



INSTRUCTION MANUAL

Integrator[™] Series High Definition Switcher Matrix Module Set



Revision A



ENGINEERING THE BIG PICTURE[™]

Integrator

Integrator Series High Definition Switcher Matrix Module Set

Installation and Operation Manual

Release A
February 1999



WARRANTY

Leitch products are warranted against defects in materials and workmanship for a period of two years from date of shipment. Leitch, at its option, will repair or replace products which prove to be defective during the warranty period, provided they are returned to Leitch freight prepaid. Other products sold by Leitch which are produced by a third party will carry the original manufacturer's warranty. Leitch will continue to support these items with parts and service after expiration of that warranty.

This warranty shall not apply to any defect, failure or damage caused by abuse, misuse, improper use, negligence, accident, modification, alteration, or improper or inadequate maintenance and care.

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Safety Summary

Review the following safety precautions to avoid injury and prevent damage to this product or any products connected to it.

Only qualified personnel should perform service procedures.

Safety Terms and Symbols

Terms in This Manual

Warning: Statements identifying conditions or practices that can 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.

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 take Attention and refer to the manual.



Protective ground (earth) terminal.



Fuse. Replace with same type and rating of fuse.



Observe precautions for handling electrostatic sensitive devices.

Injury Precautions

WARNING! (Integrator frame only)



Potentially lethal voltages are present within the Integrator 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.

[PL Poland] Przed zdjęciem pokrywy wyciągnąć wtyczkę z gniazda sieciowego.

(English Translation: Pull out the plug from the mains socket before the removal of a cover.)

[French] AVIS: RISQUE DE CHOC ...LECTRIQUE - NE PAS OUVRIR.

(English Translation: WARNING: SHOCK HAZARD - DO NOT OPEN.)

[French] INSTALLER SUR SUPPORT DE MONTAGE SEULEMENT.

(English Translation: MOUNT IN RACK ONLY.)

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.

[United Kingdom] WARNING: THIS APPLIANCE MUST BE EARTHED.

[Sweden] APPARATEN SKALL ANSLUTAS TILL JORDAT UTTAG NÄR DEN ANSLUTS TILL ETT NÄTVERK.

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: (Integrator Frame only)



Disconnect power from the Integrator 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 Setting



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.

Attention:



Observe Precautions for handling electrostatic sensitive devices.



FUSE: Replace with same type and rating of fuse.

[French]ATTENTION: UTILISER UN FUSIBLE DE RECHANGE DE MÊME TYPE DE __A __V.

(English Translation: CAUTION: REPLACE WITH SAME TYPE __A __V FUSE.)

[French]ATTENTION: D...BRANCHER AVANT DE REMPLACER LE FUSIBLE.

(English Translation: CAUTION: DISCONNECT SUPPLY CORD BEFORE CHANGING FUSE.)

Do Not Operate With Suspected Failures



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

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

[Sweden] VARNING: Denna apparat har mer än en nätanslutning. Samtliga nätkablar måste bortkopplas för att göra de interna kretsarna spänningsfria.

Battery Use Warnings:



CAUTION: Replace battery with CR2032 Only. Use of another battery may present a risk of fire or explosion.



CAUTION: Battery may explode if mistreated. Do not recharge, disassemble or dispose of in fire.

[DK Denmark] Advarsel! Lithiumbatteri. Eksplosionsfare ved fejlagtig handling. Udskiftning må kun ske med batteri af samme fabrikat og type. Lever det brugte batteri tilbage til leverandoren.

(English Translation: Warning! Lithium battery. Danger of explosion if incorrectly replaced. Must only be replaced by a battery of same make and type. Used batteries shall be returned to the supplier.)

[FI Finland] VARNING Explosionsfara vid felaktigt batteribyte. Använd samma batterityp eller en eller en ekvivalent typ som rekommenderas av tillverkaren. Kassera använt batteri enligt fabrikantens instruktion.

(English Translation: Caution: Danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Discard used batteries according to manufacturer's instructions.)

[SE Sweden] VARNING: Byte till felaktig batterityp kan medföra fara för explosion. Använd därför samma eller likvärdig typ enligt apparattillverkarens rekommendation. Kassera förbrukade batterier enligt tillverkarens anvisning.

(English Translation: CAUTION: Danger of explosion if battery is incorrectly replaced. Replace only with the same type or an equivalent type recommended by the equipment manufacturer. Discard used batteries according to the manufacturer's instructions.)

