grass valley
A BELDEN BRAND

SIRIUS 800 ROUTER RANGE

SIRIUS 830, 840 AND 850 ROUTERS

User Manual

Issue 6 Revision 1

2019 November 04

www.grassvalley.com

FCC Compliance

In order to comply with FCC/CFR47: Part 15 regulations, it is necessary to use high-quality, triple-screened Media or Monitor cable assemblies with integrated ferrite suppression at both ends.

Patent Information

This product may be protected by one or more patents.

For further information, please visit: www.grassvalley.com/patents/

Copyright and Trademark Notice

Terms and Conditions

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A Grass Valley manual may have been revised to reflect changes made to the product during its manufacturing life. Thus, different versions of a manual may exist for any given product. Care should be taken to ensure that one obtains the proper manual version for a specific product serial number.

Information in this document is subject to change without notice and does not represent a commitment on the part of Grass Valley.

Warranty information is available from the Legal Terms and Conditions section of Grass Valley's website.
(See www.grassvalley.com.)

Title	Sirius 800 User Manual
Part Number	Issue 6 Revision 1
Revision	2019-11-04, 11:11

About this Manual

This manual describes the Sirius 800 router range, and the configuration of the various modules that can be added to the range.

Refer to the individual Installation manuals for details on how to unpack, install and test the Sirius 800 routers and the Sirius 800 Maintenance & Upgrade manual for maintenance information.

Refer to the Workbench manual for details on configuring hardware and software panels.

If you have any questions regarding the installation and setup of your product, please refer to the Customer Service contact details (see *Grass Valley Technical Support* on page 476).

Software and Firmware Release Details

This version of the Sirius 800 user manual documents the features and functions available with Workbench version V5.4.x and firmware release PA1250x. These features are shown in summary in Table 1

Table 1 Firmware Release History

Firmware Release Version	Module	AHP Features Supported
V5.4.x	**Nucleus2 2464/ 2463**	AHP control (software/firmware supplied with the Workbench release).
PA1250x	**4915**	Gain, Phase Invert, Left/Right Swap, Left Both, Right Both, Mono Mix.
PA1250x	**5919**	Audio De-embedding, Gain, Phase Invert, 16 Channel Mix and Channel Swap (Shuffle), Video Frame/Line Sync, Video Delay, Audio Input Embedding.
PA1250x	**4929**	Gain, Phase Invert, Left/Right Swap, Left Both, Right Both, Mono Mix, Audio Delay, Sample Rate Convert.
PA1250x	**5949**	16 Channel Mix, Channel Swap (Shuffle), Gain, Phase Invert and Audio Embedding, Video Frame/Line Sync, Video Delay.
Crosspoint Modules:		
PA1250x	**5903**	Audio crosspoint operation, Audio Input Embedding.
PA1250x	**5905**	Video crosspoint operation.
Modules no longer supplied with new systems:		
PA1250x	**5915**	Audio De-embedding, Gain, Phase Invert, 16 Channel Mix and Channel Swap (Shuffle).
PA1250x	**4925**	Gain, Phase Invert, Left/Right Swap, Left Both, Right Both, Mono Mix.
PA1250x	**5925**	16 Channel Mix, Channel Swap (Shuffle), Gain, Phase Invert and Audio Embedding.

Firmware release notes are included with the firmware and are available on request from Grass Valley Customer Service (see *Grass Valley Technical Support* on page 476).

Export System Information (Nucleus2 only)

Router system information can be exported to a CSV file by right clicking on the controller in the configuration screen of Workbench. System information saved includes; hardware module types, hardware versions, firmware versions, software versions, Workbench details and database location information. See the Workbench manual for information on using Workbench.

Important Safety Information

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 Underwriters Laboratory (UL) regulations and recommendations for USA.

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.

CE 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 rated mains voltage.
- This product relies on the building's installation for short-circuit (over-current) protection. Ensure that a fuse or circuit breaker for the rated mains voltage 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.
- 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. Servicing should be done in a static-free environment.
- To reduce the risk of electric shock, plug each power supply cord into separate branch circuits employing separate service grounds.

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 may include 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* at:

http://www.grassvalley.com/assets/media/5692/Take-Back_Instructions.pdf

Cautions for LCD and TFT Displays

Excessive usage may harm your vision. Rest for 10 minutes for every 30 minutes of usage.

If the LCD or TFT glass is broken, handle glass fragments with care when disposing of them. If any fluid leaks out of a damaged glass cell, be careful not to get the liquid crystal fluid in your mouth or skin. If the liquid crystal touches your skin or clothes, wash it off immediately using soap and water. Never swallow the fluid. The toxicity is extremely low but caution should be exercised at all times.

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.

LISTED

La marque UL 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.

C US

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.

C US

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.

C US Intertek

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.
- Pour réduire le risque de choc électrique, branchez chaque cordon d'alimentation dans des circuits de dérivation distincts utilisant des zones de service distinctes.

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.

Manipulation de la pile

Ce produit peut inclure une pile de sauvegarde. Il y a un risque d'explosion si la pile est remplacée de manière incorrecte. Remplacez la pile uniquement par un modèle identique ou équivalent recommandé par le fabricant. Disposez des piles usagées conformément aux instructions du fabricant. Avant de vous séparer de votre équipement Grass Valley, veuillez consulter les *informations de mise au rebut et de recyclage* à:

http://www.grassvalley.com/assets/media/5692/Take-Back_Instructions.pdf

Précautions pour les écrans LCD et TFT

Regarder l'écran pendant une trop longue période de temps peut nuire à votre vision. Prenez une pause de 10 minutes, après 30 minutes d'utilisation.

Si l'écran LCD ou TFT est brisé, manipulez les fragments de verre avec précaution au moment de vous en débarrasser. veillez à ce que le cristal liquide n'entre pas en contact avec la peau ou la bouche. En cas de contact avec la peau ou les vêtements, laver immédiatement à l'eau savonneuse. Ne jamais ingérer le liquide. La toxicité est extrêmement faible, mais la prudence demeure de mise en tout temps.

Environmental Information

European (CE) WEEE directive.

This symbol on the product(s) means that at the end of life disposal it should not be mixed with general waste.

Visit www.grassvalley.com for recycling information.

Grass Valley believes this environmental information to be correct but cannot guarantee its completeness or accuracy since it is based on data received from sources outside our company. All specifications are subject to change without notice.

If you have questions about Grass Valley environmental and social involvement (WEEE, RoHS, REACH, etc.), please contact us at environment@grassvalley.com.

Safety Information (Continued)

Lithium Batteries

Battery Warning

CAUTION

This equipment contains a lithium battery.

There is a danger of explosion if this is replaced incorrectly.

Replace only with the same or equivalent type.

Dispose of used batteries according to the manufacturer's instructions.

Batteries **shall only** be replaced by trained service technicians.

Your Grass Valley equipment usually comes with at least one button battery 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.

Battery Disposal

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

1. Make sure the AC adapter / power Cord is unplugged from the power outlet.
2. Remove the protective cover from your equipment.
3. Gently remove the battery from its holder using a blunt instrument for leverage such as a screwdriver if necessary. In some cases the battery will need to be desoldered from the PCB.
4. Dispose of the battery and equipment according to your local environmental laws and guidelines.

WARNING

- Be careful not to short-circuit the battery 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 dismantle, open or shred batteries.
- 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.

Laser Safety - Fiber Output SFP and QSFP Modules Warning

LASER SAFETY

The average optical output power does not exceed 0 dBm (1mW) under normal operating conditions. Unused optical outputs should be covered to prevent direct exposure to the laser beam.

Even though the power of these lasers is low, the beam should be treated with caution and common sense because it is intense and concentrated. Laser radiation can cause irreversible and permanent damage of eyesight. Please read the following guidelines carefully:

- Make sure that a fiber is connected to the board's fiber outputs before power is applied. If a fiber cable (e.g. patchcord) is already connected to an output, make sure that the cable's other end is connected, too, before powering up the board.
- **Do not** look in the end of a fiber to see if light is coming out. The laser wavelengths being used are totally invisible to the human eye and can cause permanent damage. Always use optical instrumentation, such as an optical power meter, to verify light output.

Cable Management

It is important that the cabling to and from the router is correctly labeled and routed. This will simplify the work required if the installation needs to be changed or added to at a future date.

CAUTION

- Cables connected to the router must be fitted with adequate vertical and horizontal strain relief to avoid twisting of the rear panels causing damage to the router connectors and loss of electrical/signal connection to the router.
- Cables connected to the router should be routed so they do not cover any of the frame fan exhausts as this can restrict airflow through the router.

Power Supplies

The power supply shelves are separate 2RU modules. Power supply shelves are rack mountable and can be placed above, below or remote from the Sirius frame.

CAUTION

- Ensure that the power supply shelves are correctly earthed see section for details.
- The power supply units are sealed and do not contain any serviceable items

> CAUTION
> - Power supply shelves are heavy so it is advised that two people are needed to support the weight of the power supply shelves during installation.
> - To prevent damage, power supply shelves should not be mounted using just the front ears, and should have support at the rear of the shelves.

The power supply alarm cable(s) and 48 V DC cables are supplied by Grass Valley and can be ordered as either 2.5 meter cables or 8 meter cables.

