Kaleido-X (4RU)

Unmatched picture quality and layout flexibility

Hardware Description & Installation Manual

M809-9900-121

17 December 2014

grass valley
A **BELDEN** BRAND

Copyright & Trademark Notice

Terms and Conditions

Title	Kaleido-X (4RU) Hardware Description & Installation Manual
Part Number	M809-9900-121
Revision	17 December 2014, 4:31 pm

Important Safeguards and Notices

This section provides important safety guidelines for operators and service personnel. Specific warnings and cautions appear throughout the manual where they apply. Please read and follow this important information, especially those instructions related to the risk of electric shock or injury to persons.

Symbols and Their Meanings

Indicates that dangerous high voltage is present within the equipment enclosure that may be of sufficient magnitude to constitute a risk of electric shock.

Indicates that the user, operator or service technician should refer to the product manuals for important operating, maintenance, or service instructions.

This is a prompt to note the fuse rating when replacing fuses. The fuse referenced in the text must be replaced with one having the ratings indicated.

Identifies a protective grounding terminal which must be connected to earth ground prior to making any other equipment connections.
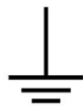
Identifies an external protective grounding terminal which may be connected to earth ground as a supplement to an internal grounding terminal.

Indicates that static sensitive components are present, which may be damaged by electrostatic discharge. Use anti-static procedures, equipment and surfaces during servicing.

Indicates that the equipment has more than one power supply cord, and that all power supply cords must be disconnected before servicing to avoid electric shock.

The presence of this symbol in or on Grass Valley equipment means that it has been tested and certified as complying with applicable Canadian Standard Association (CSA) regulations and recommendations for USA/Canada.

The presence of this symbol in or on Grass Valley equipment means that it has been tested and certified as complying with applicable Underwriters Laboratory (UL) regulations and recommendations for USA/Canada.

The presence of this symbol in or on Grass Valley equipment means that it has been tested and certified as complying with applicable Intertek Testing Services regulations and recommendations for USA/Canada.

Intertek

The presence of this symbol in or on Grass Valley product means that it complies with all applicable European Union (CE) directives.

The presence of this symbol in or on Grass Valley product means that it complies with safety of laser product applicable standards.

Warnings

A warning indicates a possible hazard to personnel, which may cause injury or death. Observe the following general warnings when using or working on this equipment:

- Appropriately listed/certified mains supply power cords must be used for the connection of the equipment to the mains voltage at either 120 V AC or 240 V AC.
- This product relies on the building's installation for short-circuit (over-current) protection. Ensure that a fuse or circuit breaker for 120 V AC or 240 V AC is used on the phase conductors.
- Any instructions in this manual that require opening the equipment cover or enclosure are for use by qualified service personnel only.
- Do not operate the equipment in wet or damp conditions.
- This equipment is grounded through the grounding conductor of the power cords. To avoid electrical shock, plug the power cords into a properly wired receptacle before connecting the equipment inputs or outputs.
- Route power cords and other cables so they are not likely to be damaged. Properly support heavy cable bundles to avoid connector damage.
- Disconnect power before cleaning the equipment. Do not use liquid or aerosol cleaners; use only a damp cloth.
- Dangerous voltages may exist at several points in this equipment. To avoid injury, do not touch exposed connections and components while power is on.
- High leakage current may be present. Earth connection of product is essential before connecting power.
- Prior to servicing, remove jewelry such as rings, watches, and other metallic objects.
- To avoid fire hazard, use only the fuse type and rating specified in the service instructions for this product, or on the equipment.
- To avoid explosion, do not operate this equipment in an explosive atmosphere.
- Use proper lift points. Do not use door latches to lift or move equipment.
- Avoid mechanical hazards. Allow all rotating devices to come to a stop before servicing.
- Have qualified service personnel perform safety checks after any service.

Cautions

A caution indicates a possible hazard to equipment that could result in equipment damage. Observe the following cautions when operating or working on this equipment:

- This equipment is meant to be installed in a restricted access location.

- When installing this equipment, do not attach the power cord to building surfaces.
- Products that have no on/off switch, and use an external power supply must be installed in proximity to a main power outlet that is easily accessible.
- Use the correct voltage setting. If this product lacks auto-ranging power supplies, before applying power ensure that each power supply is set to match the power source.
- Provide proper ventilation. To prevent product overheating, provide equipment ventilation in accordance with the installation instructions.
- Do not operate with suspected equipment failure. If you suspect product damage or equipment failure, have the equipment inspected by qualified service personnel.
- To reduce the risk of electric shock, do not perform any servicing other than that contained in the operating instructions unless you are qualified to do so. Refer all servicing to qualified service personnel. Servicing should be done in a static-free environment.
- This unit may have more than one power supply cord. Disconnect all power supply cords before servicing to avoid electric shock.
- Follow static precautions at all times when handling this equipment.

Electrostatic Discharge (ESD) Protection

Electrostatic discharge occurs when electronic components are improperly handled and can result in intermittent failure or complete damage adversely affecting an electrical circuit. When you remove and replace any card from a frame always follow ESD-prevention procedures:

- Ensure that the frame is electrically connected to earth ground through the power cord or any other means if available.
- Wear an ESD wrist strap ensuring that it makes good skin contact. Connect the grounding clip to an *unpainted surface* of the chassis frame to safely ground unwanted ESD voltages. If no wrist strap is available, ground yourself by touching the *unpainted* metal part of the chassis.
- For safety, periodically check the resistance value of the antistatic strap, which should be between 1 and 10 megohms.
- When temporarily storing a card make sure it is placed in an ESD bag.
- Cards in an earth grounded metal frame or casing do not require any special ESD protection.

Battery Handling

This product includes a backup battery. There is a danger of explosion if the battery is replaced incorrectly. Replace the battery only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions. Before disposing of your Grass Valley equipment, please review the *Disposal and Recycling Information* appendix.

Mesures de sécurité et avis importants

La présente section fournit des consignes de sécurité importantes pour les opérateurs et le personnel de service. Des avertissements ou mises en garde spécifiques figurent dans le manuel, dans les sections où ils s'appliquent. Prenez le temps de bien lire les consignes et assurez-vous de les respecter, en particulier celles qui sont destinées à prévenir les décharges électriques ou les blessures.

Signification des symboles utilisés

Signale la présence d'une tension élevée et dangereuse dans le boîtier de l'équipement ; cette tension peut être suffisante pour constituer un risque de décharge électrique.

Avertit l'utilisateur, l'opérateur ou le technicien de maintenance que des instructions importantes relatives à l'utilisation et à l'entretien se trouvent dans la documentation accompagnant l'équipement.

Invite l'utilisateur, l'opérateur ou le technicien de maintenance à prendre note du calibre du fusible lors du remplacement de ce dernier. Le fusible auquel il est fait référence dans le texte doit être remplacé par un fusible du même calibre.

Identifie une borne de mise à la terre de protection. Il faut relier cette borne à la terre avant d'effectuer toute autre connexion à l'équipement.

Identifie une borne de mise à la terre externe qui peut être connectée en tant que borne de mise à la terre supplémentaire.

Signale la présence de composants sensibles à l'électricité statique et qui sont susceptibles d'être endommagés par une décharge électrostatique. Utilisez des procédures, des équipements et des surfaces antistatiques durant les interventions d'entretien.

Le symbole ci-contre signifie que l'appareil comporte plus d'un cordon d'alimentation et qu'il faut débrancher tous les cordons d'alimentation avant toute opération d'entretien, afin de prévenir les chocs électriques.

La marque C-CSA-US certifie que l'appareil visé a été testé par l'Association canadienne de normalisation (CSA) et reconnu conforme aux exigences applicables en matière de sécurité électrique en vigueur au Canada et aux États-Unis.

La marque C-UL-US certifie que l'appareil visé a été testé par Underwriters Laboratory (UL) et reconnu conforme aux exigences applicables en matière de sécurité électrique en vigueur au Canada et aux États-Unis.

La marque ETL Listed d'Intertek pour le marché Nord-Américain certifie que l'appareil visé a été testé par Intertek et reconnu conforme aux exigences applicables en matière de sécurité électrique en vigueur au Canada et aux États-Unis.

Le marquage CE indique que l'appareil visé est conforme aux exigences essentielles des directives applicables de l'Union européenne en matière de sécurité électrique, de compatibilité électromagnétique et de conformité environnementale.

Le symbole ci-contre sur un appareil Grass Valley ou à l'intérieur de l'appareil indique qu'il est conforme aux normes applicables en matière de sécurité laser.

Avertissements

Les avertissements signalent des conditions ou des pratiques susceptibles d'occasionner des blessures graves, voire fatales. Veuillez vous familiariser avec les avertissements d'ordre général ci-dessous :

- Un cordon d'alimentation dûment homologué doit être utilisé pour connecter l'appareil à une tension de secteur de 120 V CA ou 240 V CA.

- La protection de ce produit contre les courts-circuits (surintensités) dépend de l'installation électrique du bâtiment. Assurez-vous qu'un fusible ou un disjoncteur pour 120 V CA ou 240 V CA est utilisé sur les conducteurs de phase.

- Dans le présent manuel, toutes les instructions qui nécessitent d'ouvrir le couvercle de l'équipement sont destinées exclusivement au personnel technique qualifié.

- N'utilisez pas cet appareil dans un environnement humide.

- Cet équipement est mis à la terre par le conducteur de mise à la terre des cordons d'alimentation. Pour éviter les chocs électriques, branchez les cordons d'alimentation sur une prise correctement câblée avant de brancher les entrées et sorties de l'équipement.

- Acheminez les cordons d'alimentation et autres câbles de façon à ce qu'ils ne risquent pas d'être endommagés. Supportez correctement les enroulements de câbles afin de ne pas endommager les connecteurs.

- Coupez l'alimentation avant de nettoyer l'équipement. Ne pas utiliser de nettoyants liquides ou en aérosol. Utilisez uniquement un chiffon humide.

- Des tensions dangereuses peuvent exister en plusieurs points dans cet équipement. Pour éviter toute blessure, ne touchez pas aux connexions ou aux composants exposés lorsque l'appareil est sous tension.