Unpacking/Shipping Information

The Integrator has been carefully inspected, tested and calibrated before shipment to ensure years of stable and troublefree service. Please check the equipment for any visible damage which may have occurred during transit. Please confirm that all items listed on the packing list have been received. If any item on the packing list is missing, please contact your Leitch dealer. If any item is damaged, please contact the carrier. Ensure that all packaging material is removed from the Integrator and its associated components before installing the unit.

It is suggested that you keep at least one set of original Leitch packaging, in the event that a product needs to be returned for service. If the original package is not available, you can purchase replacement packaging from Leitch at a modest cost or supply your own packaging as long as it meets the following criteria:

Packaging must be able to withstand the product weight.

Product must be held rigid within the packaging.

There must be at least two inches of space between the product and the container.

The corners of the product must be protected.

Products that are being returned to Leitch for servicing should be shipped pre-paid in the original packaging material if possible. If the product is still within the warranty period, the product will be returned by pre-paid shipment after servicing.

Installation Information

The Integrator is shipped with rear support guides that prevent uneven loading of the frame in the rack. The Integrator is rack mountable and should be mounted in a standard 19" rack using the rack mounting positions and rear support guides provided. It is recommended that each Integrator frame be connected to a separate electrical circuit for protection against circuit overloading. The Integrator relies on forced air cooling for optimal performance. It is recommended that all obstructions to the air flow be removed prior to installing the frame in the rack. The Integrator frame rear panel has provision for external earth grounding. It is recommended that the frame be grounded to earth via the protective earth ground on the rear panel.

Customer Service Information

If you need to speak to a Sales or Customer Service Representative, please contact one of the following:

Leitch Technology International, Inc.* 25 Dyas Road North York, ON, Canada M3B 1V7 800-387-0233 416-445-9640 Fax: 416-445-0595	Leitch Incorporated* 920 Corporate Lane Chesapeake, VA 23320 U.S.A. 800-231-9673 757-548-2300 Fax: 757-548-4088
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Leitch Technology International Inc. Latin America Contact 3900 N.W. 79th Avenue, Suite 569 Miami, FL 33166 U.S.A. 305-591-6011 Fax: 305-591-0613	Leitch do Brasil Tecnologia e Comercio Ltda. Av. Brigadeiro Faria Lima 1781 2 Andar Cj.22 Jd. Paulistano - San Paulo SP Brasil - ZIP: 01451-001 +55 11-867-0218 Fax: +55 11-867-0408
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*These offices have Customer Service Departments.



DECLARATION OF CONFORMITY

We

Leitch Technology International, Inc.
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Fax: 416-445-0595

The Integrator has been designed to comply with the following CE, FCC, UL, ICES and CSA standards:

EMC standards:

EN 50081-1	Generic emission standard.
EN 55022	Limits and methods of measurement of radio disturbance characteristics of information technology equipment, Class A.
EN 50082-1	Generic immunity standard.
IEC 1000-4-2 1995-01	Electrostatic discharge requirements "ESD", 6kV CD, 8kV AD.
IEC 801-3 1984	Radiated, radio frequency electromagnetic field, 3V/m {1kHz 80% AM, 27-1000MHz}
IEC 1000-4-4 1995-01	Electrical fast transient requirements "Burst", 0.5kV Sig. Lines, 1kV Power line.

per the provision of the Electromagnetic Compatibility Directive 89/336/EEC of 3 May 1989 as amended by 92/31EEC of 28 April 1992 and 93/68/EEC, Article 5 of 22 July 1993

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.

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.

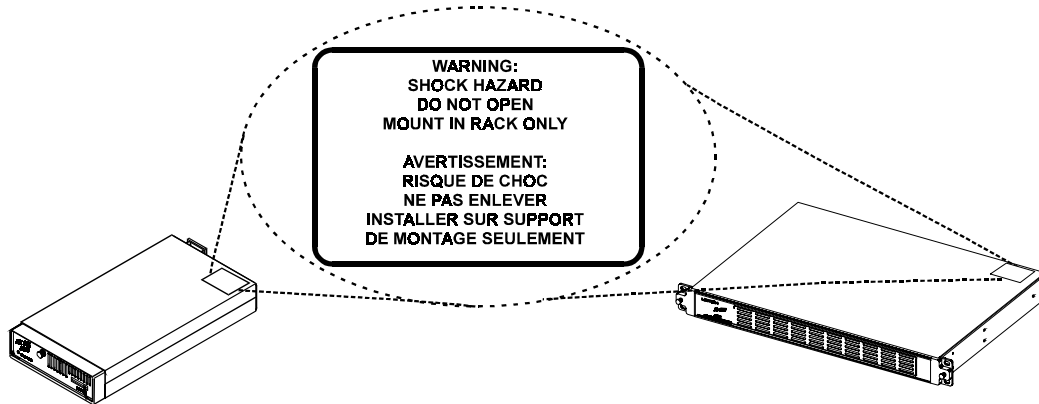
Safety standards:

EN 60950	Safety of Information Technology Equipment, including electrical business equipment. EN60950:1992 + A1:1993 + A2:1993 + A3:1995 + A4:1997 + A11:1997 NEMKO-TSE(74-SEC)207/94. Low-Voltage Directive 73/23/EEC of February 19, 1973 as amended by 93/68/EEC.
UL 1419	Safety requirements for mains operated electronic and related apparatus for household and similar general use.
CSA C22.2 No. 1-94	Safety requirements for audio, video and similar electronic equipment.

The original Declaration of Conformity is on file with:

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WARNING!:



WAARSCHUWING:
SCHOK GEVAAR
NIET OPEN MAKEN
ALLEEN IN RAK MONTER

AVVISO:
PERICOLO DI CORRENTE
E PROIBITO L'APERTURA
SI PREGA DI FARE IL MONTAGGIO
AL PROPRIO SOPPORTO

FIGYELEM:
ÁRAMÜTÉS VESZÉLY
CSAK A MEGTELELŐ
TARTÓKERETBE ÜZEMBEHELYEZNI

ADVARSEL:
MULIGHED FOR ELEKTRISK STØD
INDEHOLDER STRØMFØRENDE DELE
APPARATET MÅ KUN ÅBNES AF
KVALIFICERET.
SKAL INSTALLERES I JORDET RACK

ATENÇÃO:
PERIGO DE CHOQUE
SO PARA MONTAGEM
EM BASTIDOR

注意：
請勿打頂板以免觸電
該設備須放在機櫃中使用

WARNUNG:
SCHOCK GEFAHR
NICHT ÖFFNEN
NUR IN DAS GESTELL MONTIEREN

UWAGA:
GROZI PORAZENIEM
NIE OTWIERAC
MONTOWAC TYLKO W RAMIE

VARNING:
FARA FÖR ELEKTRICITETNEM KINYITNI
ÖPPNA EJ
MONTERES ENDAST I RACK

ADVERTENCIA:
PELIGRO DE DESCARGA ELÉCTRICA
NO ABRIR EL EQUIPO
SOLO PARA INSTALAR EN RACK

ΠΡΟΕΙΔΠΟΙΗΣΗ
ΚΙΝΔΗΝΟΣ ΗΛΕΚΤΡΟΠΛΗΞΙΑΣ
ΜΗΝ ΑΝΟΙΓΕΤΕ
ΤΟΠΟΘΕΤΕΙΣΤΕ ΜΟΝΟ ΣΕ ΚΑΤΑΛΛΗΛΟ
ΗΠΟΣΤΗΡΙΓΜΑΦΪΧ ΠπψΤψ

ТРЕДУПРЕЖДЕНИЕ:
Электрический опаность не открыте.
Монтироваега в ракега только.

Revision	Date	Comments
Release A	February 1999	Initial Release

About This Manual

Purpose

This manual provides information on the features, installation procedures, operational procedures, and specifications for the Integrator Series High Definition Routing Switcher Matrix Module Set.

Audience

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

This manual provides information on the High Definition Routing Switcher Matrix Module Set in the Integrator Series. There are separate manuals for each signal format, for the control system, for the Serial Protocol Reference used with the Serial Port control communications, and the main manual which provides a general overview of the Integrator Series and all frame specific information.

Conventions

This manual has the following typographical conventions:

- Computer or system information as displayed on a screen is represented in `Courier Font`.
- User required keyboard entries are shown in **Courier Bold Font**.
- **Bold** text is used to place emphasis on certain words.
- Push buttons or keys are shown exactly as they appear on the keyboard or unit or in **Bold Arial Font**.

Also, refer to the symbols and safety conventions listed in the Safety Summary at the beginning of this manual.

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Chapter 1

Integrator: High Definition Overview

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1.1 Unpacking/Customer Service

All Integrator systems are carefully inspected and calibrated before shipment to ensure years of stable, trouble-free operation. After unpacking, inspect for any visible damage caused during transit, and check each item against the packing list to verify delivery of the complete order. If there is damage, or any item on the packing list is missing, contact your Leitch dealer or call the factory for assistance.