Earth Cables

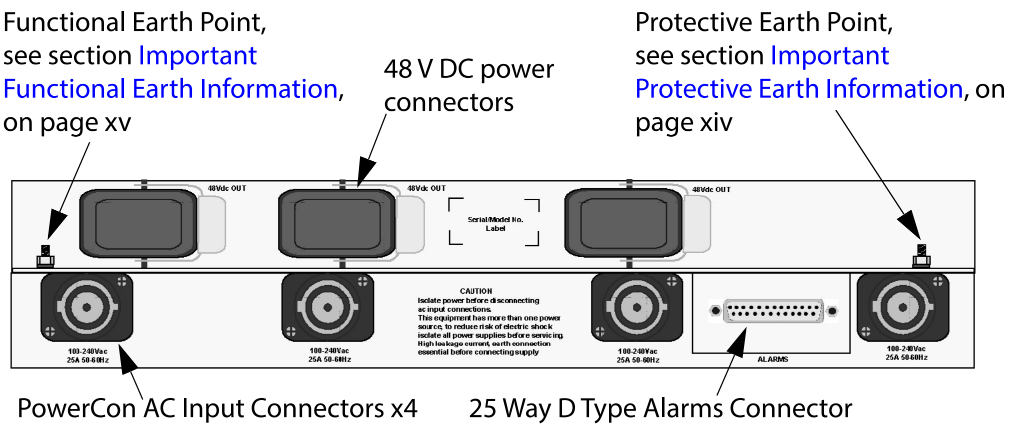

Figure 1 Power Supply Shelf Rear Panel

Important Protective Earth Information

Due to the high leakage current, ensure that all of the power supply shelves are grounded to the protective earth. Earth studs are provided on the rear of each power supply shelf for this purpose. These studs have M6 size nuts, and are suitable to take an eyelet crimp.

> Note:
> - The Protective earth is indicated on the power supply shelf by this symbol:
>
>   
>
>   (located on the right side of the power supply shelf, see Figure 1).
> - Protective Earthing is a conductor in the building installation wiring, or in the power supply cord, connecting a main protective earthing terminal to an earth point in the building installation.

WARNING

PROTECTIVE EARTH

- The building installation must provide a means for connection to the protective earth and the equipment must be connected to that means.
- A service person must check that the socket outlets that the equipment is to be powered from provide a connection to the protective earth. If not the service person must arrange for the installation of the protective earth wire in the building.

WARNING

High leakage current; the Protective Earth connection is essential before connecting the supply.

Important Functional Earth Information

Up to three earth cables (636027) are supplied with the Sirius 800 depending on how many power supply shelves are fitted. One should be fitted from each power supply shelf to the Sirius 800 router frame, this is called a Functional Earth.

Note:

- The Functional Earth on the power supply shelf is indicated by this symbol:
  ⏚
  (located on the left side of the power supply shelf, see Figure 1).
- Functional Earthing is the earthing of a point on the equipment or system, which is necessary for purposes other than safety.

WARNING

The Functional Earth cable from the power supply shelf to the Sirius frame must be fitted.

Ventilation

A fully populated Sirius 800 is ventilated by groups of fan modules mounted in the front and rear of the router. The vents in the front, sides and rear must not be obstructed and should be periodically cleaned and kept free from the build-up of dust. All the fan modules are monitored for failure.

Air is pulled in through the ventilation slots in the front door and circulated through the router, passing over the modules, and then expelled by the rear fans, air is also expelled out at points on each side of the frame, where the crosspoint modules are situated.

The power supply shelves have their own integral cooling system.

CAUTION

- Ensure the flow of air is not restricted through the vents and fan exhausts.
- Do not obstruct the air vents situated on both sides of the frame, and allow a minimum of 50 mm (2 inches) clearance to allow air flow. The air that is exhausted from the sides must be able to flow past the rear of the router frame without being obstructed. This also applies to the PSU shelves.
- The fan assemblies should be placed back into the closed position as soon as possible after opening, as this ensures correct ventilation of the frame. Failure to do this will result in failure.
- In practice the maximum time that a fan assembly can be left open will depend on a number of factors such as; ambient temperature, frame loading, crosspoint routings, etc. To ensure correct operation under all conditions the fan assemblies should be left open for no more than 4 minutes at a time.

Compliance Standards

This equipment complies with the following standards:

EN60950-1 2006
Safety of information Technology Equipment Including Electrical Business Equipment.

UL1419 (3rd Edition) - UL File E193966
Standard for Safety - Professional Video and Audio equipment

EMC Standards:

This unit conforms to the following standards:

EN 55032:2015 (Class A)

EN 55103-2:2009 (Environment E2)

EN 61000-3-2:2014 (Class A)

EN 61000-3-3:2013

Federal Communications Commission Rules, 47 CFR: Part 15, Subpart B (Class A)

> WARNING
> This equipment is compliant with Class A of CISPR 32.
> In a residential environment this equipment may cause radio interference.

EMC Performance of Cables and Connectors

Grass Valley products are designed to meet or exceed the requirements of the appropriate European EMC standards. In order to achieve this performance in real installations it is essential to use cables and connectors with good EMC characteristics.

All signal connections (including remote control connections) shall be made with screened cables terminated in connectors having a metal shell. The cable screen shall have a large-area contact with the metal shell.

COAXIAL CABLES

Coaxial cables connections (particularly serial digital video connections) shall be made with high-quality double-screened coaxial cables such as Belden 1694A or Belden 1505A.

D-TYPE CONNECTORS

D-type connectors shall have metal shells making good RF contact with the cable screen. Connectors having “dimples” which improve the contact between the plug and socket shells, are recommended.

AC and DC Cables

AC & DC cables used must be double screened to maintain EMC compliance.

Summary Top-Level Contents

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Contents List

1 Product Overview

Grass Valley, a Belden brand, continues to lead the way in video and audio signal routing with its innovative Sirius 800 router range. The large-scale, multi-format routers incorporate many technological firsts, the Sirius 800 routers offer multi-format operation up to 12 Gb/s in one frame.

Sirius 850 34U * expandable router | Sirius 840 27U * non- expandable router | Sirius 830 15U * non- expandable router

Figure 2 Sirius 800 Router Range

Note: * The router height in Figure 2 *does not* include the power supply shelves which are a further 2U each in height. Between one and three power supply shelves are used with the Sirius router depending on the router configuration and local mains voltage.

The Sirius 800 routers support a range of different configurations based on a common module format. The router range is made up of the non-expandable Sirius 830 and Sirius 840 routers and the field expandable Sirius 850 router.

The Sirius 850 can be equipped as 576 x 1152 in a single frame or is field expandable up to 1152 x 1152 video (dependent on input/output card configuration) by linking two Sirius 850 routers together using multi-way cables. No other external splitters or combiners are required.

This chapter contains:

Product Overview

1.1 Signal Flow

The Sirius 800 routers are large scale multi-format video and audio routers. The Sirius 800 routers enable you to mix and match different signal formats in the same router frame. Signal formats include:

- 12 Gb/s, 6 Gb/s, 3 Gb/s and 1.5 Gb/s HD SDI and SD SDI video;
- video over IP;
- DVB-ASI;
- embedded AES; and
- discrete AES and MADI audio.

Different video signal formats can also be freely mixed within individual video input/output modules. BNC and Fiber connections are available for video and MADI signals and high density 62 way D-type sockets for AES. In addition to video and audio Advanced Hybrid Processing (AHP) modules allow adjustment and processing of input and output signals.

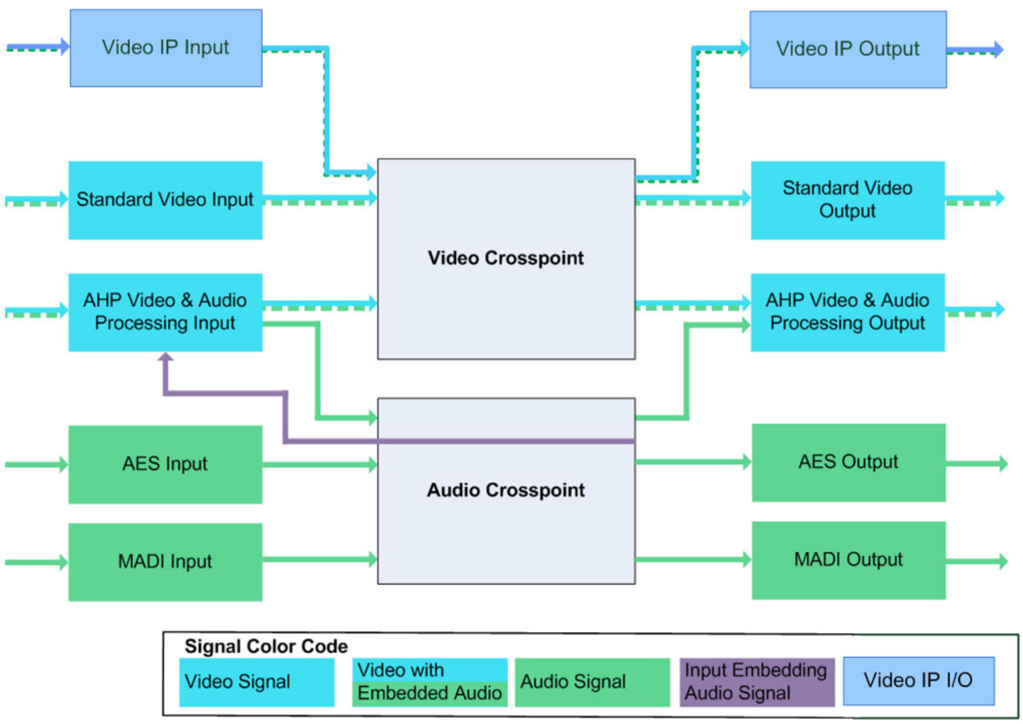


Figure 3 Audio and Video Signal Routing

1.1.1 Input Modules

The standard (non AHP) video input front modules (55917, 5917, 5913, 5914 & 5916) route the video and embedded audio through to the video crosspoint cards.