- Avant de procéder à toute opération d'entretien ou de dépannage, enlevez tous vos bijoux (notamment vos bagues, votre montre et autres objets métalliques).

- Pour éviter tout risque d'incendie, utilisez uniquement les fusibles du type et du calibre indiqués sur l'équipement ou dans la documentation qui l'accompagne.

- Ne pas utiliser cet appareil dans une atmosphère explosive.

- Présence possible de courants de fuite. Un raccordement à la masse est indispensable avant la mise sous tension.

- Après tout travail d'entretien ou de réparation, faites effectuer des contrôles de sécurité par le personnel technique qualifié.

Mises en garde

⚠️ Les mises en garde signalent des conditions ou des pratiques susceptibles d'endommager l'équipement. Veuillez vous familiariser avec les mises en garde ci-dessous :

- L'appareil est conçu pour être installé dans un endroit à accès restreint.
- Au moment d'installer l'équipement, ne fixez pas les cordons d'alimentation aux surfaces intérieures de l'édifice.
- Les produits qui n'ont pas d'interrupteur marche-arrêt et qui disposent d'une source d'alimentation externe doivent être installés à proximité d'une prise de courant facile d'accès.
- Si l'équipement n'est pas pourvu d'un modules d'alimentation auto-adaptables, vérifiez la configuration de chacun des modules d'alimentation avant de les mettre sous tension.
- Assurez une ventilation adéquate. Pour éviter toute surchauffe du produit, assurez une ventilation de l'équipement conformément aux instructions d'installation.
- N'utilisez pas l'équipement si vous suspectez un dysfonctionnement du produit. Faites-le inspecter par un technicien qualifié.
- Pour réduire le risque de choc électrique, n'effectuez pas de réparations autres que celles qui sont décrites dans le présent manuel, sauf si vous êtes qualifié pour le faire. Confiez les réparations à un technicien qualifié. La maintenance doit se réaliser dans un milieu libre d'électricité statique.
- L'appareil peut comporter plus d'un cordon d'alimentation. Afin de prévenir les chocs électriques, débrancher tous les cordons d'alimentation avant toute opération d'entretien.
- Veillez à toujours prendre les mesures de protection antistatique appropriées quand vous manipulez l'équipement.

Protection contre les décharges électrostatiques (DES)

⚠️ Une décharge électrostatique peut se produire lorsque des composants électroniques ne sont pas manipulés de manière adéquate, ce qui peut entraîner des défaillances intermittentes ou endommager irrémédiablement un circuit électrique. Au moment de remplacer une carte dans un châssis, prenez toujours les mesures de protection antistatique appropriées :

- Assurez-vous que le châssis est relié électriquement à la terre par le cordon d'alimentation ou tout autre moyen disponible.
- Portez un bracelet antistatique et assurez-vous qu'il est bien en contact avec la peau. Connectez la pince de masse à une *surface non peinte* du châssis pour détourner à la terre toute tension électrostatique indésirable. En l'absence de bracelet antistatique, déchargez l'électricité statique de votre corps en touchant une surface métallique *non peinte* du châssis.

- Pour plus de sécurité, vérifiez périodiquement la valeur de résistance du bracelet antistatique. Elle doit se situer entre 1 et 10 mégohms.
- Si vous devez mettre une carte de côté, assurez-vous de la ranger dans un sac protecteur antistatique.
- Les cartes qui sont reliées à un châssis ou boîtier métallique mis à la terre ne nécessitent pas de protection antistatique spéciale.

Remplacement et élimination des piles

L'appareil renferme une pile. Pour réduire le risque d'explosion, vérifiez la polarité et ne remplacez la pile que par une pile du même type, recommandée par le fabricant. Mettez les piles usagées au rebut conformément aux directives du fabricant. Avant de vous défaire de l'équipement, assurez-vous d'avoir lu l'appendice *Disposal and Recycling Information.*

Recycling

Visit www.grassvalley.com for recycling information.

Certification and Compliance

Safety Compliance

This equipment complies with the requirements of the following standards for safety of information technology equipment:

- CSA-C22.2 No. 60950-1-07
- UL 60950-1 (2nd Edition)
- IEC 60950-1:2005 (2nd Edition)

The power cords supplied with this equipment meet the appropriate national standards for the country of destination.

Electromagnetic Compatibility

This equipment has been tested for verification of compliance with FCC Part 15, Subpart B requirements for class A digital devices.

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

CE This equipment has been tested and found to comply with the requirements of the EMC directive 2004/108/EC:

- EN 55022 Class A Radiated and conducted emissions
- EN 61000-3-2 Limits for harmonic current emissions
- EN 61000-3-3 Limitation of voltage changes, voltage fluctuations and flicker
- EN 61000-4-2 Electrostatic discharge immunity
- EN 61000-4-3 Radiated, radio-frequency, electromagnetic field immunity
- EN 61000-4-4 Electrical fast transient/burst immunity
- EN 61000-4-5 Surge transient immunity
- EN 61000-4-6 Conducted disturbances immunity
- EN 61000-4-11 Voltage dips, short interruptions and voltage variations immunity

Table of Contents

1 Kaleido-X (4RU) Installation

The Kaleido-X is a multi-room, multi-image display processor and router in a single, expandable chassis. This document contains physical descriptions, installation instructions and connection information for the Kaleido-X (4RU) frame and the cards that are installed in it.

Summary

Introduction

The Kaleido-X (4RU) system's unique mix of capabilities represents the most integrated monitoring and routing solution. As a multi-image processor, it offers the highest level of signal flexibility. Each chassis can display 32 HD, SD or Analog inputs any number of times, in any size, across 4 displays of any resolution and orientation.

Features

Unmatched flexibility	Any source can be repeated to any position, to any display, at any size, at any resolution, without blocking or grouping restrictions.
Superior display	Highest quality multi-image output without compression, with superior on-screen graphics, for the most critical live monitoring applications.
768 audio channels	Unprecedented audio performance with the ability to monitor up to 768 channels of audio, including embedded, discrete AES, or discrete analog.

Multi-room layouts	Intuitive layout editor software allows rapid creation of multi-room layouts, which can be recalled quickly from networked remote control panels.
Highly robust	Highly robust design, with multiple points of redundancy, and no single point of failure for reliable 24/7 operation.

Overview of the Kaleido-X System

The following diagram shows a basic Kaleido-X (4RU) system configuration, with a single Kaleido-X (4RU) feeding 4 monitor wall displays. The Kaleido-RCP2 (if available) would be located on the production desk, while the Client PC could be anywhere with internet access to the network.
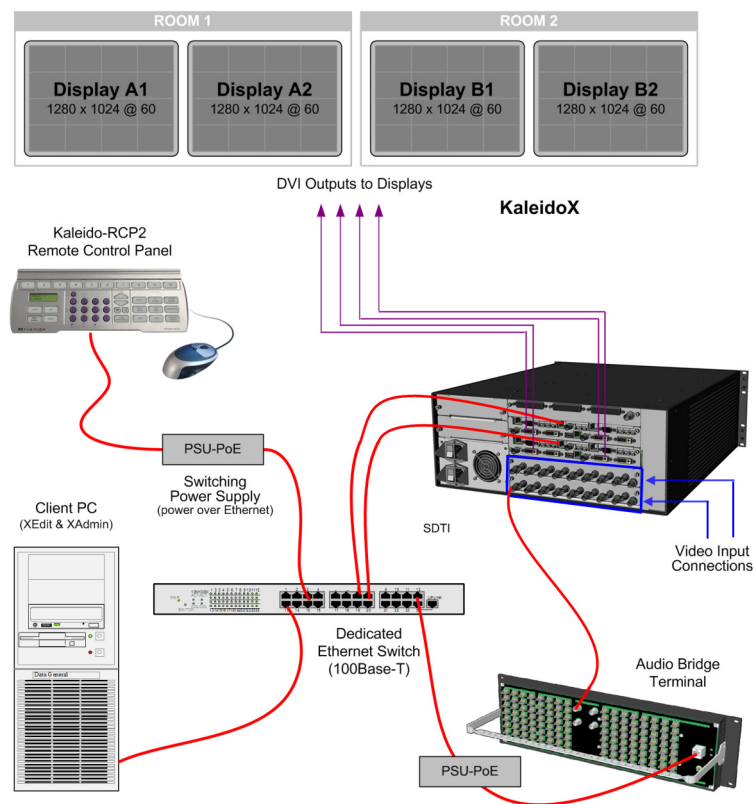
The diagram below shows the Kaleido-X multiviewer system and its inputs and outputs. Examples of the various external devices that connect to the multiviewer are also shown.
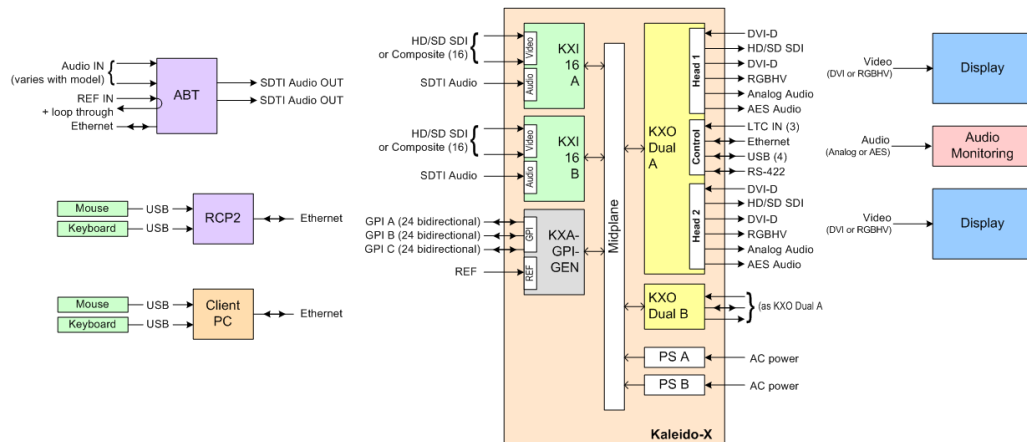
Kaleido-X (4RU) system block diagram

Mechanical Installation

Unpacking

Make sure the following items have been shipped with your Kaleido-X. If any of these are missing, contact your distributor or Grass Valley.