Repair of this unit should be performed by qualified personnel only. Lethal voltages may be present if the unit is disassembled. Suitable precautions should be taken to prevent electrical shock.

WARNING!



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

A bench test of the entire system is recommended prior to final installation. Testing should include verification of configuration switch settings, cabling compatibility and proper system operation.

1.2 High Definition Matrix Module Set

The Integrator Routing Switcher System is a multi-format medium-to-large scale routing switcher system. High Definition is one of several signal types available in the Integrator Routing Switcher System. The Integrator's broadcast-quality High Definition Matrix Module Set is a set of modules and submodules that combine to create a customized matrix size and options package. The Integrator High Definition Matrix Module Set can be used in any of the three Integrator frame sizes: 4RU, 6RU, and 8RU.

The High Definition Routing Modules set provides switching for SMPTE 292M (1.485 Gb/s) for 720p or 1080i high definition serial digital video format signals.

The High Definition Integrator performs 16x16 high definition signal format switching in a single slot of the Integrator frame. There are three elements in the High Definition Matrix Mode Set; 64X-HDMB, 64X-HDMI, and 64X-HDBP. The '64X' represents the Integrator Series for its base matrix design. The 'HD' represents the High Definition signal Format. The 'MB' is the Mother Board or the main modules of the set. The 'MI' is the Midplane Input/Output Board. The 'BP' is the Backplane Input/Output Module that has the input and output connectors and provide the connections to and from the Integrator. The 64X-HDMI and the 64X-HDBP are assembled together and create the HD Backplane Module Assembly. The following sections contain a description of these modules and the other options available with the Integrator's High Definition Serial Digital Video Matrix Module Set.