The video IP input module (5960) converts streaming video from high-performance IP interfaces into up to 24 video input channels with accompanying embedded audio and metadata. These are sent through to the video crosspoint cards.

The 1840 and 1841 12G input rear panels can be used with 55917 and 5917 video input modules for 12G input capability.

The AHP video input modules (5919 & 5915) de-embed up to 16 mono audio channels per video input. Both the embedded and de-embedded audio channels can be manipulated directly on the input module before being routed through the video and audio crosspoint cards respectively. The 1840 and 1841 input rear panels can be used with the AHP video input modules for 12G input capability.

The audio input module (4915) accepts either MADI only or a combination of AES and MADI depending on the rear panel that is fitted. In either case the individual audio channels can then be routed through the audio crosspoint cards.

1.1.2 Video Crosspoints

The video signals are routed through the video crosspoints to one or more destinations on the video output modules as instructed by the router control system. Any embedded audio is routed along with the video.

The video routing is completely non blocking and an optional video crosspoint card gives the router video crosspoint redundancy.

Optionally the Sirius 850 has a second set of video crosspoint cards in the top of the router that are used to route signals to the expansion outputs (577 to 1152). As with the other crosspoint cards an optional video crosspoint can be fitted for video redundancy.

1.1.3 Audio Crosspoints

The audio crosspoint card routes the mono audio channels in the Sirius 800 routers and the audio routing is completely non blocking. An optional, audio crosspoint card can be added for audio crosspoint redundancy.

The de-embedded and discrete audio signals are routed through the audio crosspoint to one or more destinations (to audio output modules, video AHP input modules, and video AHP output modules) as instructed by the router control system. The audio can be routed to the audio output modules, re-embedded on the video AHP output modules or a combination of both.

Failed crosspoints and audio transport streams are detected by the output module(s) which automatically switch to the alternate audio crosspoint module if fitted.

1.1.4 Output Modules

The standard video output modules (55926, 5926, 55938, 5938, 5923, 5924 & 5937) receive the video and embedded audio signals and transmit them to the router outputs.

The video IP output module (5970) receives 24 video channels with embedded audio and metadata from the crosspoint cards and converts them to video IP streams. These are sent out to a high-performance IP network via high performance IP output interfaces.

The AHP video output modules (55949, 5949 & 5925) can embed up to 16 mono audio channels per video output if required. These audio channels are routed from the audio crosspoint card and can originate from discrete audio inputs, de-embedded audio or a combination of both. The audio replaces the original embedded audio that was routed with the video. The audio channels can be manipulated directly on the video output module before being output from the router. The 1842 input rear panel can be used with the AHP video output modules for 12G input capability.

The audio output modules (4929 & 4925) output either MADI only or a combination of AES and MADI depending on the rear panel that is fitted. The audio channels are routed from the audio crosspoint card and can originate from discrete audio inputs, de-embedded audio or a combination of both.

For expanded Sirius 850 configurations, expansion output modules (55928 and 5928) provide extra router frame video SDI or ASI outputs with accompanying video expansion rear modules (1290, 1365, 1366, and 1293).

1.1.5 Audio Processing

Each of the AHP video input (5919 & 5915) and output (55949, 5949 & 5925) modules contains a powerful processing engine that can manipulate the individual audio channels passing through them.

The 5919, 5915, 55949, 5949 and 5925 audio processing tools include gain control, phase invert, 16 channel mixer and channel swap (shuffle). The audio processing tools are a licensed feature which must be purchased for each module they are needed on (see Section 1.6 for details).

The audio input (4915) and output (4929 & 4925) modules include gain control, phase invert and stereo mode (left/right swap, left both, right both or mono mix). The 4915, 4929 and 4925 audio processing tools are supplied free of charge for each audio module.

In addition to the standard processing tools described above the 4929 audio output module offers Audio Delay and Sample Rate Conversion (SRC) which are licensed features that must be purchased for each module they are needed on (see Section 1.6 for details).

1.1.6 Input Embedding

Input embedding enables any incoming audio channel (embedded, AES or MADI) to be routed via the audio crosspoint to an AHP video input module (5919). Input embedding works by replacing/overwriting one or more of the original source video embedded audio channels with audio channels sourced from the audio crosspoint modules.

This enables finished audio package to be built up on the AHP video input modules which saves one output and one input, freeing them up for other routing needs. It also eliminates looping cables and saves cost, power and space, see section 7.23.2.1 for further details.

Input embedding requires the purchase of an S8AHP-VA (Embedded Audio Processing license) and S8AHP-VE (Input Embedding license) for each video AHP input module (5919) being used for input embedding (see Section 1.6 for details).

1.1.7 Audio Phasing

In a synchronous system multi-channel audio passing through the router remains co-timed on all channels of like signal format across the entire router. There are three signal formats; embedded audio, MADI and AES. Embedded audio is further broken down into sub formats of; SD, HD and 3G.

Router and processing delays are managed by the router so that co-timed audio entering the router from any like format will remain co-timed on the output of the router.

The example below shows audio from various router inputs embedded on a video channel of a video output module. The audio inputs could equally have been routed to an audio output module and the signals would remain co-timed as shown.

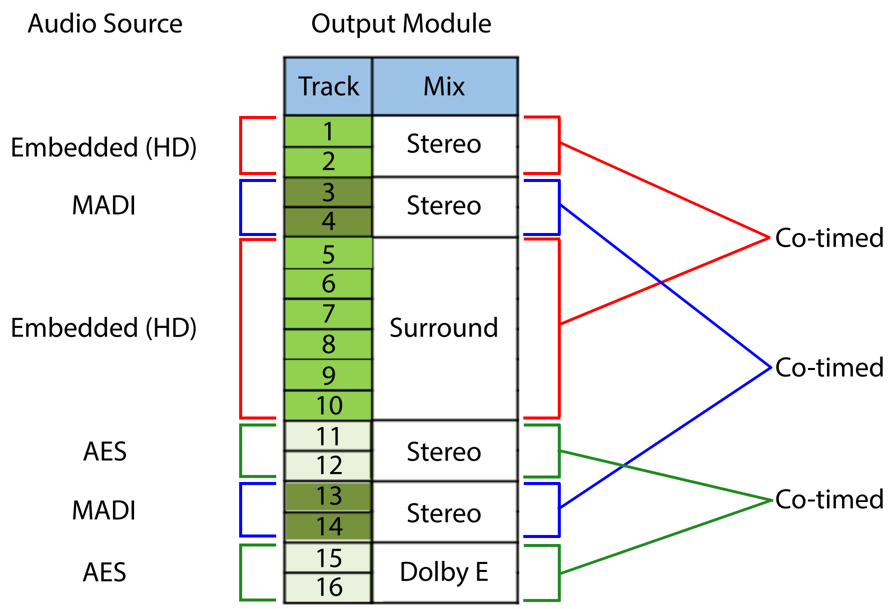


Figure 4 Example: Audio from Various Sources Embedded on a Video Output Module

1.1.8 Video Processing

Each of the AHP video input (5919) and AHP video output (55949, 5949) modules contain frame/line synchronizers allowing video signals to be synchronized with router references. Frame or line syncs can be offset to allow for delays later in the system.

The frame/line synchronizer is a licensed feature which must be purchased (see Section 1.6 for details).

1.1.9 Integrated Multiviewers

Sirius 800 routers can be equipped with integrated multiviewers. These can monitor any router SDI input and/or SDI output depending on the integrated multiviewer. These integrated units provide multiviewer video wall display outputs at the rear of the Sirius frame on HD-BNC or Fiber connectors via SFP connections.

The Sirius 800 integrated multiviewer modules include:

- **MV-800:** MV-800 Integrated Multiviewer.

  Monitors up to 48 router inputs per multiviewer.
  Up to three multiviewers per router frame, depending on router model, monitoring a maximum of 140 router inputs.
  See the MV-800 User Manual for more information.

- **MV-830** Integrated Multiviewer.

  A double-width Sirius 830 router output and input module with an integrated multiviewer.
  Monitors up to 48 router inputs/outputs/sources per multiviewer.

Fits into a Sirius 830 router.
See the MV-830 User Manual for more information.

- **MV-840** and **MV-850** Integrated Multiviewers.

  A dual-width Sirius router output module with an integrated multiviewer.
  Monitors up to 48 router outputs per multiviewer.
  Fits into Sirius 840/850 router models.
  See the MV-840/850 User Manual for more information.

The Integrated Multiviewer signal flow is shown in Figure 5.