- Kaleido-X unit, with pre-installed cards and power supplies
- 2 AC power cords
- A DVD of system software and documentation
- The Kaleido-X (4RU) Quick Start Guide
- DVD including the Release Notes for the current version of the Kaleido-X software, the Kaleido-X User's Manual, database samples, Quick Start guides and hardware reference manuals for all multiviewer models

> Note: In line with our commitment to environmental preservation, only the Quick Start Guide for your multiviewer model, and some ancillary documents (e.g. welcome letters, warranty cards) are distributed in printed form. All manuals and the Release Notes are available on the DVD that shipped with your multiviewer. See the *Documentation* section of the Release Notes for a complete list. You can obtain the latest version of the manuals, the Release Notes, as well as software and useful data, from the *Software and documentation* section of Grass Valley's support portal.

- Keyboard
- Mouse

- Serial port adapters (one with straight cabling and one with crossover cabling for each output card in your multiviewer):

Part number	Adapter cabling	RS-422 pinout at the DE-9P connector
1737-3000-102	Straight	Controller (SMPTE master) mode
1792-3700-100	Crossover	Tributary (SMPTE slave) mode

Rack-Mount Installation

A Kaleido-X multiviewer may be installed in a standard 19-inch rack, using the proper screws and washers (not included). The Kaleido-RCP2 Remote Control Panel (optional) may also be installed in a rack using the optional KRCP-RK2 mounting kit.

For proper ventilation, make sure the front and side panel air vents are not blocked and the air filter is clean.

Frame and Electrical Installation

Kaleido-X (4RU) is a self-contained unit consisting of a frame, redundant power supplies, and various input and output cards. The monitor wall displays and external control devices complete the system.

Frame

The Kaleido-X (4RU) frame is 4 RU high. It incorporates an internal midplane for interconnecting the cards. Cards are installed from the front of the frame. Each card is associated with input and/or output connectors which are mounted on a connector panel. These connector panels are installed from the rear of the frame, in the same vertical position as their associated card. The redundant power supplies are installed in the lower right-hand corner of the frame.

The hinged front door can be opened to give access to the cards.

The Kaleido-X (4RU) frame incorporates the following key elements:

- A rack-mountable mechanical framework
- A side-opening, removable door to cover and protect the front of the frame and the installed cards
- A midplane board that enables inter-card communication
- Slots for installing signal processing cards that plug into the midplane
- Mounting points for rear connector panels
- Redundant power supplies
- Ventilation

The front slots and rear panel connection points are color-coded according to the type of card that can be located in the slot. The extractor handles on the cards are color-coded to match. The cards are physically configured so they cannot be installed in the wrong type of slot.

Slot #   Slot #

1

2

3

4

5

6

7

PSU A

PSU B
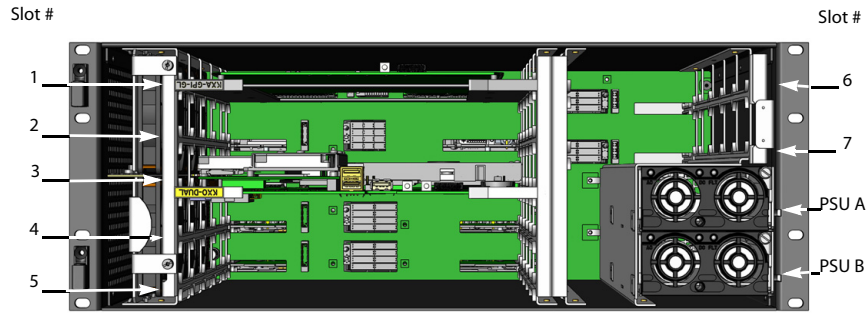
The illustration above shows the location of the available slots in the frame. The function of each slot is given in the following table:

Slot	Function	Color code		Card type
1	Main	Grey		KXA-GPI-GEN
2	Output A	Yellow		KXO-Dual3, KXO-Dual
3	Output B			
4	Input A	Green		KXI-16HSV3, KXI-16HSV
5	Input B			KXI-16HS3, KXI-16HS KXI-16SV
6	Option A	Mauve		Future Use
7	Option B			

The rear of the frame holds the rear connector panels for the cards, the AC power connectors with integral ON/OFF switches, and a fan for power-supply cooling.

AC power sockets with ON/OFF switches

Power supply cooling fan   Rear connector panels
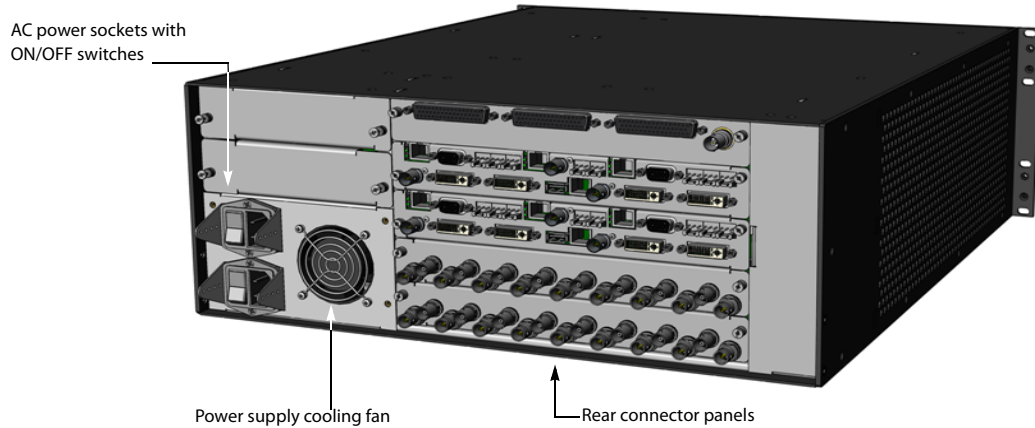
Monitoring the Temperature of the Kaleido-X

For optimal performance, it is strongly recommended that you operate the Kaleido-X in an environment with an ambient temperature lower than 20 °C (68 °F).

> IMPORTANT
> **When measuring the ambient room temperature, take your readings from directly in front of the Kaleido-X frame.**

There are two factors that could influence airflow inside the frame:

- altitude
- airflow obstruction at the rear of the unit

To monitor airflow efficiency, the Kaleido-X offers on-board probing that monitors the temperature in strategic areas. Use the table, below, to determine whether measured values exceed recommended values.

Monitored values via XAdmin	Temperature should not exceed
Input cards	75 ºC (167 ºF)
Output cards	83 ºC (181 ºF)

Keep in mind that these values are measured *at the chip level* and should be interpreted as *relative indicators* of the cards' internal temperature and of the system's overall ability to evacuate excess heat, in the context of your specific system configuration.

If measured values exceed recommended values, make the necessary corrections to your installation (please contact Grass Valley Technical Support for the recommended practice).

Power Supplies

The Kaleido-X is powered by dual redundant power supplies. These are installed in the lower right-hand corner of the frame. The supplies are installed and removed from the front of the frame and are hot-swappable, so that a defective supply may be replaced without removing the Kaleido-X from service.

Access the power supplies by opening the front door of the frame. PSU A is located on the top, and PSU B is located on the bottom.
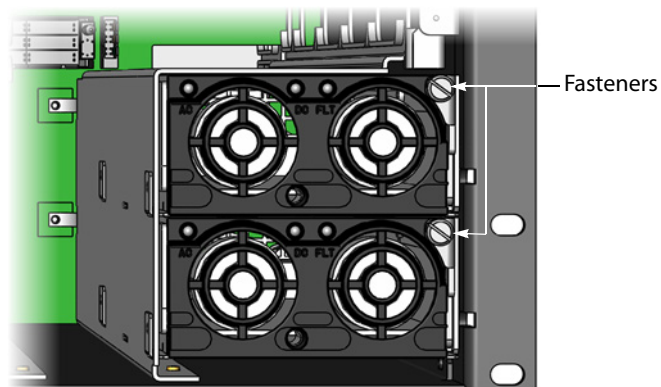
Fasteners

Removing a Power Supply

To remove a power supply

1 Open the front door of the frame and locate the two power supplies at the lower right side.
2 Undo the threaded fastener at the upper right side of the supply to be removed.

3 Pull on the bracket holding the fastener; it rotates down and becomes a handle for pulling the power supply out of its slot.

Installing a Power Supply

To install a power supply

1 Position the supply in front of an empty power supply slot in the top front of the frame, with the connector end towards the frame.

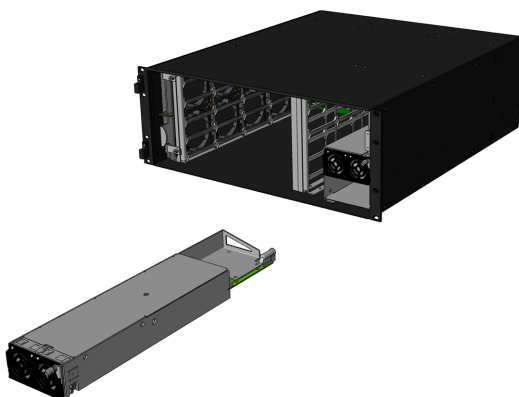2 Slide the power supply into the empty slot, moving it gently until it contacts the sockets at the rear of the slot.

3 Push firmly but gently on the power supply faceplate until the power supply's connectors have mated with the frame's sockets, and the power supply will go in no further.

4 Use the captive screw in the rotating handle to secure the power supply in position.

Operation

Separate AC connectors are provided for the two power supplies, and are located at the bottom left of the rear of the frame as seen from the rear. Connect both power supplies to an appropriate power source using the supplied power cords.

- The top power socket is for PSU A.
- The bottom power socket is for PSU B.