1.2.1 64X-HDMB: Integrator High Definition Mother Board Module

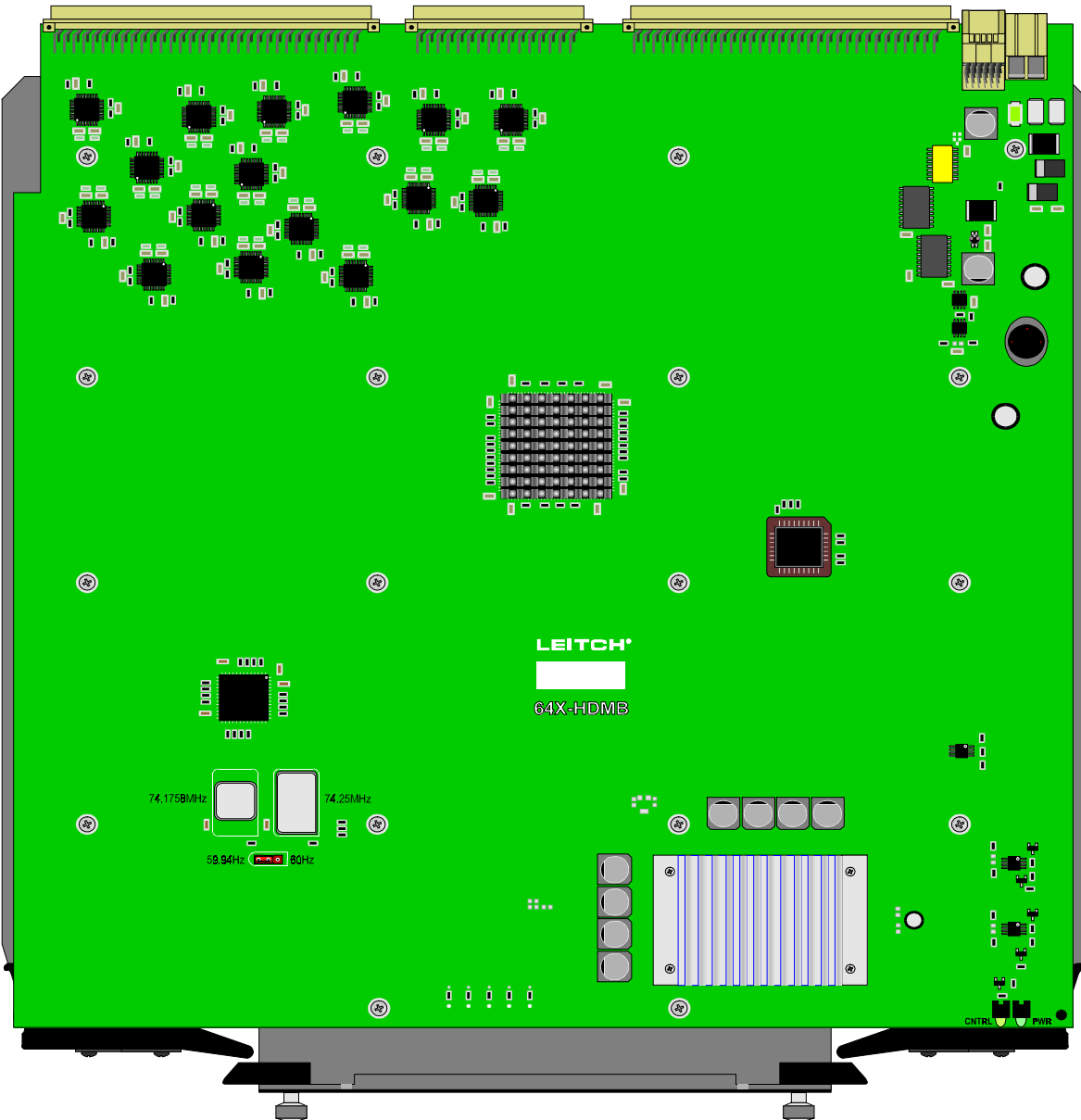


Figure 1-1 64X-HDMB: High Definition Mother Board

The Integrator 64X-HDMB High Definition Serial Video module is a 16 input by 16 output receiver and crosspoint module for SMPTE 292M (1.484 Gb/s) for 720p or 1080i high definition serial digital format signals. The board contains 16 digital cable equalizers, a 16x16 crosspoint matrix and reclocking to 59.94 Hz or 60 Hz refresh rate. The 64X-HDMB also contains a power conversion circuit and a control logic interface circuit.

The system controller automatically detects the presence, position, and matrix size of each module. There is one jumper setting required which is the setting for either 59.94 or 60 Hz frame rate.

Input Equalization

The High Definition Integrator offers automatic EQ. The 64X-SIB module contains input equalization circuits which receive the SDI signals from the 64X-VBPI Video Input Backpanel. The equalizer circuit recovers the SDI signal from the coax (or fiber, if applicable) cable and converts it to a differential signal which is distributed to the crosspoint IC. The equalizer IC can automatically recover a 270 Mb/s SDI signal from up to 100m of Belden 1694 cable. Longer cable runs may be possible over cable types with lower losses.

Crosspoint matrix

There is a single 16x16 crosspoint matrix which is non-expandable on the 64X-SIB module.

Logic Interface

The logic interface allows the 64X-HDIB module to communicate with the Integrator system controller. In addition to addressing the crosspoint matrix, the logic circuit also provides the system controller with information about the 64X-HDIB module. The 64X-HDIB matrix size, module location within the Integrator frame, I/O backpanel type, elevator board type, software revision level, power supply monitor status, and other information is provided to the system controller through the logic interface.

Communication with the system controller is confirmed by illumination of the yellow LED on the front edge of the 64X-HDIB module. Other information about the 64X-HDIB can be viewed with a terminal or computer connected to the Integrator system controller. Refer to the Integrator Series Routing Switchers Manual for more information on monitoring the status of modules within the Integrator frame.

Power Conversion

The Integrator frame supplies +/-24 Volts and +5V to all slots in the frame. The +5V from the frame is regulated by the frame power supply and used directly to power the logic control section of the 64X-HDIB module. The +/-24 volt inputs are converted to a single +5V rail with an on board DC-DC converter and used to power the rest of the 64X-HDIB module.

The +5V and +/- 24V rails contain a resettable poly fuse device that will trip in case of an over-current fault condition on the 64X-HDIB module. These poly fuse devices will automatically reset a short time after the over-current condition is no longer present.

The 64X-HDIB module contains four test points near the front edge of the card which provide access to the +24, -24, and +5V (labelled +5VL) rails that

power the module. A test point is also provided for the +5V rail from the on board DC-DC converter (labelled +5V). A ground test point is also provided.

A green LED on the front edge of the module indicates that power is present on the 64X-HDIB module, but does not guarantee that all rails are present and within specified limits of +/- 5%. The power supply rails are monitored with on board voltage monitors that provide the system controller with the status of the power supply rails.