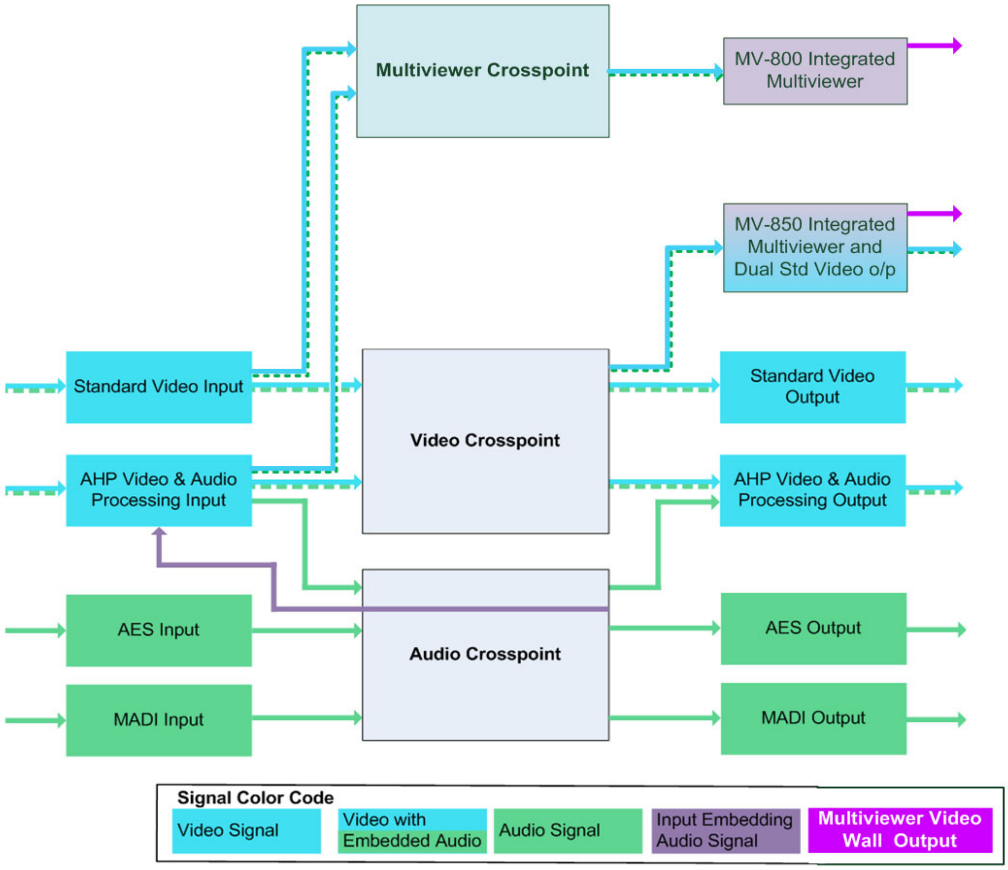


Figure 5 Integrated Multiviewer Signal Routing

Note:

Operating Temperature Range:

The operating temperature range of a Sirius router depends on whether the router frame has one or more MV-8x0 Integrated Multiviewers fitted.

See Appendix D.5, Table 159, *Sirius 800 Common Frame Details*, on page 430.

1.2 Router Configuration and Control

1.2.1 Overview

The Grass Valley Workbench configuration and control system is flexible and scalable, providing a range of interfaces from a single router control panel running on a PC, through to large and powerful installations using dual redundant control across many sites. System configuration details are stored in a Workbench database which is written (pushed) to the router controllers to configure them. Once the router controllers have been configured in this way they store the database locally allowing the router to work independently after a power off even if the connection to the Workbench database PC/server is not available.

Workbench operates in a client-server configuration using standard TCP/IP network protocols, that makes it easy to integrate into existing network infrastructures. Grass Valley and third-party protocols are also used when interconnecting different equipment types.

If required, device drivers can use an embedded controller with dual redundant power, and run a real-time operating system. This combination offers the ultimate in resilient design.

1.2.2 Router System Configuration

The router system is configured using Workbench software running on a computer with a network connection to the router. Workbench is also used to create PC-based soft panels for router control.

Router configuration details are stored in the Workbench SQL database. Once configuration is complete the configuration is pushed to the router controllers allowing them to work without a database connection. The Workbench database can be created from scratch, custom built by Grass Valley (chargeable) or it can be based on one of the sample/default databases supplied with Workbench.

Workbench comes with default databases for each Sirius 800 router type (830, 840 and 850):

- video-only routing;
- AHP routing; and
- ‘4K’ video routing.

Additionally the Sirius 850 has default video only and AHP databases for single and both dual frame configurations (frame 1 of 2 and frame 2 of 2).

Microsoft SQL Management Studio is used for database administration functions including database backup and restore. Database redundancy is available when setup using standard MS-SQL configuration. See the Sirius Installation and Quick Start manual for details on how to link Workbench to a database. For details on using the configuration software see the Workbench user manual.

Figure 6 and Figure 7 show two typical installation scenarios:

Note:

- Both installation scenarios include an optional RollCall PC that can be used to control the router. Changes made by RollCall are reflected in Workbench and vice versa.
- The RollCall PC cannot be used to configure the router and this must be carried out using Workbench.
- Both scenarios show a single Sirius 800 series router for clarity however systems may well contain multiple routers, control panels and other devices. See the Workbench User Manual for details on device support.

Figure 6 shows an example of a distributed installation where the database and SQL server are installed on the server PC. Client PCs are loaded with individual components that connect through the network to the database. The Workbench and/or RollCall PC can be used for router control.

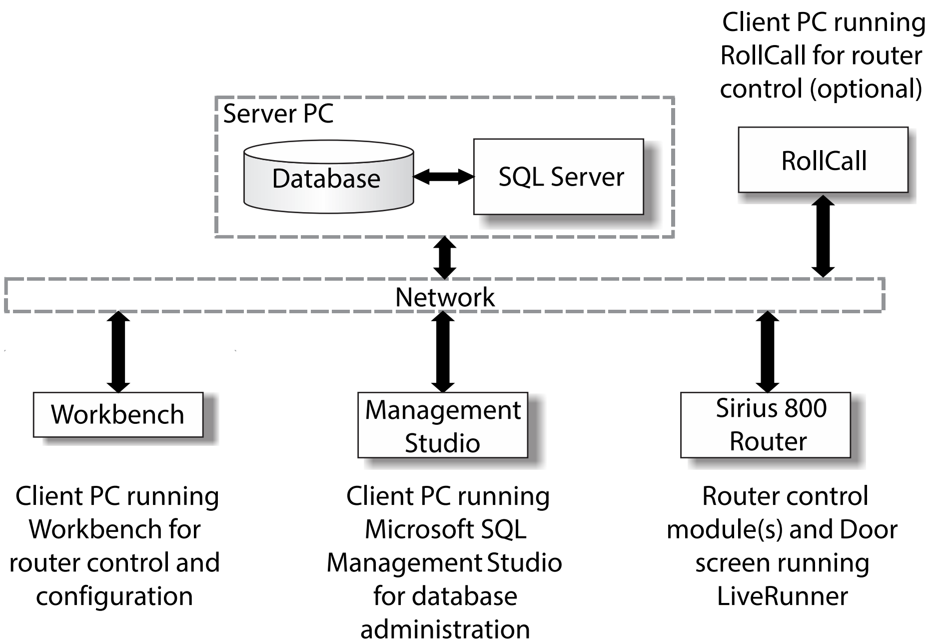


Figure 6 Example: Standalone Database Server with Multiple Client PCs and Router(s)

Figure 7 shows an example a stand-alone installation where everything resides on a single Client/Server PC. The Workbench and/or RollCall PC can be used for router control.

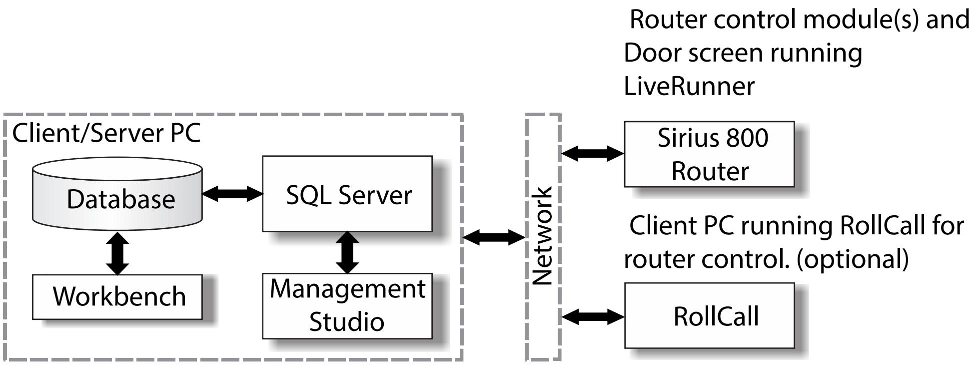


Figure 7 Example: Single Client/Server PC with Router(s) and a RollCall Client

1.2.3 Routing Control

The router can be controlled from Workbench Softpanels, RollCall, Panels and via Grass Valley or third-party protocols for third party control systems. Softpanels are usually used from a PC running LiveRunner which is a client only version of Workbench. The client only version can't be used for router configuration. When Workbench Softpanel control is used the Softpanels need to connect to the Workbench database on power-up after which they talk to the router directly. Hardware panels and RollCall clients talk to the router directly.

Video and audio routing is achieved by the use of matrices, levels and associations. Inhibits can be set up to prevent unwanted routes from being set and routes can be automatically or manually protected if required. Salvos or Snapshot can be configured to bring the router back to a known state.

The Workbench configuration tools allow you to design one or more audio mapping templates to quickly group and name the channel order/signal types and these can then be applied to the input and output channels as required. This method simplifies the configuration process which makes setting up new input and output feeds quicker and less prone to errors.

1.3 Sirius 800 Input/Output Modules

Input and output modules are fitted to the front of the router frame.

1.3.1 Input Modules

The following input modules are available for the Sirius 800 routers (input modules fitted to earlier routers are listed in Appendix C.2):

Video Input Modules

- **55917** and **5917 - Sirius 800 Standard Video BNC/Fiber Input Module**
  Input connector type dependent on rear panel fitted.
- **5919 - Sirius 800 Video AHP Input Module with delay and Sync Capability**
  Input connector type dependent on rear panel fitted.
- **5960 - Sirius 800 Video IP Input Module**
  Video IP network connector type dependent on rear panel fitted.

