is damage to this product, have it inspected by qualified service personnel.

CAUTION: This unit can have more than one power supply cord. To de-energize the internal circuitry, you have to disconnect all power cords.

ADVARSEL: Utstyret kan ha mer enn en tilførselsledning. For å gjøre interne deler spenningsløse må alle tilførselsledningene trekkes ut.

WARNING: Denna apparat har mer än en nätsladd. Samtliga nätkablarn måste bortkopplas för att göra de interna kretsarna spänningsfria.
**Fuse:** Replace with same type and rating of fuse.

**Caution:** Replace with same type fuse.

**Attention:** Utiliser un fusible de rechange de même type.

**Caution:** Disconnect supply cord before changing fuse.

**Attention:** Débrancher avant de remplacer le fusible.

**Achtung:** Vor Auswechseln der Sicherung ist das Gerät vom Netz zu trennen.

**Caution**

Disconnect power from the frame before removing or installing input/output modules. Removing or installing modules with power applied could cause serious damage to system components.

**Use Proper Power Source**

Do not operate this product from a power source that supplies more than the specified voltage.
EMC and Safety Standards


EMC Standards

Table A-1. EMC Standards

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<th>Description</th>
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<td>EN55022</td>
<td>Limits and Methods of Measurement of Radio Disturbance Characteristics of Information Technology Equipment-Class A</td>
</tr>
<tr>
<td>EN61000-3-2</td>
<td>Limits for Harmonic Current Emissions (Equipment Input Current Less Than or Equal to 16 A Per Phase)</td>
</tr>
<tr>
<td>EN61000-3-3</td>
<td>Limitations of Voltage Fluctuations and Flicker in Low Voltage Supply Systems for Equipment with Rated Current Less Than 16 A</td>
</tr>
<tr>
<td>EN61000-4-2</td>
<td>Electrostatic Discharge Requirements “ESD” 2 kV CD, 4 kV AD</td>
</tr>
<tr>
<td>EN61000-4-3</td>
<td>Radiated Radio-Frequency Electromagnetic Field Immunity Test 1 V/m {1 kHz 80% AM, 80-1000 MHz}</td>
</tr>
<tr>
<td>EN61000-4-4</td>
<td>Electrical Fast Transient Requirements “Burst,” 0.5 kV Sig. &amp; Ctrl. Lines 0.5 kV a.c. &amp; d.c. Power Line, 0.5 kV Functional Earth</td>
</tr>
<tr>
<td>EN61000-4-5</td>
<td>Surge Immunity Test 0.5 kV a.c. Power Line</td>
</tr>
<tr>
<td>EN61000-4-6</td>
<td>Immunity to Conducted Disturbances Induced by Radio Frequency Fields 1 V rms 0.15-80 MHz Sig. &amp; Ctrl. Lines, 3 V rms 0.15-80 MHz d.c. Power Line, 1 V rms 0.15-80 MHz a.c. Power Line, 1 V rms 0.15-80 MHz Functional Earth</td>
</tr>
<tr>
<td>EN61000-4-11</td>
<td>Voltage Dips, Short Interruptions, and Voltage Variations- Immunity Tests</td>
</tr>
</tbody>
</table>
These devices are for professional use only and comply with Part 15 of FCC rules. Operation is subject to the following two conditions:

1. These devices may cause interference to radio and TV receivers in residential areas.
2. These devices will accept any interference received, including interference that may cause undesired operations.

Changes or modifications not expressly approved by Leitch Technology,™ the party responsible for compliance to the FCC Part 15 Rule, could void the user’s authority to operate this equipment legally in the United States.

These devices do not exceed the Class A limits for radio noise emissions from digital apparatus as set out in the interference standard entitled “Digital apparatus,” ICES-003 of the Canadian Department of Communications.

**Additional EMC Information**

This device is for professional use in a controlled EMC environment, such as purpose-built broadcast studios.

EMC regulations require that the radiation emitted from this unit does not exceed certain limits. These limits are only met when the front panel is closed and the two thumb screws are secured.

Compliance to the EMC regulations is also dependent on the use of suitably shielded (screened) cables. Coax cables should be of the double-shielded (screened) variety. Unused BNCs should be fitted with 75Ω terminations.

All audio cables should be screened with the shield (screen) making good contact with the metallic parts of the cable connectors.

D-type connectors used with this unit should always have metallic shells with the shield (screen) of the cable mechanically bonded to the metal shell. It is further recommended that the D-type cable connectors be of the “dimple” variety. These connectors make a better contact and consequently improve EMC performance.
# Safety Standards

## Table A-2. Harmonized and Reference IEC Safety Standards

<table>
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<th>Harmonized Standard</th>
<th>Reference IEC Standard</th>
<th>Description</th>
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<td>IEC 60950:1999 (Modified)</td>
<td>Safety of Information Technology Equipment</td>
</tr>
<tr>
<td></td>
<td>Amendment 1 to IEC 60065 7th Edition</td>
<td>Audio, Video, and Similar Electronic Apparatus Safety Requirements</td>
</tr>
<tr>
<td>UL 1419 (March 28, 1997)</td>
<td>2nd Edition</td>
<td>Standard for Professional Video and Audio Equipment</td>
</tr>
<tr>
<td>UL 60950 (December 1, 2000)</td>
<td>3rd Edition</td>
<td>Safety of Information Technology Equipment</td>
</tr>
<tr>
<td>CAN/CSA-C22.2 No. 60950-00</td>
<td></td>
<td>Safety of Information Technology Equipment (Bi-National Standard, with UL 60950)</td>
</tr>
<tr>
<td>CAN/CSA-C22.2 No. 1-98</td>
<td></td>
<td>Audio, Video, and Similar Electronic Equipment</td>
</tr>
<tr>
<td>CSA C22.2 No. 1-98 including Am1 (June, 2003)</td>
<td></td>
<td>Audio, Video, and Similar Electronic Equipment</td>
</tr>
</tbody>
</table>
Appendix B

Special Instructions for Telecommunications Installations

Overview

Integrator products that are designed to operate in a telecommunications environment must be installed according to the following guidelines:

• Connect this equipment to a 48 VDC source that is electrically isolated from the AC source. The 48 VDC source must be reliably connected to earth.
• Verify 12 amp fuses are installed at the power inputs of the Integrator as over-current protection devices in conformance with applicable codes.
• The chassis of the Integrator must be securely connected to earth ground using eight gauge copper wire. This eight gauge wire must be crimped to the provided two-hole compression terminal which in turn must be securely bolted to the dual terminal lugs on the rear of the Integrator chassis. The other end of the eight gauge copper wire must be securely fastened to earth ground.

Telecommunications Installations Instructions

The following information is located on the Integrator chassis and is repeated here.

This equipment is designed to permit the connection of the grounded conductor of the DC supply circuit to the grounding conductor at the equipment. All the following conditions must be met:

a. This equipment shall be connected directly to the DC supply system grounding electrode conductor or to a bonding jumper from a grounding terminal bar or bus to which the DC supply system grounding electrode conductor is connected.

b. This equipment shall be located in the same immediate area (such as, adjacent cabinets) as any other equipment that has a connection between the grounded conductor of the same DC supply circuit and the grounding conductor, and also the point of grounding of the DC system. The DC system shall not be grounded elsewhere.
Appendix B: Special Instructions for Telecommunications Installations

c. The DC supply source is to be located within the same premises as this equipment.

d. There shall be no switching or disconnecting devices in the grounded circuit conductor between the DC source and the point of connection of the grounding electrode conductor.
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