The +/-24 volt rails draw a maximum of 1A from the Integrator frame power supply. The +5VL rail draws a maximum of 150 mA from the Integrator frame power supply. This module draws a maximum of 50 Watts from the Integrator frame power supply.

1.2.2 Integrator High Definition Backpanel Assembly

The Integrator High definition Backpanel Assembly contains both the 64X-HDBP and the 64X-HDMI. The 64X-HDBP is the Backpanel board that has the BNC connectors for the inputs or the outputs. The 64X-HDMI is the High Definition Interface Modules. This interface modules is mounted on the back of the backpanel module to make the Backpanel Assembly. The backpanel assembly is used to interface a total of 16 inputs and 16 outputs to/from the 64X-HDMB.

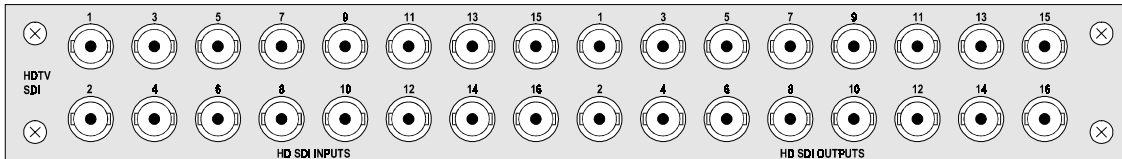


Figure 1-2 64X-HDBP Front View on the Rear Panel of the Integrator Frame

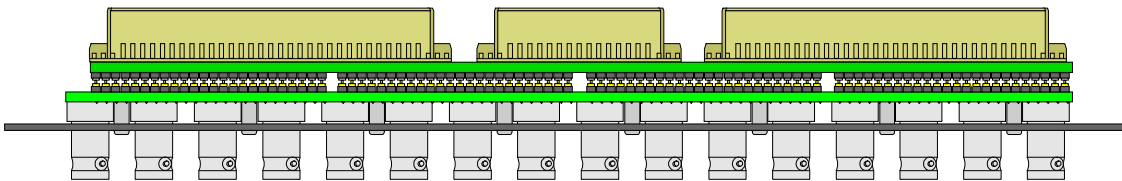


Figure 1-3 Side View of the Integrator High Definition Backpanel Assembly

Chapter 2

Installation and Configuration

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2.1 Frame Sizes and Types-Architecture

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. The following sections will outline the specific frame size options available using the Integrator's High Definition Matrix Module Set.

2.1.1 High Definition in the Four Rack Unit (4RU) Frame

The dimensions of the 4RU size Integrator frame are 17.50" x 15.83" x 6.969" and fits into a standard rack. The 4RU Integrator frame has a 4 matrix module capacity. The 4RU Integrator frame can house one signal type in the 64x64 matrix size or two signal types in the 32x32 size. The following table shows the modules required for each possible serial digital video configuration that can fit into the 4RU frame. (Note: All of these configurations are high definition format only. For mixed format configurations, see the mixed format configurations in the Integrator Configuration Guide.)

Model #s	Description	Modules/Parts Required			Required Slots
		64X-HDMB	64X-HDMI	64X-HDBP	
64X-16X16HDS4	16x16 High Definition Serial Digital Video	1	1	1	1

The 4RU version of the Integrator comes equipped with: a power supply module, a fan module, and a logic module. The upgrade options available with the 4RU Integrator are: a redundant power supply module, and a redundant logic module. The fan module can be purchased separately for failure replacement.

The following illustration is a basic block diagram showing typical high definition routing switcher signal flow. The modules and submodules in the signal flow are labeled to correspond to the previous descriptions in Section 1.2 High Definition Serial Digital Video Matrix Module Set.