Audio Input Module

- **4915 - Sirius 800 AES/MADI Input Module - 120 AES Pairs and 3 MADI Input Channels or 12 MADI (Main & Redundant)**
  input connector type and inputs dependent on rear panel fitted.

1.3.2 Output Modules

The following output modules are available for the Sirius 800 routers (output modules fitted to earlier routers are listed in Appendix C.4):

Video Output Modules

- **55926** and **5926 - Sirius 800 Standard Video Output Module (Non Expandable)**
  Output connector type dependent on rear panel fitted.
- **55938** and **5938 - Sirius 850 Standard Video Output Module (Expandable)**
  Output connector type dependent on rear panel fitted.
- **55949** and **5949 - Sirius 800 Video Embedding & AHP Output Module with delay and sync capability**
  Output connector type dependent on rear panel fitted.
- **5970 - Sirius 800 Video IP Output Module**
  Video IP network connector type dependent on rear panel fitted.

Audio Output Module

- **4929 - Sirius 800 AES/MADI Output Module with audio delay - 120 AES Pairs and 3 MADI Output Channels or 12 MADI (Main & Redundant)**
  Output connector and outputs type dependent on rear panel fitted.

1.3.3 Rear Panels

CAUTION:
Order and use the SFP modules specified for the respective Sirius 800 Rear Panel.
Using other SFP modules may damage the router.

1.4 Interconnection Cables

1.4.1 Unbalanced 62 Way AES to BNC Breakout Cable

The optional breakout cable converts a single unbalanced 62 way high density AES connector to 24 unbalanced AES female BNC connectors. For use with Unbalanced AES input and output rear panels, see sections 7.19 and 9.13 respectively.

- **Unbalanced 62 Way AES to BNC Breakout Cable - 1 metre**
  Order Code FGAEY 2502910A
  Cable kit consists of 1 x 1 metre (3 Feet 3 Inches) breakout cable with connectors.
  Five cables are required for all of the AES connectors on an AES rear panel.

1.4.2 DS-Link to DS-Link Cable

A 'DS-Link to DS-Link' cable can be used to:

- Loop-through signals to/from external Grass Valley IQ modular products.
- Expand a Sirius 850 system to up to 1152^2.

DS-Link to DS-Link Cable - 6 metres:
Order Code FGAEY WDS6THIN
Cable kit consists of 1 x 6 metre (19 Feet) DS-Link to DS-Link cable.

1.4.3 DC Power Cables

- **DC Power Cable Kit - 2.5 metres**:
  Order Code 1913: Cable kit consists of:

  2 x 2.5 metre (8 Feet) DC power cables
  1 x 2.5 metre (8 Feet) Earth cable
  1 x 2.5 metre (8 Feet) PSU alarm cable
- **Additional DC Power Cable - 2.5 metres**:
  Order Code 636025: Consists of 1 x 2.5 metre (8 Feet) DC power cable.
- **DC Power Cable Kit - 8 metres**:
  Order Code 1918: Cable kit consists of:

  2 x 8 metre (26 Feet) DC power cables
  1 x 8 metre (26 Feet) Earth cable
  1 x 8 metre (26 Feet) PSU alarm cable
- **Additional DC Power Cable - 8 metres**:
  Order Code 636035: Consists of 1 x 8 metre (26 Feet) DC power cable.

1.4.4 IP Network Cables

IP network cables connect a router's video IP stream interfaces (Multi-channel IP Receive or Transmit) to a high-performance IP network. The type of cable used depends on the type of small form-factor (SFP/QSFP) module fitted to the router's Video IP Input or Output rear panels and the distance to be covered (range or reach):

- **Optical Fiber:**
  - **QSFP+:** 40 Gb/s (4x10 Gb/s). Short or long range.

1.5 Sirius 800 Features

1.5.1 Sirius 830 Router

- Up to 288 x 288 video and up to 9216 x 9216 mono audio (depending on input/output card configuration) in a non-expandable 15U* frame with full video and audio crosspoint redundancy.
  *Not including power supply height.

A typical Sirius 830 router might be: 240 x 240 Video router with a 240 x 240 AES.

1.5.2 Sirius 840 Router

- Up to 576 x 576 video and up to 18432 x 18432 mono audio (depending on input/output card configuration) in a non-expandable 27U* frame with full video and audio crosspoint redundancy.
  *Not including power supply height.

A typical Sirius 840 router might be: 480 x 480 Video router with a 480 x 480 AES.

1.5.3 Sirius 850 Router

- Up to 576 x 576 video and up to 18432 x 18432 mono audio (dependent on input/output card configuration) in an expandable 34U* frame with full video and audio crosspoint redundancy.
  *Not including power supply height.
- A Sirius 850 router may be expanded:
  - Field expandable to 1152 x 1152 video (dependent on input/output card configuration) by the addition of a *further* single Sirius 850 34U frame. Signal cabling between frames is supplied with the 1365 expansion rear panels. The control bus cables between frames are standard Category 5e Ethernet cables (see section 10.2.1 for details).

  or

  - Field expandable to 576 x 1152 video by the use of 55928 or 5928 Expansion Output modules* and 1366 video HD BNC Expansion Output rear panels (processing is not available on the expansion outputs and the maximum audio matrix size remains as 18432 x 18432 mono audio channels)

Note: * The 55928 module is functionally the same as the 5928 module, but each module type is compatible with different rear panels.

A typical Sirius 850 router might be:
480 x 600 Video router with a 480 x 480 AES and 12 x 12 MADI router.

1.5.4 All Sirius 800 Routers

1.5.4.1 Signal Formats

Mix and match different signal formats in the same frame:

- BNC Video - 3 Gb/s & 1.5 Gb/s HD, SD, DVB-ASI.
- HD BNC Video - 3 Gb/s & 1.5 Gb/s HD, SD, DVB-ASI.
- 6G SDI Video - 6 Gb/s (2SI).
- 1.5G Quad-link (quadrant or 2SI modes).
- 12G SDI Video - 12 Gb/s (2SI).
- 3G Quad-link (quadrant or 2SI modes).
- Fiber Video - 3 Gb/s & 1.5 Gb/s HD, SD, DVB-ASI.
- DS-Link Video - 3 Gb/s & 1.5 Gb/s HD, SD, DVB-ASI.
- Video over IP - 3 Gb/s & 1.5 Gb/s HD, SD.
- 5 x 62 way female high density D Type connectors for balanced or unbalanced AES Audio (dependent on rear panel fitted) - AES at 48 kHz
  and
  3 x HD BNC (dependent on rear panel fitted) - MADI up to 48 kHz.
- BNC Audio - MADI up to 48 kHz.
- Fiber Audio - MADI up to 48 kHz.

1.5.4.2 Video Crosspoints

Each video crosspoint module has 288^2 crosspoints:

- **Sirius 830 up to 288 x 288**:
  Up to two crosspoint modules can be fitted sending signals to the output modules. One crosspoint module is used as the main crosspoint module and the second is optional for full 1:1 redundancy capability.
- **Sirius 840** or **Sirius 850 up to 576 x 576**:
  Up to five crosspoint modules can be fitted sending signals to the output modules. Four crosspoint modules are used as the main crosspoint modules and the fifth is optional for "+1" redundancy.
- **Sirius 850 Expanded up to 576 x 1152** (a single-frame system):
  Up to five *additional* expansion crosspoint modules can be fitted in the top of an expanded frame. These send signals to the expansion output modules in the top of the router. Four crosspoint modules are used as the main crosspoint modules and the fifth is optional for "+1" redundancy.
- **Sirius 850 Expanded up to 1152 x 1152** (a two-frame system):
  Each frame must be fitted with expansion crosspoints.

1.5.4.3 Audio Crosspoints

Each crosspoint module has up to $18{,}432^2$ crosspoints:

- **Sirius 830 up to 9,216 x 9,216:**
  Up to two crosspoint modules can be fitted sending signals to the output cards. One crosspoint module is used as the main crosspoint module and the second is optional for redundancy.
- **Sirius 840 up to 18,432 x 18,432:**
  Up to two crosspoint modules can be fitted sending signals to the output cards. One

crosspoint module is used as the main crosspoint module and the second is optional for redundancy.

- **Sirius 850 up to 18,432 x 18,432**:
  Up to two crosspoint modules can be fitted sending signals to the output cards. One crosspoint module is used as the main crosspoint module and the second is optional for redundancy.

1.5.4.4 Nucleus2 Router Controller

- Dual redundant with auto fail-over
- Provides redundant control connections on RS422/485 and Ethernet.
- Status monitoring to external control systems and door PC
- Nucleus2 2464/2463 support several protocols:
  - SW-P-02 (serial);
  - SW-P-02 (IP);
  - SW-P-06 (RS 485 multi-drop panel protocol);
  - SW-P-08 (serial);
  - SW-P-08 IN (IP);
  - RollCall;
  - SNMP Control and SNMP Monitoring.
- Nucleus 2450 controllers: Earlier Sirius 800 routers were supplied with Nucleus 2450 controllers and these support several protocols: SW-P-02 (serial), SW-P-02 IN (IP), SW-P-02 IN (time stamped crosspoint set), SW-P-06 (RS 485 multi-drop panel protocol), SW-P-08 (serial), RollCall, SNMP Control, SNMP Monitoring, GVG ES-Control and Harris Passthrough. It is not possible to use this controller with advanced AHP features.