An ON/OFF power switch for each supply is integrated into its AC connector on the rear panel. The front panel of each power supply incorporates three status lamps, as shown:

AC (green): lit when AC power is ON

DC (green): lit when DC output is OK

FLT (red): lit when supply is faulty
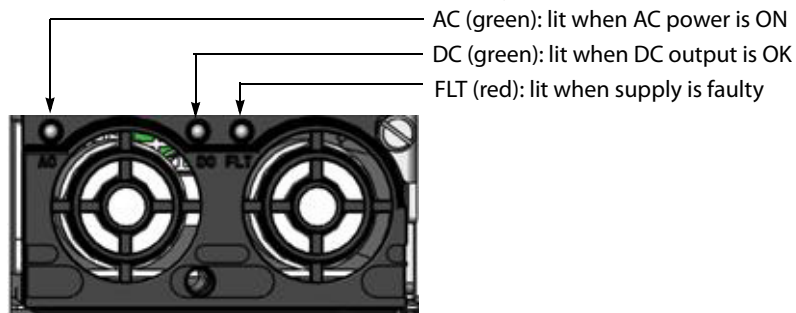
Ventilation

The Kaleido-X frame is cooled by ventilation fans. Fans are located in key positions within the frame.

Frame Cooling Fans

Primary ventilation for the cards installed in the frame is handled by eight fans located in a module on the left-hand side of the frame.

> IMPORTANT
> **The Kaleido-X requires a constant flow of cooling air during operation.**
> **DO NOT OPERATE THE UNIT IF THE FRAME COOLING FANS ARE NOT WORKING.**
> To replace a defective fan, see Replacing a Defective Cooling Fan, on page 25.

These fans draw air into the frame through a grille and filter in the front door, and exhaust it through the grate on the side of the frame.

Cooling fan module
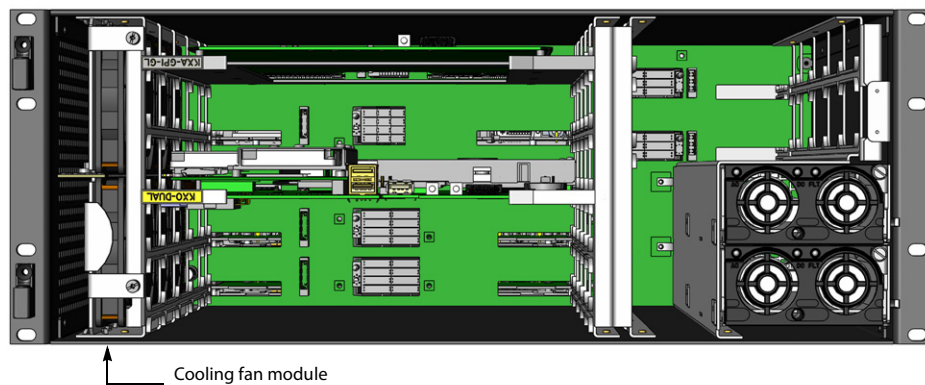
Power Supply Cooling Fans

Each power supply has two fans located on the front of the supply.

In addition, there is a fan located on the rear panel directly behind the power supplies, beside the AC connectors.

Card Cooling Fans

Some of the cards in the Kaleido-X system are equipped with on-board fans to ensure proper cooling of key components. These fans focus the air flow provided by the frame cooling fans.

Card	On-board fans
Output (KXO) card	4
Input (KXI-16) card	4
GPI/genlock card	0

Air Filter

Cooling air drawn into the Kaleido-X frame by the ventilating fans passes through a filter located behind a grille in the front door of the frame. To clean the air filter, see Cleaning the Air Filter, on page 24.

Card Installation and Replacement

This section describes the installation of rear connector panels and cards in the Kaleido-X frame.

Installing a Rear Connector Panel

To install a rear connector panel

1 Remove the blank rear panel or the rear panel from the previously-installed card, using a screwdriver to loosen the two captive screws.

2 Position the new rear panel in the vacant location so its connectors are aligned with the corresponding plugs, and push it gently into place so the connectors mate.

3 Secure the panel in place, using a screwdriver to tighten the two captive screws.

Removing a Card

To remove a card

1 Open the front door of the frame and locate the card to be removed.

2 Pull the ends of the two extractor handles out and away from the center of the card, levering it out of its connector.

3 Grasp the extractor handles, and pull the card gently straight out of the slot.

Installing a Card

To install a card

1 Open the front door of the frame and locate an empty slot appropriate for the card type.

> Note: The cards are mechanically configured so that it is not possible to install a card in the wrong slot.

2 Orient the card so that the labelled and color-coded extractor handle is on the left and the connectors are toward the frame.

3 Slide the card all the way into the slot until it touches the connectors.

4 Push gently on the extractor handles until the connectors mate and the card is completely into the slot.

Kaleido-X Cards

KXO-Dual Output Cards

The KXO-Dual and KXO-Dual3 cards are output cards that can be installed in a Kaleido-X multiviewer. They are dual-head output cards, meaning that they support two independent outputs. These outputs, called *Head 1* and *Head 2*, are each provided with a complete set of connectors.
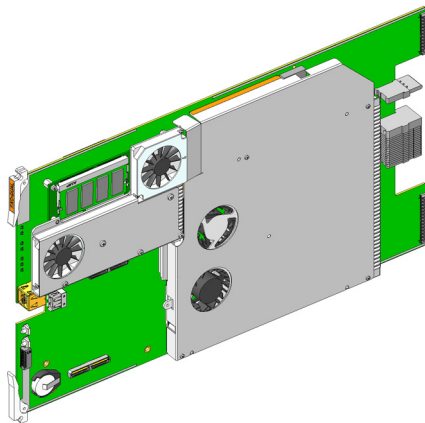
The KXO-Dual and KXO-Dual3 are multi-function cards that perform a significant portion of the signal processing required to create the monitor wall output. They incorporate a mezzanine card mounted on the component side. Each output card is complemented by a rear panel (KXO-Dual-R) that holds all input and output connectors associated with the card.

Output cards can be installed in any of the two available OUTPUT slots inside a Kaleido-X frame. These slots are color-coded YELLOW on the front and rear panel of the frame.

A Kaleido-X frame must contain at least one output card. In systems with two cards, one card is considered the *master* card, and the other is a *slave*, from a processing point of view.

• If both Output slots A and B are occupied, the card in Output A becomes the *master*.

- If the card in Output A is removed, the card in Output B will assume the master role automatically.

> **Notes**
> - Be careful to install the rear panel in the matching location at the rear of the frame.
> - The card and its rear panel can be installed in any order.
> - These cards are hot-swappable; it is not necessary to turn off the Kaleido-X when installing or replacing cards.
> - If a software master card loses network connectivity while remaining seated in its slot, then none of the other cards will take over and the multiviewer will be unavailable on the network until the connectivity issue is resolved.

Every output card is connected to the other cards in the Kaleido-X frame through the frame's internal midplane.

External connections to the card are made through connectors that are found in two locations:

- on the rear panel (see Rear Panel Connections below)
- on the front card edge (see Front Card-Edge Layout, on page 14)

HD-SDI Monitoring Output Option

The output cards provide support for HD-SDI monitoring output in 720p, 1080i or 1080p (available with the optional KXO-HDM mezzanine).

- **KXO-Dual:** If the KXO-HDM mezzanine is installed on a KXO-Dual card, the only HD-SDI output formats supported are 720p and 1080i.
- **KXO-Dual3:** For a KXO-Dual3 card, the scan format is set with the associated displays' configuration, in XEdit. Refer to the Rooms chapter, in the Kaleido-X User's Manual, for details.

> Note: To install a KXO-HDM mezzanine on an existing KXO-Dual or KXO-Dual3 card, refer to the *KXO-HDM Installation Instructions*, for details. This document is available from Grass Valley's support portal, and on the DVD that shipped with your system.

Rear Panel Connections

The rear panel layout is divided into three areas: Head 1, Head 2, and Control.

Bottom of panel   Top of panel
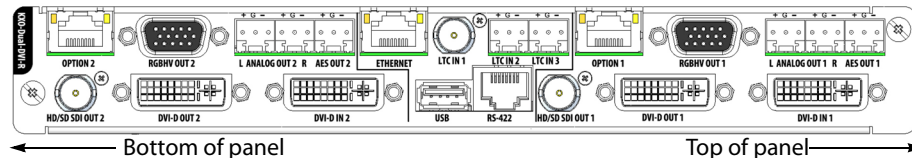
Head 1

The connectors located at the top of the rear panel (right-hand side when the card is horizontal and you can read the connector labels normally) are the *Head 1* connectors.

Head 2

The connectors located at the bottom of the rear panel (left-hand side when the card is horizontal and you can read the connector labels normally) are the *Head 2* connectors.
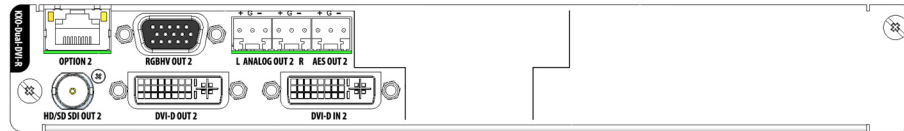
Control

The connectors located in the middle of the rear panel are *control* connectors.

The following table lists the function of each connector associated with the output heads.

Connector label		Connector type	Function
Head 1	Head 2		
HD/SD SDI OUT 1	HD/SD SDI OUT 2	BNC	Serial digital HD output signal for monitoring purposes
DVI IN 1	DVI IN 2	DVI	DVI input signal that can be used as a background in the monitor wall display in place of the internally-generated background
DVI-D OUT 1	DVI-D OUT 2	DVI	DVI digital output (no analog signal on this connector)
RGBHV OUT 1	RGBHV OUT 2	DE-15S	High-resolution analog component output to feed the monitor wall display
ANALOG OUT 1 L	ANALOG OUT 2 L	WECO	Analog audio output (left channel) to feed the audio monitoring system
ANALOG OUT 1 R	ANALOG OUT 2 R	WECO	Analog audio output (right channel) to feed the audio monitoring system
AES OUT 1	AES OUT 2	WECO	Digital audio output (AES) to feed the audio monitoring system
OPTION 1	OPTION 2	RJ-45	*(for future use)*

The following table lists the purpose of each connector associated with card control.