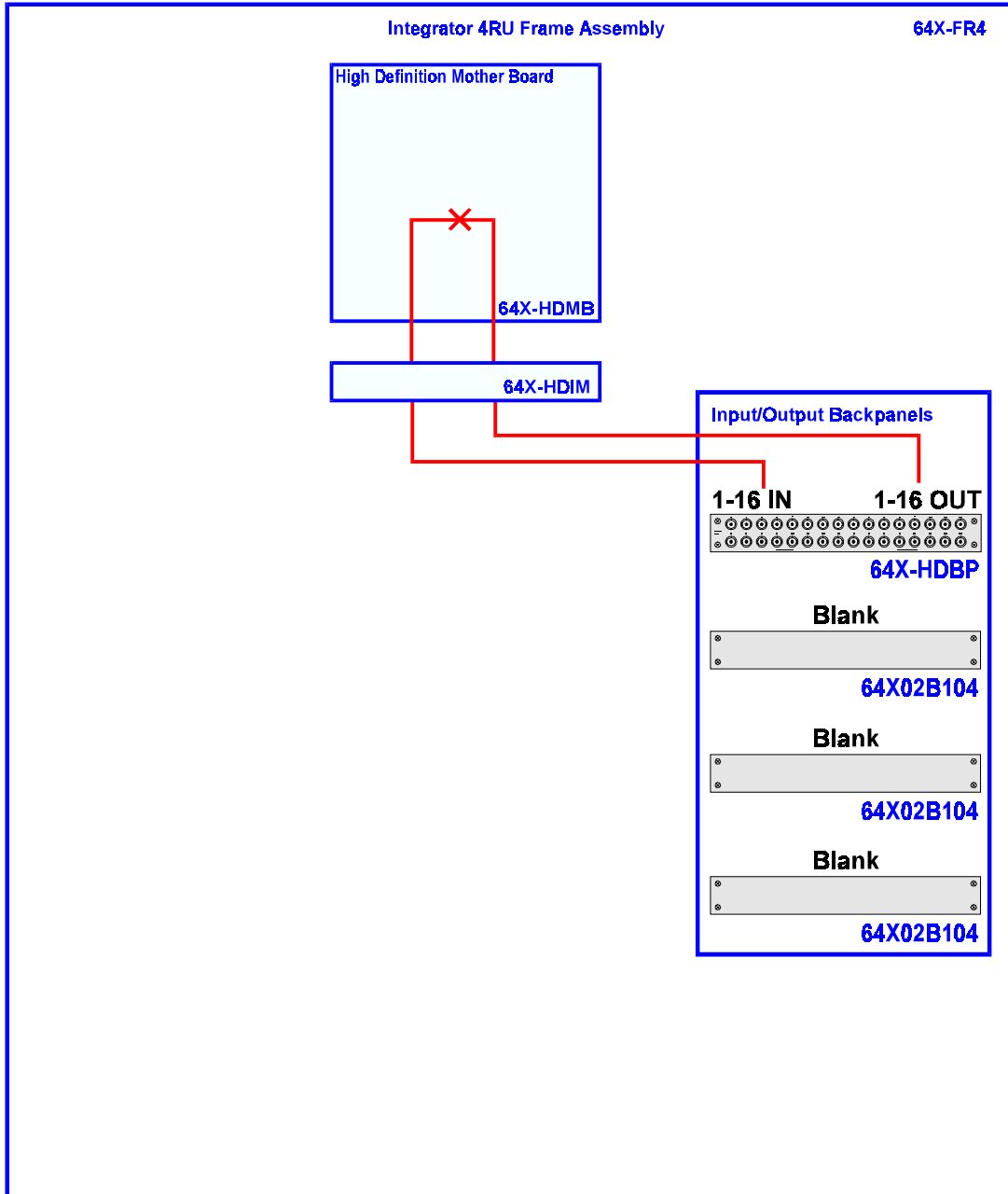


Figure 2-1 Signal Flow of 16x16 High Definition Serial Digital Video in a 4RU Integrator Frame

The high definition signal comes into the Integrator from the BNC connectors of the 64X-HDBP on the rear panel. The signal passes through the connectors to the 64X-HDMI and is equalized before traveling to the 64X-HDMB Mother Board. The signal is then switched to the proper output by the crosspoint chip. Before leaving the Mother board the signal is reclocked and travels back to the Midplane interface module. The signal is supplied to the output BNCs on the 64X-HDBP Backpanel on the back of the Integrator frame.

2.2 Configuration Settings

There is only one configuration setting required in the High Definition Integrator.

2.2.1 Frame Rate Jumper Settings

There are two possible settings for Frame Rate for the High Definition Integrator. The 59.94 Hz setting is the frame rate used when the 74.1758 MHz crystal for data at 1.485/1.001 Gb/s. The 60 Hz setting is the frame rate used when the 75.25 MHz crystal for data at 1.485 Gb/s. The following is an illustration outlining this setting.