1.5.4.5 Control Options

The Sirius 800 routers can be controlled using the following control systems:

- Workbench
- RollCall
- Hardware Panels
- Soft Panels (Workbench or RollCall/RollMap)
- External control systems using SW-P-02 or SW-P-08
- Third party control systems using SW-P-02 or SW-P-08

1.5.4.6 Miscellaneous

- Dual redundant Power Supplies are fitted for maximum resilience depending on configuration.
- A unique feature to the Sirius 800 range is the Catsii status indication and connector location functions.
- **Multiviewer outputs:**
  - **Sirius 830**: 288 x 48 to 288 x 140.
  - **Sirius840**: 576 x 48 to 576 x 140.
  - **Sirius 850**: 576 x 48 to 576 x 96.

- **Input/Output Monitoring Outputs:**
  - **Sirius 830**: Four outputs for input/output monitoring (cannot be used if Multiviewer outputs are fitted).
  - **Sirius 840 and 850**: Four independent outputs for input/output monitoring.
- Extensive status reporting from Workbench control, via the touch screen panel in the front door, further Workbench status and control using an external PC running Workbench V3 or later.

1.6 Software Compatibility Matrix

1.6.1 Sirius 800 Routers

Table 2 states the compatibility between Sirius 800 router controller module versions and Grass Valley Workbench software releases.

The compatible software version depends on the router controller module used and whether any router video IP modules are fitted.

Table 2   Sirius 800 Series Router Controller versus Workbench Software Release

Sirius 800 Router Controller Module	**Workbench Software Release**	
	Router frame ***without*** any Video IP I/O modules fitted	Router frame ***with one or more*** Video IP I/O modules fitted
2450 * **2462** **2463**	Up to 3.17.5 and 4.2 and above. See **Note 1**.	4.6.2 or later
2464	4.0.3 and above. See **Note 1**.	4.6.2 or later

Note 1: *All* Sirius 800 router controllers are supported by Grass Valley Workbench software release 4.2.x.

Note 2: * The 2450 controller cannot be used with AHP or Audio modules.

1.7 12G SDI Rear Module Compatibility

1.7.1 Router Frame Compatibility

12G SDI rear modules are compatible with any Sirius 800 router frame.

1.7.2 12G SDI Rear Panel - Front Module Compatibility

Table 3 Front Module Compatibility of 12G SDI Rear Panels

12G Rear Panel	Compatible Front Modules
1840	55917, 5917, 5919. See **Note 1**.
1841	5917, 5919. See **Note 1**.
1842	55926, 5926; 55938, 5938; 5925; 55949, 5949. See **Note 2**.

Note 1: For firmware PA1250P onwards, the rear panel type (1840 or 1841) does not affect the firmware used. (As long as both the rear and its corresponding front module are programmed the same.)

However, for earlier firmware versions, rear modules **1840** and **1841** must be fitted with different firmware, depending on the front module used. See Table 5 on page 19.

Note 2: Rear panel **1842** has no firmware dependency on front module.

1.7.3 12G SDI Rear Panel - Module Firmware Compatibility

When using a 12G rear panel, ensure a minimum front module firmware revision is used. See Table 4.

Table 4 Front Module Firmware with 12G Rear Panels

Front Module used with 12G Rear	Firmware version to use
5917	PA1009 version 02.02 or higher.
55917	PA1314 v01v00 or higher.
5915 **5919**	PA0957 version 03.03 or higher.
5926 **5038**	PA1010 version 03.01 or higher.
55926 **55938**	PA 1315 v01.00 or higher.
5925 **5049**	PA0961 version 04.01 or higher.
55949	TBD

1.7.4 12G Rear Module Firmware

The 12G rear module firmware version currently depends on which corresponding front module is being used with the 12G rear card. See Table 5.

Table 5 12G Rear Module Firmware

For	12G Rear Module	used with	Front Module	use	Rear Firmware
	1840 or 1841		**5917**		For firmware package PA1250P onwards, use PA1313. For earlier firmware packages, use PA 1312
	1840 or 1841		**5915, or 5919**		For firmware package PA1250P onwards, use PA1313. For earlier firmware packages, use PA1305
	1842		**Any front module**		PA1306

CAUTION: Fitting 12G Rear Panels with firmware <u>*earlier than*</u> PA 1250P:
(Modules: 1840, 1841 and 1842)

When fitting 12G Rear Panels into a Sirius S800 router, firmware used on the rear panel and on the corresponding front module must satisfy the compatibility requirements stated in this section in cases for firmware <u>*earlier than*</u> PA 1250P.
Otherwise the modules/rears may not be recognized in the system and will not function correctly.

1.8 Video IP I/O Modules

1.8.1 SFPs/QSFPs

Video IP I/O modules have 1Gbit Ethernet ports (for “Control”) and high-performance Ethernet interfaces (for Video IP media streams).

- The 1Gb/s control interface Ethernet ports on Sirius 800 Video IP I/O modules are fitted with Ethernet SFPs. SFPs may be ordered separately as spares.

Order Code	Description
FGAEY 1GBE-SFP	1GbE SFP

- The high-performance media interface Ethernet ports are not fitted with any QSFPs. These modules must be ordered separately. The Grass Valley order codes for fiber QSFP modules are shown below.

Order Code	Description
FGAN FCQ-40GE-LR4	40GBASE-LR4 long range QSFP for SMF
FGAN FCQ-40GE-SR	40GBASE-SR short range QSFP for MMF

1.8.2 Video IP Module Configuration

The presence of a 5960 Video IP Input or a 5970 Video IP Output module in the router frame is set up in the router ‘configuration and control’ WorkBench tool.

All configuration of the IP inputs or IP outputs etc. on these modules is done separately, via control screens using the RollCall Control Panel tool.

(See *5960 Sirius 800 Video IP Input Module* on page 178,
5970 Video IP Output Module on page 223, and
Appendix F *Video IP Input/Output Configuration* on page 437.)

1.8.3 IP Terminology

Table 6 Video over IP Terminology

Term	Description
Essence	A general term to describe a component of a video signal. For example, Video, Audio or Metadata.
Spigot	General term for a source or destination.
Flow	Sequence of RTP packets of a single essence.
Source	Originator of one or more flows.
Destination	Receiver of one or more flows.

1.8.4 Router Frame Compatibility of Video IP I/O Modules

The Video IP I/O modules are only compatible with Mark 3 Sirius 800 router frames.

Table 7   Video IP I/O Module Sirius 800 Frame compatibility

Video IP I/O Module	**Mark 1 Frame** (Standard Unmodified Frame)	**Mark 2 Frame** (Original Modified Frame)	**Mark 3 Frame** (Standard & Modified Blue Fan Frame)
5960 **1824** **1825**	NO	NO	**Yes**
5970 **1832**	NO	NO	**Yes**

1.9 AHP Licensing

The Advanced Hybrid Processing (AHP) features are enabled by the Grass Valley Licensing system. Licenses are enabled on a module by module basis allowing you to choose which input and output modules are enabled for audio and video processing. See section 1.9.1 and 1.9.2 for details of the licenses available.

The licensing can be enabled on a module at any point without changing module hardware or removing the module from the router frame.

Table 8 and Table 9 show the licensed options that are available for each of the Advanced Hybrid Processing (AHP) input and output modules.

1.9.1 Video Module Licensing Options

Table 8 Licensed Options for Video Input and Output Modules

	Embedded Audio Processing **Gain, Phase Invert, 16 Channel Mix, Channel Swap (Shuffle)**	**Embedded Audio Processing** **Delay**	**Video Processing** **SD/HD Frame/Line Sync, Video Delay**	**Input Embedding** **Audio Input Embedding**
License Order Code:	S8AHP-VA 1 license per module	S8AHP-VD 1 license per module **Note:** also requires S8AHP-VA on the module	S8AHP-VF 1 license, 8 assignable channels (assigned to any input or output channels)	S8AHP-VE 1 license per module **Note:** also requires S8AHP-VA on the module
Module				
5919 Video AHP Input Module	Purchasable License	Purchasable License	Purchasable License	Purchasable License
5949 Video AHP Output Module	Purchasable License	Purchasable License	Purchasable License	Not Applicable
Modules no longer supplied with new systems:				
5915 Video AHP Input Module	Purchasable License	Not Applicable	Not Applicable	Not Applicable
5925 Video AHP Output Module	Purchasable License	Not Applicable	Not Applicable	Not Applicable

Important: If the SD card is removed from a module for more than 30 minutes the licensed options will cease to function on that module. Routing will not be affected but remember that if any processing functions such as; mixing, shuffle, gain, Frame Sync, Delay, etc are in use they will be reset to their default values. Replacing the licensing SD card will re-instate the licensed options.

See the Sirius 800 Maintenance & Upgrade manual for details on updating the module licenses.

1.9.2 Audio Module Licensing Options

Table 9 Licensed Options for Audio Input and Output Modules

	Audio Processing		
	Gain, Phase Invert, Left/Right Swap, Left Both, Right Both, Mono Mix	**Audio Delay**	**Sample Rate Convert (SRC)**
License Order Code:	N/A	N/A	S8A-SRC 1 license per module
Module			
4915 Audio AHP Input Module	Free license with each module	N/A	N/A
4929 Audio AHP Output Module with Delay	Free license with each module	Free license with each module	Purchasable license
Module (no longer supplied with new systems):			
4925 Audio AHP Output Module	Free license with each module	N/A	N/A

Important: If the SD card is removed from a module for more than 30 minutes the licensed options will cease to function on that module. Routing will not be affected but remember that if any processing functions such as; shuffle, gain, delay, SRC, etc are in use they will be reset to their default values. Replacing the licensing SD card will re-instate the licensed options.

See the Sirius 800 Maintenance & Upgrade manual for details on updating the module licenses.