Connector label	Connector type	Function
LTC IN 1	BNC	Time code input #1
LTC IN 2	WECO	Time code input #2
LTC IN 3	WECO	Time code input #3
ETHERNET	RJ-45	100 Base-T Ethernet connection
USB	USB A	Connect a mouse, keyboard, or USB key for software upgrade or data backup There are three other USB ports accessible on the front of the card that serve the same functions.
RS-422	RJ-45 (see note below)	Connect to an RS-422 (SMPTE ST 207, EBU-3245) or RS-485 device or network

Note: The Kaleido-X's RS-422 ports have an RJ-45 connector in order to preserve space on a busy panel. The RS-422 interface specifies a DE-9 connector, so if you are using this interface, you will require a DE-9-to-RJ-45 adapter. Grass Valley supplies two adapter models, correctly wired for this application: a straight adapter (part no. 1737-3000-102), and a crossover adapter (part no. 1792-3700-100).

The pinout for the RS-422 signal on the RJ-45 connector on the output cards' rear panel, and the wiring diagram for an appropriate adapters, are shown here:

Pinout of each RS-422 port's RJ-45 connector on the multiviewer

RJ-45
Pinout of **straight** adapter (Grass Valley part no. 1737-3000-102)

DE-9 male   DE-9 female
Pinout of RS-422 connector on SMPTE **slave** device
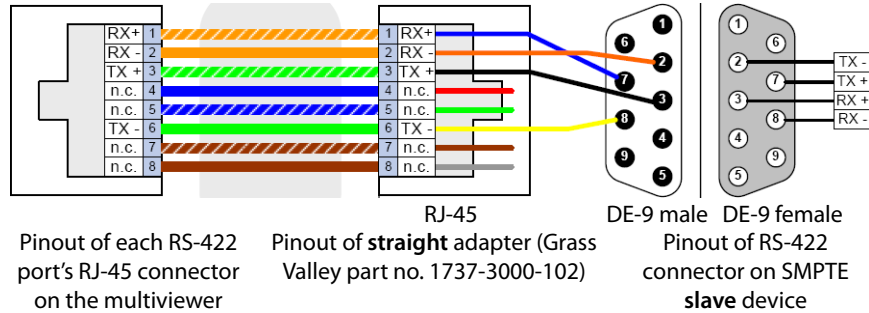
Standard wiring between multiviewer and devices wired to SMPTE "slave" specification (e.g. most routers, Ross Synergy switchers, Nevion ETH-CON)

13

| RJ-45 | DE-9 male | DE-9 female |

Pinout of each RS-422
port's RJ-45 connector
on the multiviewer

Pinout of **crossover** adapter (Grass
Valley part no. 1792-3700-100)

Pinout of RS-422
connector on SMPTE
master device
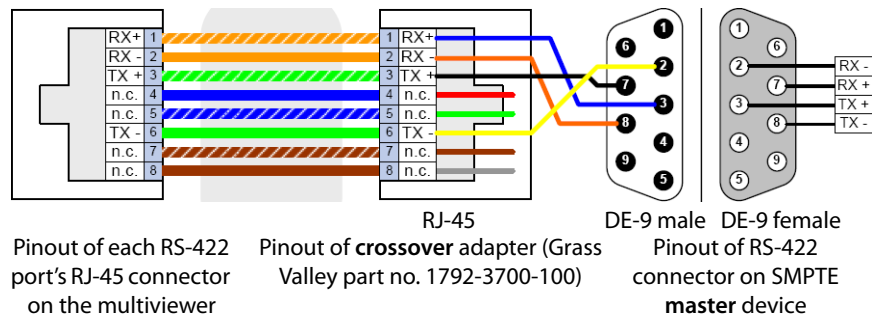
*Standard wiring between multiviewer and devices wired to SMPTE "master" specification (e.g. Philips
Jupiter router control system, Miranda Presmaster PCS)*

> Note: The RS-422 port on the multiviewer side has no ground pin. Using
> the appropriate DE-9S-to-RJ-45 adapter, an external device should be able
> to communicate with the multiviewer despite the lack of a ground.

For more information on the RS-422 port's specifications, see KXO-Dual, and KXO-Dual3, on
page 32. For more information about RS-422 serial connections, see the "Serial
Connections" section, in the *Routers* chapter of the Kaleido-X User's Manual.

Front Card-Edge Layout

The following diagram shows the various indicators, connectors and buttons that appear
on the output cards' front edge:

Status LEDs

Card
CPU
DVI 1
DVI 2
LTC 1
LTC 2
LTC 3

USB connectors

Buttons

Bypass
CPU ON/OFF (Reset)
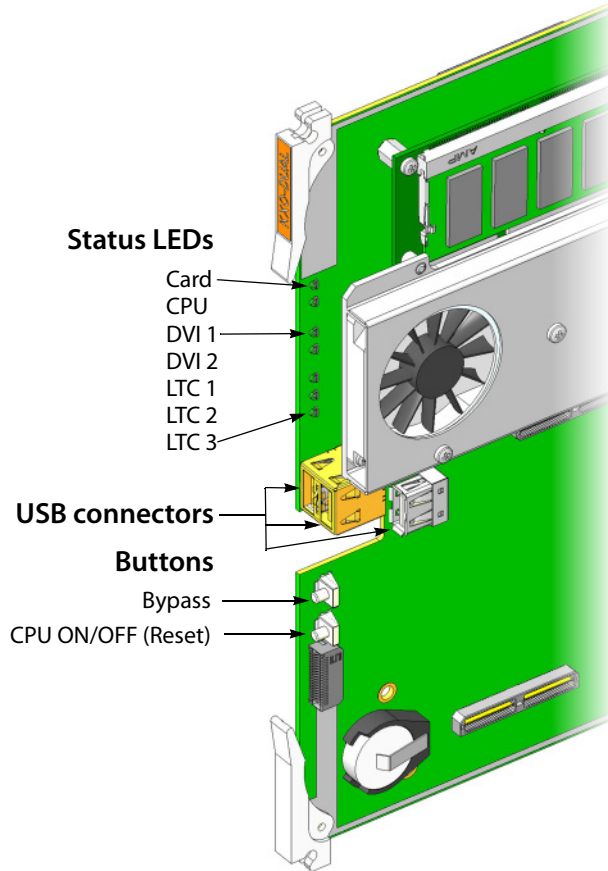
Front Card-Edge Connectors

The front card-edge connectors are not accessible in normal use, as they are covered by the front door of the frame. They are provided for maintenance purposes, or for special circumstances. One exception is the recessed USB connector, which can be used to hold a USB key that can be left in place during operation with the door closed.

Connector label	Connector type	Function
USB 1, USB 2 and USB 4	USB A	Connect a mouse, keyboard, or USB key for software upgrade or data backup
(unlabeled)	ICAT	(for factory use only)

Front Card-Edge Indicators

The following LED status indicators are visible on the output cards' front edge:

LED label	LED color	Interpretation
Card status	Green Orange Red Flashing red	OK Warning Configuration failed Firmware upgrade in progress
CPU status	Off Orange Flashing Green Green Flashing Red	Card is powered off OS is booting up Kaleido-X Software is starting Kaleido-X Software is up and running Software upgrade in progress
DVI 1	Off Green Orange	No input DVI input detected on Head 1 Test
DVI 2	Off Green Orange	No input DVI input detected on Head 2 Test
LTC 1	Green Red	Valid LTC signal at LTC 1 input No LTC signal or invalid signal at LTC 1 input
LTC 2	Green Red	Valid LTC signal at LTC 2 input No LTC signal or invalid signal at LTC 2 input
LTC 3	Green Red	Valid LTC signal at LTC 3 input No LTC signal or invalid signal at LTC 3 input

KXO-HDM Indicator

One LED indicator is located on the optional KXO-HDM mezzanine:

LED color	Interpretation
Green	System OK
Red	Configuration failed / Safe mode
Flashing red	Programming
Yellow	Programming mode

Front Card-Edge Controls

Two buttons are located on the output cards' front edge:

Button label	Function
Bypass	Toggle the display of video on the DVI-D outputs
CPU ON/OFF	Reset the card

All other adjustment, alignment and configuration of this card are accomplished using external controllers (e.g. the XEdit software), and are documented in their respective manuals.
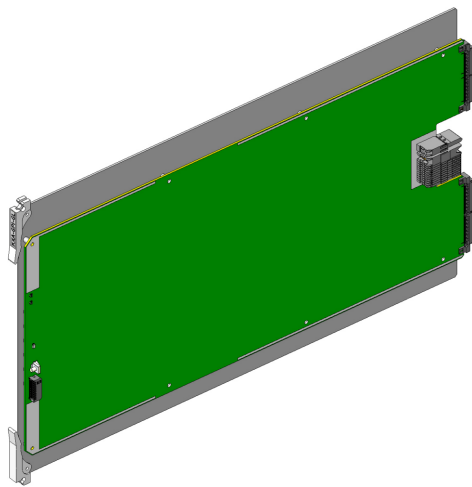
GPI/Genlock Card

The KXA-GPI-GEN card provides status monitoring, genlock and GPI I/O interfacing for the Kaleido-X.

> Note: This card is optional, and is not included in the basic package. You must purchase and install this card to enable the GPI/Genlock features of the Kaleido-X.

The GPI/Genlock card fits in the Kaleido-X frame. It is complemented by a rear panel connector KXA-GPI-GEN-R that houses all input and output connectors associated with the card.

The GPI/Genlock card must be installed in the MAIN slot in the Kaleido-X frame. This slot is color-coded GREY on the front and rear panel of the frame.

The GPI/Genlock card is connected to the other cards in the Kaleido-X frame through the frame's internal midplane. See Card Installation and Replacement on page 9, for instructions on installing the card and the rear panel.

> Notes
> • Be careful to install the KXA-GPI-GEN-R rear panel in the matching location at the rear of the frame.
> • The GPI/Genlock card and its rear panel can be installed in any order.
> • Kaleido-X cards are hot-swappable; it is not necessary to turn off the multiviewer when installing or exchanging cards.

Rear Panel Connections

External connections to the GPI/Genlock card are made through connectors mounted on the KXA-GPI-GEN-R rear panel. These connectors carry both input and output signals.