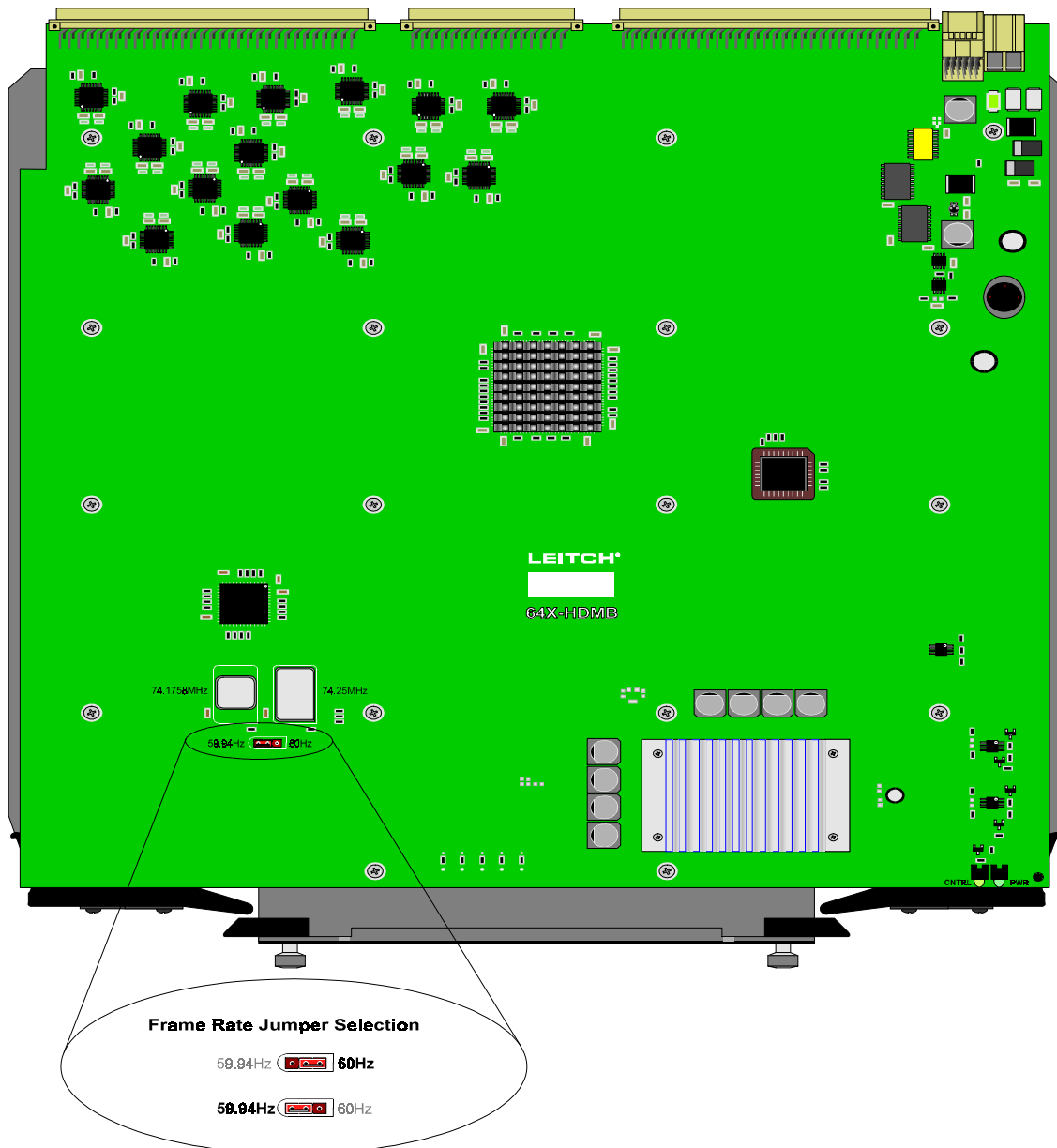


Figure 2-2 64X-HDMB Frame Rate Jumper Setting

Chapter 3

Specifications

3.1 High Definition Serial Digital Video Specifications 3-2

3.1 High Definition Serial Digital Video Specifications

HD Video Inputs

Number	16
Type	75 Ohm
Equalization	Automatic up to 100m of Belden 1694
Signal Type	HDTV 720 p, 1080I, etc. at 1.485 Gb/s
Level	800 mV +/- 10%; SMPTE 292 compliant

HD Video Outputs

Number	16
Type	75 Ohm
Signal Type	HDTV 720 p, 1080I, etc. at 1.485 Gb/s
Level	800 mV +/- 10%; SMPTE 292 compliant
Jitter	< 200 ps
Reclocking	Automatic on all outputs
Frame Rate	Jumper Selectable for 59.94 or 60 Hz

Specifications and designs are subject to change without notice.



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