1.10 Sirius 830 Frame Overview

1.10.1 Frame Architecture

Figure 8 shows the main features of a non-expandable Sirius 830 Router frame.

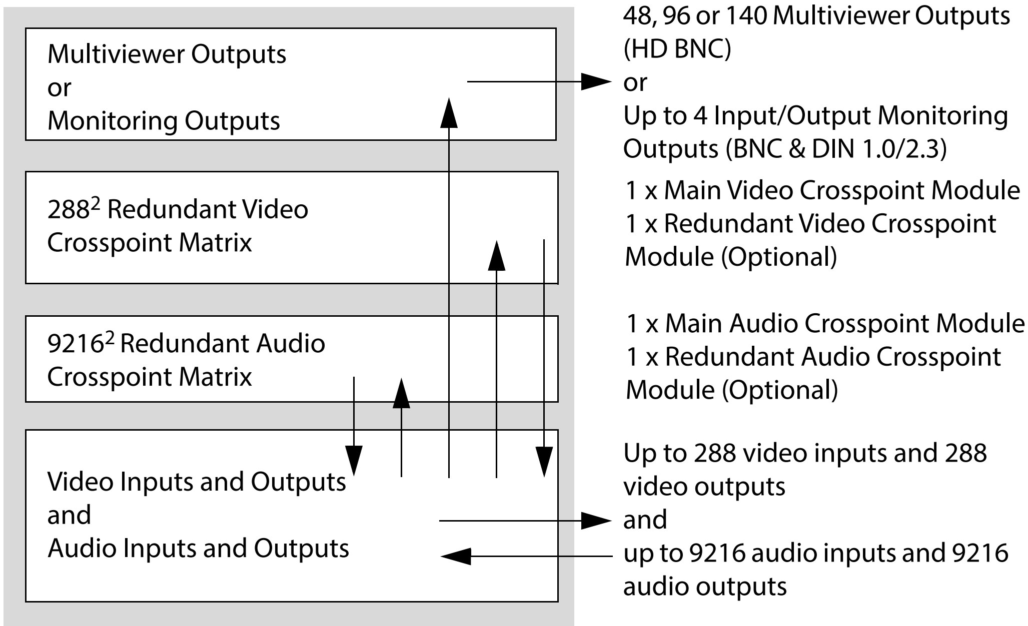


Figure 8 Sirius 830 Router Frame Architecture

1.10.2 Signal Flow Through the Router

The Sirius 830 routes video and/or audio signals by using the video and audio crosspoint modules. The Sirius 830 can be fitted with either Multiviewer outputs or Input/Output monitoring as required (Figure 9).

Multiviewer Outputs

If the Multiviewer Crosspoint Module is fitted it receives signals from the input modules after any processing has been carried out.

Input/Output Monitoring Outputs

If an Input/Output Monitoring Module is fitted each monitoring output can be independently configured to display either an input or an output signal. Each monitoring output can also be independently configured to display a signal before or after processing has been applied to it (processing modules only).

Up to four monitor signals are passed to both the BNC and DIN 1.0/2.3 connectors on the 1237 rear monitor module (see Section 11.2.2). The BNC connectors are optimized for video signals (including embedded audio) and the DIN 1.0/2.3. connectors are optimized for discrete audio signals.

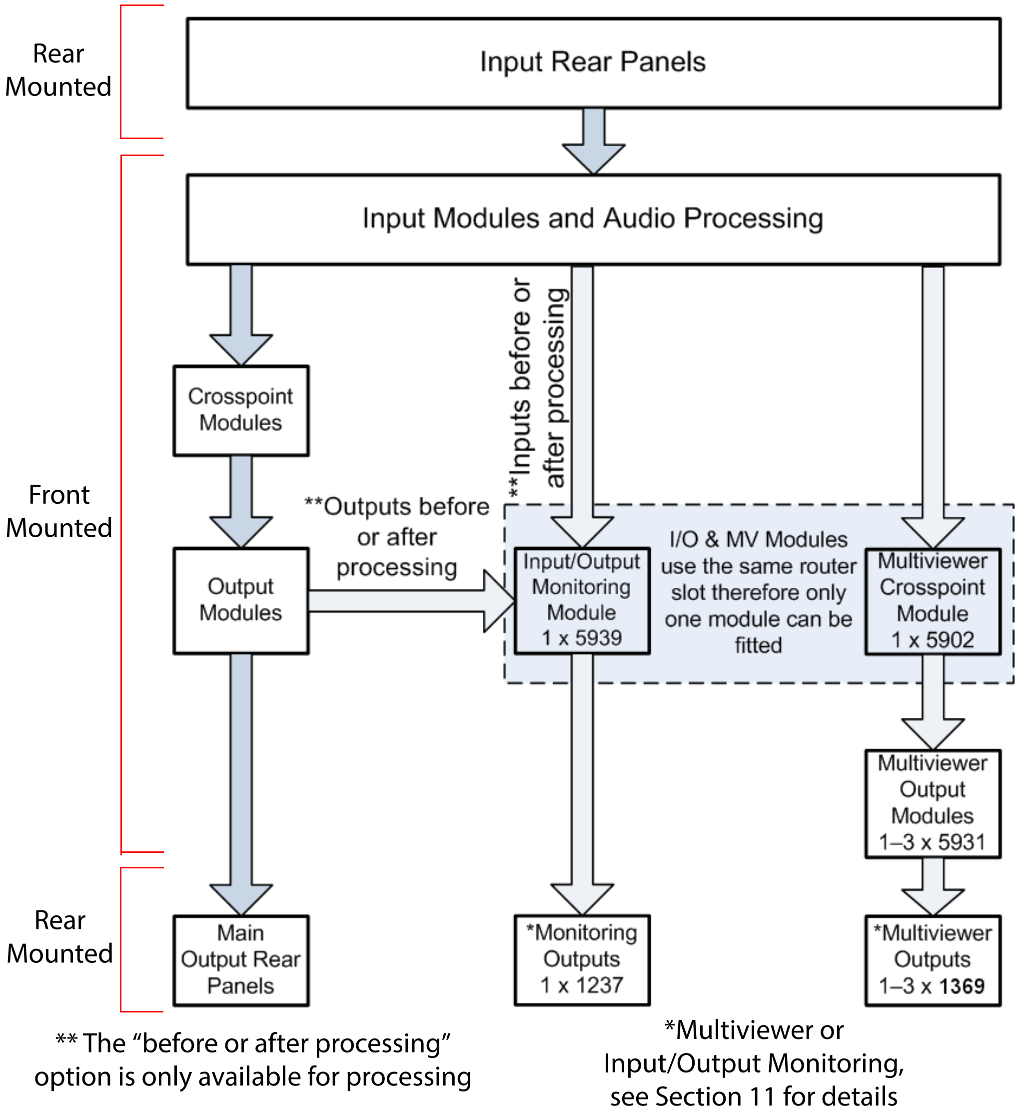


Figure 9 Sirius 830 Signal Flow Diagram

1.10.3 Rear Connectors

Figure 10 shows a fully populated Sirius 830 frame with BNC Inputs and Outputs. See section 6.2 for rear panel input/output connector configuration details. Multiviewer crosspoint cards and rear panels cannot be installed the same frame as a 1237 Monitoring module (for details see Section 11).

Cables connected to the router must be fitted with adequate vertical and horizontal strain relief to avoid twisting of the rear panels causing damage to the router connectors and loss of electrical/signal connection to the router.

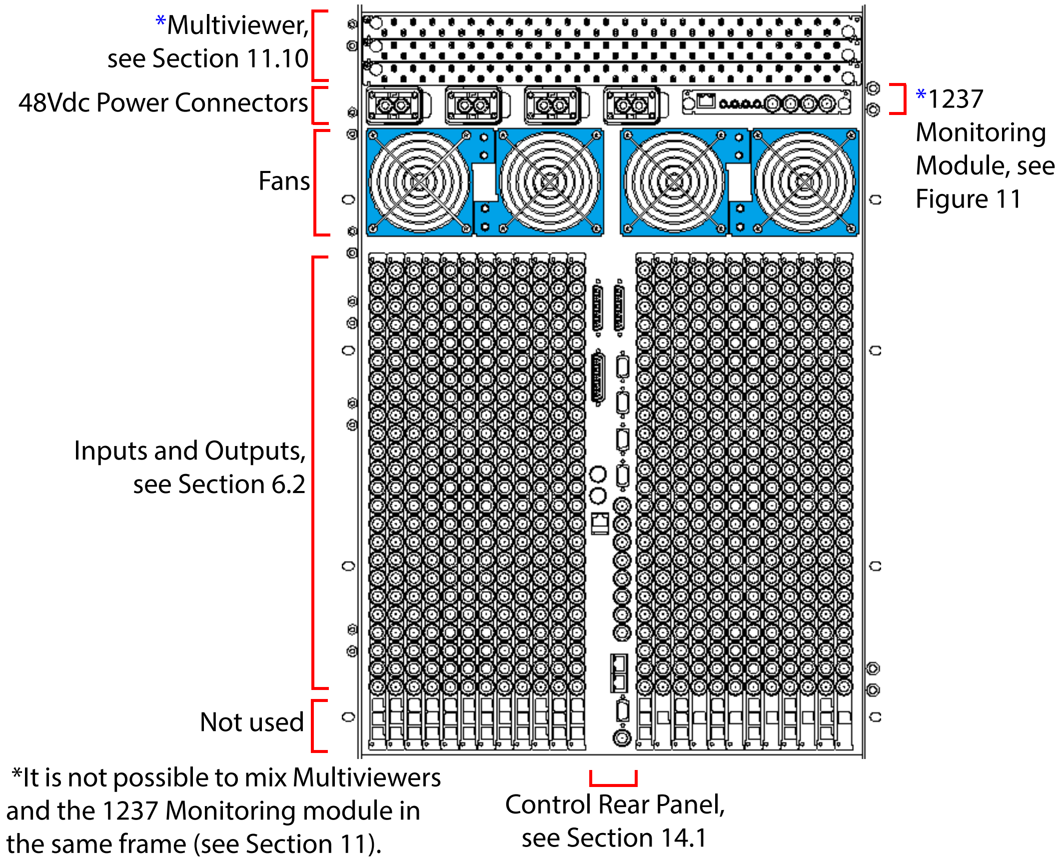


Figure 10 Sirius 830 frame with BNC Input/Output, Rear View

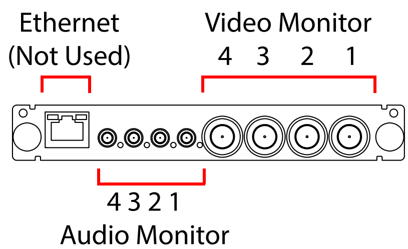


Figure 11 Sirius 830 1237 Monitoring Outputs

- For details of the 1237 monitoring outputs see Section 11.9.
- For details of the Sirius 830 BNC and Fiber rear connectors see Section 6.2.4.