← Bottom of panel   Top of panel →
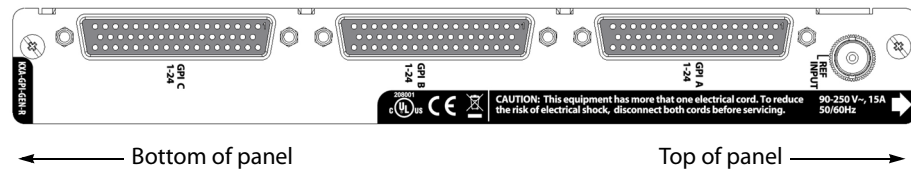
Rear Panel Connectors

Connector label	Connector type	Function
GPI A 1-24	DB-50 (female)	GPI A input/output (bidirectional) connections
GPI B 1-24	DB-50 (female)	GPI B input/output (bidirectional) connections
GPI C 1-24	DB-50 (female)	GPI C input/output (bidirectional) connections
REF INPUT	BNC	Reference signal to genlock the multiviewer to the local plant. Supported Reference formats: • SMPTE ST 170, SMPTE ST 318 • ITU 624-4, BUT 470-6 • PAL and NTSC composite sync • SMPTE ST 274, SMPTE ST 296, SMPTE ST 240

GPI I/O Connections

The three GPI connectors each support 24 bidirectional GPI contacts. Each individual GPI can be configured via software as an Input or Output GPI. They are identified in the software as:

• GPI A, line 1 to 24
• GPI B, line 1 to 24
• GPI C, line 1 to 24

The pinouts of all three connectors are identical, and are shown in the following table:

Pinout for GPI A, GPI B and GPI C connectors

Pin	Signal	Pin	Signal	Pin	Signal
1	22N	18	23N	35	24N
2	22P	19	23P	36	24P
3	19N	20	20N	37	21N
4	19P	21	20P	38	21P
5	16N	22	17N	39	18N
6	16P	23	17P	40	18P
7	13N	24	14N	41	15N
8	13P	25	14P	42	15P
9	10N	26	11N	43	12N
10	10P	27	11P	44	12P
11	7N	28	8N	45	9N

Pinout for GPI A, GPI B and GPI C connectors *(continued)*

Pin	Signal	Pin	Signal	Pin	Signal
12	7P	29	8P	46	9P
13	4N	30	5N	47	6N
14	4P	31	5P	48	6P
15	1N	32	2N	49	3N
16	1P	33	2P	50	3P
17	GND	34	GND		

GPI Circuits

The individual GPI contacts are reconfigurable as either inputs or outputs. For interfacing purposes, the input and output circuit configurations are as shown in the following diagrams:

GPI configured as INPUT   GPI configured as OUTPUT
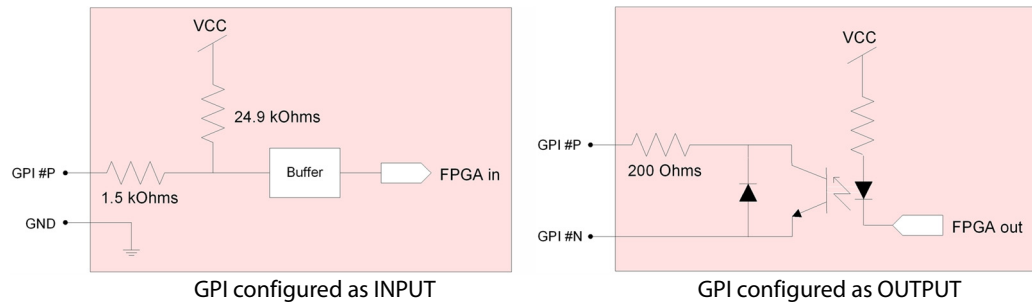
You should ensure your GPI physical connections are well established. In the following example, the goal is to trigger a relay and light up a light.

> **CAUTION**
> **In the example below, make sure your P and N connections are in the proper polarity otherwise your GPI output will always be in the ON state.**
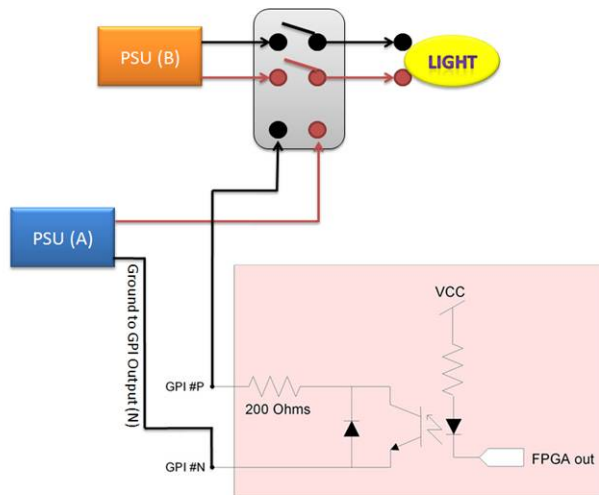
To facilitate cabling of the GPI inputs and outputs, a terminal block adapter is available separately (order code KXA-TBA-G). The GPI Terminal Block Adapter accommodates up to 24 terminal block connections using positive and negative terminal connections. Each column on the terminal block has 6 positive and 6 negative terminal connections that correspond to each pin position. Negative pins (labelled with an N) on the Terminal Block Adapter are not used as connections. Positive pins (labelled with a P) and Ground pins (labelled with a GND) correspond to GPI-IN connections.
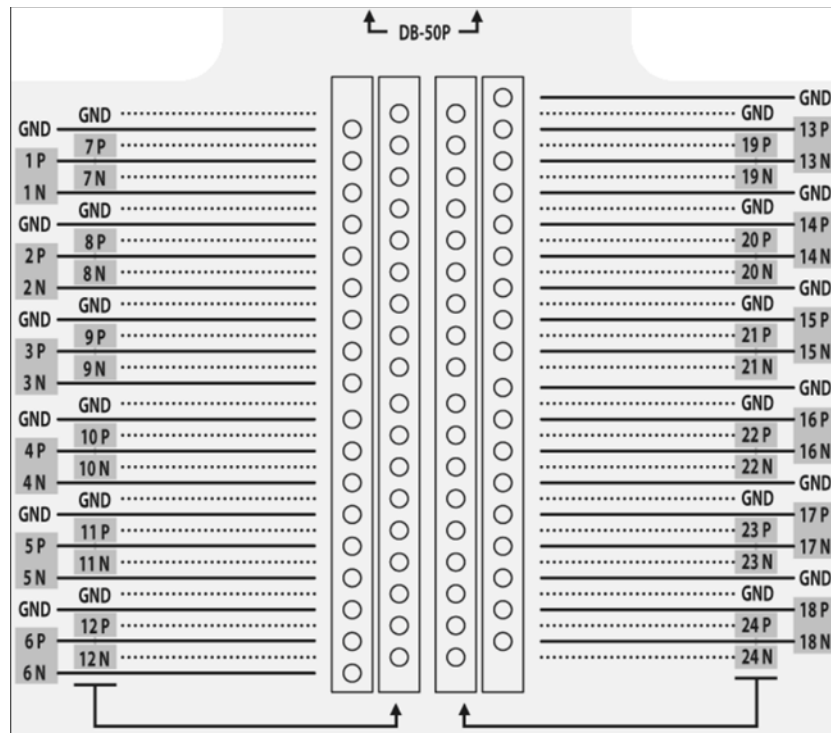
P = Positive, N = Negative

Front Card-Edge Layout

The following diagram shows the indicators and button that appear at the front end of the GPI/Genlock card:

Status LEDs
Card
Reference IN

Button
Reset
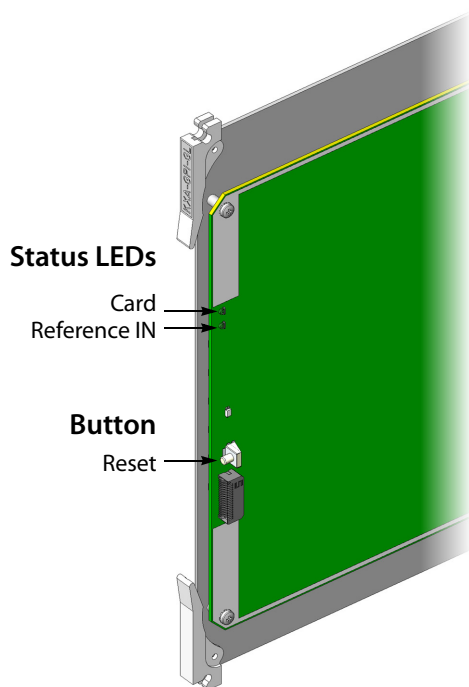
Indicators

The following LED status indicators are visible on the front edge of the GPI/Genlock card:

LED label	LED color	Interpretation
Card status	Green	OK
	Red	Configuration failed
	Blinking Red	System upgrade in progress
Reference input status	Green	OK
	Off	No input
	Red	Signal not recognized
	Orange	Frame rate not supported

Controls

One button is located on the front card edge of the GPI/Genlock card:

Button label	Function
Reset	Reset the FPGA and restart the card—for maintenance use

All other adjustment, alignment and configuration of this card are accomplished using external controllers (e.g. the XEdit software), and are documented in their respective manuals.

Front Card-Edge Connector

An ICAT connector is located on the front card edge at the bottom, below the RESET button. This connector is reserved for factory use, and has no user functionality.

KXI-16 Input Cards

The KXI-16HSV3 card is one of a series of input cards that can be installed in the Kaleido-X system. This card is a universal input card that accepts 3Gbps, HD-SDI, SD-SDI and composite inputs. Other cards in this series are the KXI-16HSV (3Gbps not supported), the KXI-16HS and KXI-16HS3 (composite inputs not supported), and the KXI-16SV (HD-SDI not supported).

Every KXI-16 card is complemented by a rear panel connector (KXI-16-R with 16 BNC connectors) that holds all input and output connectors associated with the card.
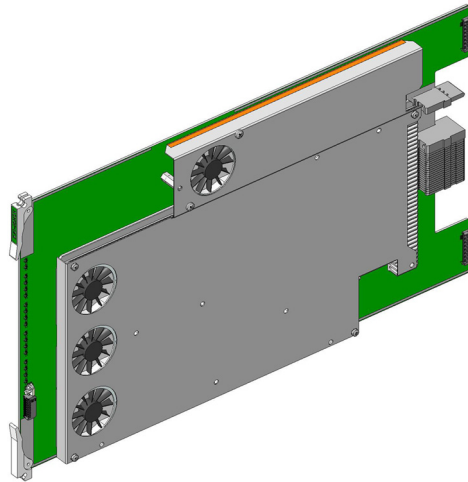
Input cards can be installed in any of the two available *Input* slots in the front of the Kaleido-X frame. These slots are color-coded GREEN on the front and rear panel of the frame.

Every input card is connected to the other cards in the Kaleido-X frame through the frame's internal midplane. External connections to a KXI-16 card are made through connectors mounted on the associated KXI-16-R rear panel. See Card Installation and Replacement on page 9, for instructions on installing the card and the rear panel.

Notes
- Be careful to install the KXI-16-R rear panel in the matching location at the rear of the frame.
- The KXI-16 card and its rear panel can be installed in any order.
- Kaleido-X cards are hot-swappable; it is not necessary to turn off the Kaleido-X when installing or exchanging cards.

Rear Panel Connections

The connectors located on the KXI-16-R rear panel are shown in the diagram and described in the table below.

Bottom of panel   Top of panel
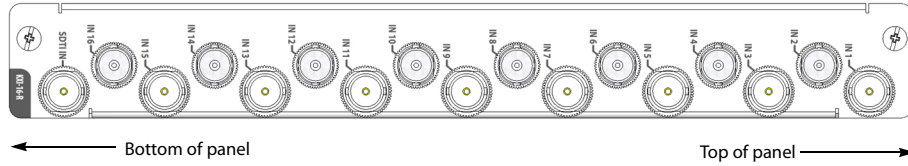
| Connector label	Connector type	Function
IN 1 to IN 16	BNC	HD/SD SDI or composite video inputs 1 to 16
SDTI IN	BNC	Multiplexed audio from an external audio box (Audio Bridge Terminal)

Front Card-Edge Layout

The following diagram shows the various indicators, connectors and buttons that appear at the front end of the KXI-16 input cards:

Status LEDs
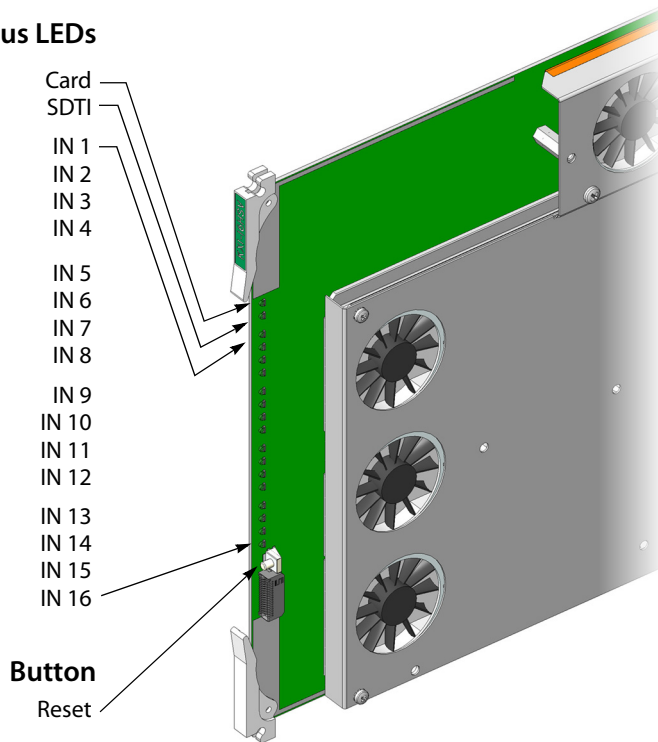
Card
SDTI

IN 1
IN 2
IN 3
IN 4

IN 5
IN 6
IN 7
IN 8

IN 9
IN 10
IN 11
IN 12

IN 13
IN 14
IN 15
IN 16

Button
Reset

Front Card-Edge Indicators

The following LED status indicators are visible on the front edge of the input cards (listed from top to bottom):

LED label	LED color	Interpretation
Card Status	Green Red Orange Blinking Red	Card OK Error Programming in progress Upgrade in progress
SDTI Status	Green Red	Valid signal present No signal or invalid signal
IN 1 Status to IN 16 Status	Green Red	Valid signal present No signal or invalid signal

Front Card-Edge Controls

One button is located on the front card edge:

Button label	Function
Reset	Reset the FPGA and restart the card (for maintenance use)

Front Card-Edge Connector

An ICAT connector is located on the front card edge at the bottom below the RESET button.

This connector is reserved for factory use, and has no user functionality.

Maintenance

Cleaning the Air Filter

Occasionally, the air filter has to be cleaned in order to maintain proper ventilation. The air filter is located in the front door of the Kaleido-X (4RU) frame. The filter may be cleaned without removing it from the door.

To clean the air filter

1 Remove the door from the frame by opening it, and lifting it straight up.

2 Place the door flat on a work surface with the inside of the door facing up.

3 Using a vacuum cleaner with a brush nozzle to prevent scratching, vacuum the dust from the inner side of the door.

4 Turn the door over and vacuum the outer side of the door.

5 Reinstall the door on the frame by positioning the hinge pins on the door over the hinge assembly on the frame, and lowering the door into place.

Replacing a Defective Power Supply

In the event of a power supply failure, the unit will switch to the redundant power supply for its power source. An alarm will appear on the Kaleido-X output screen, until it is manually reset through the Kaleido-X software. It is not necessary to turn off the unit before replacing the defective power supply.

The faulty power supply will show a red FLT lamp on its front panel.

See Power Supplies on page 6 for complete instructions on removing and reinstalling a power supply.

Replacing a Defective Cooling Fan

The primary cooling fans for the Kaleido-X frame are located in a module on the left-hand side of the frame. Eight fans are mounted in a removable assembly.

> IMPORTANT
>
> **The Kaleido-X requires a constant flow of cooling air during operation. DO NOT OPERATE THE UNIT IF THE FAN ASSEMBLY IS DISABLED OR REMOVED.**
>
> IN THE EVENT OF A FAN FAILURE: Please contact your nearest support center to get a replacement unit. The system can run with failed fans, but the temperature should be closely monitored using XAdmin and the defective units replaced ASAP.

To remove the fan assembly

1 Power off the entire frame by unplugging the AC cords.

2 Release the two captive mounting screws at the top and bottom of the fan assembly.

Captive screw

Cooling fan module

KXA-GPI-GL

KXO-DUAL

Handle

Captive screw
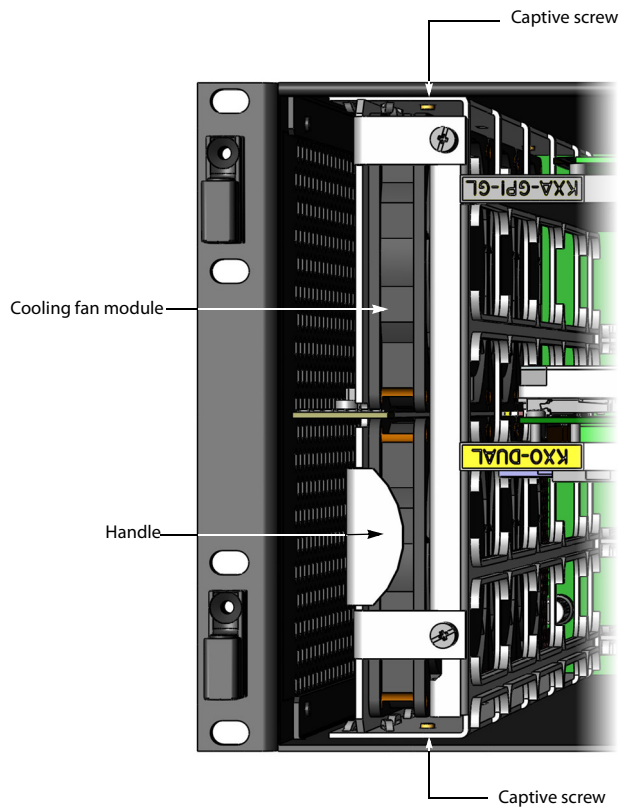
3 Pull the assembly straight out of the frame by using the handle on the front of the fan module.

> In some cases there may be incidental contact between the screws holding the fans in place on the fan module and the edge of the card slot assembly. Pull firmly to remove the module.

Once the defective fan has been replaced, reinstall the fan assembly

1 Position the assembly in the opening with the handle on the lower left, as shown below.

2 Slide the assembly into the opening and push on the handle to seat the connectors.

> Note: In some cases there may be incidental contact between the screws holding the fans in place on the fan module and the edge of the card slot assembly. Push firmly to slide the assembly into place, easing up once the last row of screws is past the edge of the card slot assembly.

3 Tighten the two captive screws.

4 Power up the frame by plugging in the AC cords.

5 Verify that all eight fans are running properly.

2
Specifications

This chapter lists equipment specifications for the Kaleido-X (4RU) multiviewers and their cards.

Kaleido-X Inputs

KXI-16HSV, KXI-16HS, KXI-16SV, KXI-16HSV3, and KXI-16HS3

These cards support 16 signal inputs. The input types include 3G-SDI, Composite, SD-SDI, or HD-SDI (auto-detected), depending on the card type. The processing delay is two fields if the video inputs are genlocked, and two or three fields if the video inputs are not genlocked. Signal inputs require BNC connectors.

Composite Inputs (KXI-16HSV3, KXI-16HSV, KXI-16SV)

Signal	NTSC (SMPTE ST 170), NTSC-J, PAL-BGDHI, PAL-N, PAL-M, SECAM
Return loss	> 25 dB up to 5.75 MHz
Quantization	8 bits
Impedance	75 Ω

SD-SDI Inputs (KXI-16HSV3, KXI-16HSV, KXI-16HS3, KXI-16HS, KXI-16SV)

Signal	4:2:2 SMPTE ST 259-C (270 Mbps)
Formats	525 and 625
Audio	SMPTE ST 274:1994
Return loss	> 15 dB up to 270 MHz
Jitter	< 0.2 UI
Cable length	250 m (820 ft) (Belden 1694A)

HD-SDI Inputs (KXI-16HSV3, KXI-16HSV, KXI-16HS3, KXI-16HS)

Signal	4:2:2 SMPTE ST 292-C (1.5 Gbps)
Formats	720p24, 720p25, 720p29.97, 720p50, 720p59.94 1080i50, 1080i59.94 1080PsF23.98, 1080PsF24, 1080PsF25, 1080PsF29.97 1080p23.98, 1080p24, 1080p25, 1080p29.97 Note: The Kaleido-X software does not distinguish between 1080PsF25 and 1080i50, and neither between 1080PsF29.97 and 1080i59.94. Both 1080PsF25 and 1080i50 are reported as 1080i50, and both 1080PsF29.97 and 1080i59.94 are reported as 1080i59.94, on the monitor wall and in XAdmin's Status and Options page.
Audio	SMPTE ST 299
Return loss	> 12 dB up to 1.485 GHz
Jitter	< 0.2 UI
Cable length	100 m (328 ft) (Belden 1694A)

3G-SDI Inputs (KXI-16HSV3, KXI-16HS3)

Signal	4:2:2 SMPTE ST 424:2006 (2.97, 2.97/1.001 Gbps)
Formats	SMPTE ST 425:2008 level A and level B (single stream) 1080p50 1080p59.94
Audio	SMPTE ST 299
Return loss	> 15 dB up to 1.5 GHz > 10 dB up to 2.97 GHz
Jitter	< 0.2 UI
Cable length	100 m (328 ft) (Belden 1694A)

Graphic converted to HD-SDI from KXI-DVI-Bridge

Signal	SMPTE ST 292-C (1.485, 1.485/1.001 Gbps)
Formats	1024 × 768 @ 60 (XGA) 1280 × 1024 @ 60 (SXGA) 1366 × 768 or 1368 × 768 @ 60 (WXGA) 1680 × 1050 @ 60 (WSXGA+) 1600 × 1200 @ 60 (UXGA)
Cable length	100 m (328 ft) (Belden 1694A)

These cards support one SDTI audio input.

SDTI Audio Inputs

Signal	SMPTE ST 305:2005 (up to 128 channels/64 AES)
Cable length	250 m (820 ft) (Belden 1694A)
Connector	BNC

KXA-GPI-GEN Card

This card supports a reference input for system genlock.

Reference Inputs

Supported formats	SMPTE ST 170
	SMPTE ST 318
	ITU 624-4
	BUT 470-6
	PAL and NTSC composite sync
	SMPTE ST 274
	SMPTE ST 296
	SMPTE ST 240
Connector	BNC

KXO-Dual / KXO-Dual3 Cards

This card supports two DVI-D inputs for background graphics:

DVI-D Inputs

Signal	DVI-D
Resolution	From 1024 × 768 to 1920 × 1200 NI
H frequency	37 kHz to 96 kHz
Refresh rate	50/59.94 Hz
Cable length	3.6 m (12 ft) with Altinex CB4012DV
Connectors	DVI-I

This card supports one LTC unbalanced input for clock synchronization:

LTC Unbalanced Input

Signal	SMPTE ST 309:1999, SMPTE ST 12:1995 (EBU-3259-E)
Level	500 mVp-p to 10 Vp-p
Impedance	>10 kΩ
Connector	BNC

This card supports two LTC balanced inputs for clock synchronization:

LTC Balanced Inputs

Signal	SMPTE ST 309:1999, SMPTE ST 12:1995 (EBU-3259-E)
Level	500 mVp-p to 10 Vp-p
Impedance	>10 kΩ
Connector	WECO (`www.weco.ca`) Plug-in Screw Connector System for Printed Circuit Boards Type 930-HFL (-DS), 930 / 931-HSL

Kaleido-X Outputs

KXO-Dual, and KXO-Dual3

These cards support two Progressive RGBHV outputs:

Progressive RGBHV Outputs

Signal	Analog RGBHV
Resolution	From 1024×768 to 1920×1200 NI
H frequency	31 kHz to 96 kHz
Refresh rate	50/59.94 Hz
Level	0.7 Vp-p
Connector	DE-15S (female)

This card supports two DVI outputs:

DVI Outputs

Signal	DVI-D
Resolution	From 1024×768 to 1920×1200 NI
H frequency	37 kHz to 96 kHz
Refresh rate	50/59.94 Hz
Cable length	3.6 m (12 ft) with Altinex CB4012DV
Connector	DVI-I

This card supports two HD-SDI outputs:

HD-SDI Outputs

Signal	4:2:2 SMPTE ST 292-C (1.5 Gbps), SMPTE ST 424
Supported resolutions	720p59.94
	1080i50
	1080i59.94
	1080p59.94

HD-SDI Outputs *(continued)*

Audio	SMPTE ST 299 (limited to one pair, embedded on group 1, pair 1)
Cable length	100 m (328 ft) (Belden 1694A)
Jitter	< 0.2 UI p-p (wideband)
Connectors	BNC

This card supports two Analog audio outputs:

Analog Audio Outputs

Signal	Balanced analog stereo
Impedance	< 600 Ω
Level	+24 dBu maximum
Connector	WECO

This card supports two AES outputs:

AES Outputs

Signal	AES3
Impedance	110 Ω
Connector	WECO

Option Outputs (Future Use)

Connector	RJ-45

Kaleido-X Control

KXA-GPI-GEN

This card supports a bidirectional GPI interface (72 GPI, software-configured). There are three DB-50 female connectors: GPI A, GPI B, and GPI C.

GPI bidirectional (up to 72)

Description	Contact closure to GND
Signal	Open collector 5 to 12 VDC
Input mode	
Pull-up voltage	2.3 Volts
Source current	2 mA when input shorted
Low-level activation	0.8 Volts max
Over voltage	25 Volts max
Output mode	

GPI bidirectional (up to 72) *(continued)*

Contact closure current	50 mA max
Reverse voltage	-15 Volts max
Reverse current	-50 mA max
V out low	0.6 Volts at 1.5mA

KXO-Dual, and KXO-Dual3

ETHERNET

Signal	10/100 BASE-T (IEEE 802.3)
Connector	RJ-45

RS-422/485

Signal	RS-422 (SMPTE ST 207, EBU-3245), RS-485
Connector	RJ-45

USB (4 connectors)

Signal	USB Version 1.0
Connector	USB

Kaleido-X (4RU) Frame

Power supply	Hot-swappable redundant power supply
Input voltage	90-264 V
Frequency	47-63 Hz
Max current	15A
Max Power out	1200 W @ 230 Vac
Dimensions	H: 175 mm (7 in) (4 RU)
	W: 448 mm (17.64 in) + mounting flange for standard 19 in rack
	D: 527 mm (20.75 in)
Full spec. temperature range	0-35°C (32°F-95°F) (ambient)
Storage humidity	90% RH non-condensing
Functional humidity	65% RH non-condensing
Weight (bare frame)	10 kg (22 lbs)

| Weight (typical configuration: 2 power supplies, 1 fan, 3 cards)	19.42 kg (42.8 lbs)
Component weight	
1 fan	0.9 kg (2 lbs)
2 power supplies	3.4 kg (7.5 lbs)
KXO-Dual (including rear)	2.25 kg (5 lbs)
KXI (including rear)	2.1 kg (4.6 lbs)
KXI-GPI-GEN (including rear)	0.77 kg (1.7 lbs)

Disposal and Recycling Information

Your Grass Valley equipment comes with at least one lithium button battery (Li-MnO$_2$) located on the main printed circuit board. The batteries are used for backup and should not need to be replaced during the lifetime of the equipment.

Before disposing of your Grass Valley equipment, please remove the battery as follows:

1 Make sure the AC adapter is unplugged from the power outlet.
2 Remove the protective cover from your equipment.
3 Gently remove the battery from its casing using a blunt instrument for leverage such as a screwdriver if necessary.
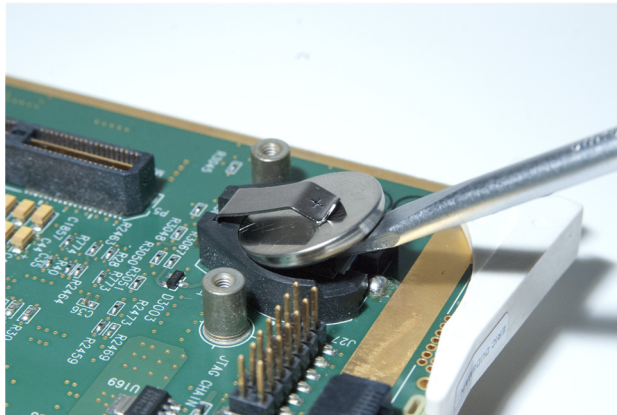
4 Dispose of the battery and equipment according to your local environmental laws and guidelines.

> WARNING
>
> Be careful not to short-circuit the batteries by adhering to the appropriate safe handling practices. Do not dispose of batteries in a fire as they may explode. Batteries may explode if damaged or overheated. Do not dispose of batteries as household waste. Do not dismantle, open or shred batteries. Keep batteries out of the reach of children.
>
> The electrolyte of the batteries contains 1,2-dimethoxyethane (DME) (CAS 110-71-4, EINECS 203-794-9) above 0.1% by weight. DME is listed as a Substance of Very High Concern (SVHC) by the regulation (EC) No 1907/2006 of the European Parliament and of the Council. It is classified as a reprotoxic of category 2 in the European Union. Accordingly, exposure to DME may impair fertility and may cause harm to the unborn child. DME is also classified as harmful by inhalation.

> **WARNING** *(continued)*
>
> Risk of exposure occurs only if the battery is mechanically or electrically abused. The most likely risk is acute exposure when a cell vents. In the event of a battery leak, do not allow battery liquid to come in contact with skin or eyes. Seek medical help immediately in case of ingestion, inhalation, skin or eye contact, or suspected exposure to the contents of an opened battery.

For more information about recycling, please contact Grass Valley.

Contact Us

Grass Valley Technical Support

For technical assistance, contact our international support center, at 1-800-547-8949 (US and Canada) or +1 514 333 1772.

To obtain a local phone number for the support center nearest you, please consult the Product Support section of Grass Valley's Web site, at `http://www.grassvalley.com/support/contact`.

An online form for e-mail contact is also available from the Web site.

Corporate Head Office

Grass Valley
3499 Douglas-B.-Floreani
St-Laurent, Quebec H4S 2C6
Canada
Telephone: +1 514 333 1772
Fax: +1 514 333 9828
www.grassvalley.com