1.10.4 Video IP I/O Module S830 Frame Compatibility

The Video IP I/O modules (5960 and 5970, and their associated Rear Panels) should only be fitted to Mark 3 Sirius 830 frames. See Table 10.

Table 10 Video IP I/O Module Sirius 830 Frame compatibility

Video IP I/O Module	Mark 1 Frame (Standard Unmodified Frame)	Mark 2 Frame (Original Modified Frame)	Mark 3 Frame (Standard & Modified Blue Fan Frame)
5960 1824	NO	NO	**Yes**
5970 1832	NO	NO	**Yes**

1.11 Sirius 840 Frame Overview

1.11.1 Frame Architecture

Figure 12 shows the main features of a non-expandable Sirius 840 router frame.

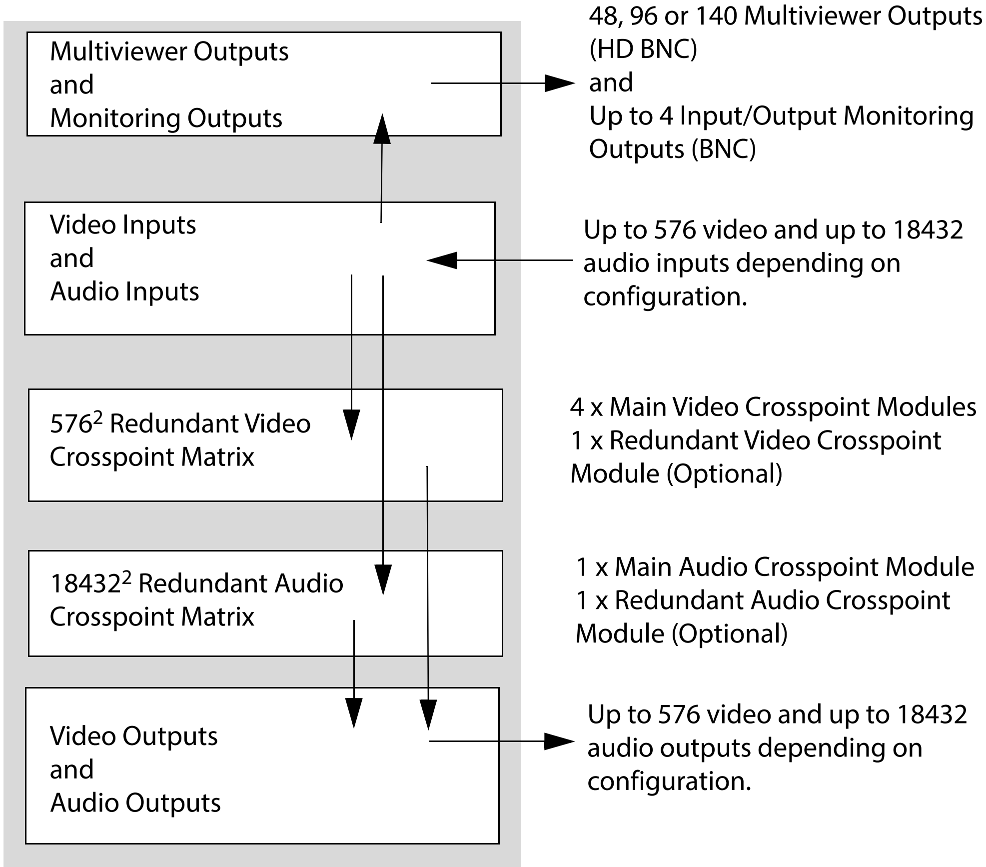


Figure 12 Sirius 840 Router Frame Architecture

1.11.2 Signal Flow Through the Router

The Sirius 840 routes video and/or audio signals by using the video and audio crosspoint modules. The Sirius 840 can be fitted with Multiviewer outputs and Input/Output monitoring as required (Figure 13). Full details of the options are shown sections 11.3.1, 11.4.2, 11.4.3 and 11.4.4

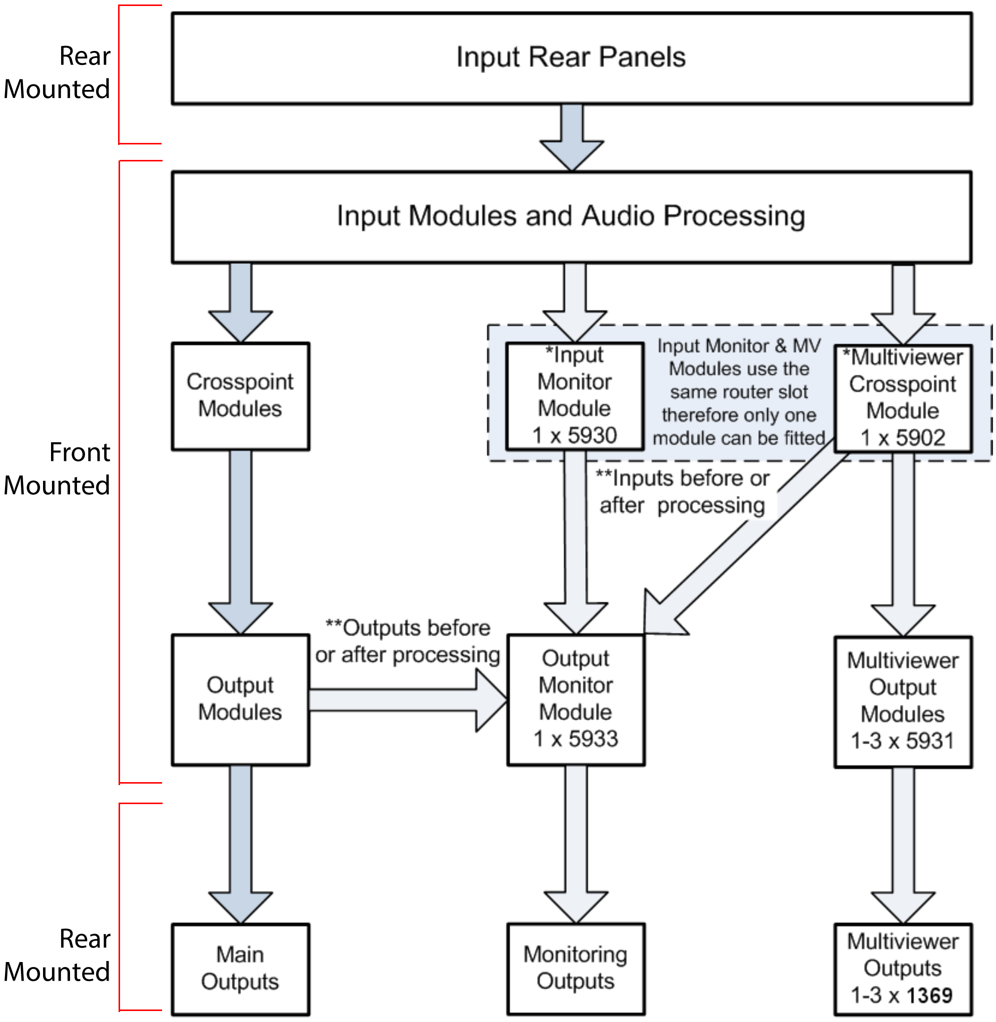
Multiviewer Outputs

If the Multiviewer Crosspoint Module is fitted it receives signals from the input modules after any processing has been carried out.

Input/Output Monitoring Outputs

If an Input/Output Monitoring Module is fitted each monitoring output can be independently configured to display either an input or an output signal. Each monitoring output can also be independently configured to display a signal before or after processing has been applied to it (processing modules only).

Up to four monitor signals are passed to the BNC connectors on the 1287 Control rear panel (see Section 14.2).



** The "before or after processing" option is only available for processing modules

*Monitor Input Module (5930) only required if the Multiviewer Crosspoint Module (5902) is not fitted.

Figure 13 Sirius 840 Signal Flow Diagram

1.11.3 Rear Connectors

Figure 14 shows a fully populated Sirius 840 frame with BNC Inputs and Outputs. See section 6.3 for rear panel input/output connector configuration details.

Cables connected to the router must be fitted with adequate vertical and horizontal strain relief to avoid twisting of the rear panels causing damage to the router connectors and loss of electrical/signal connection to the router.

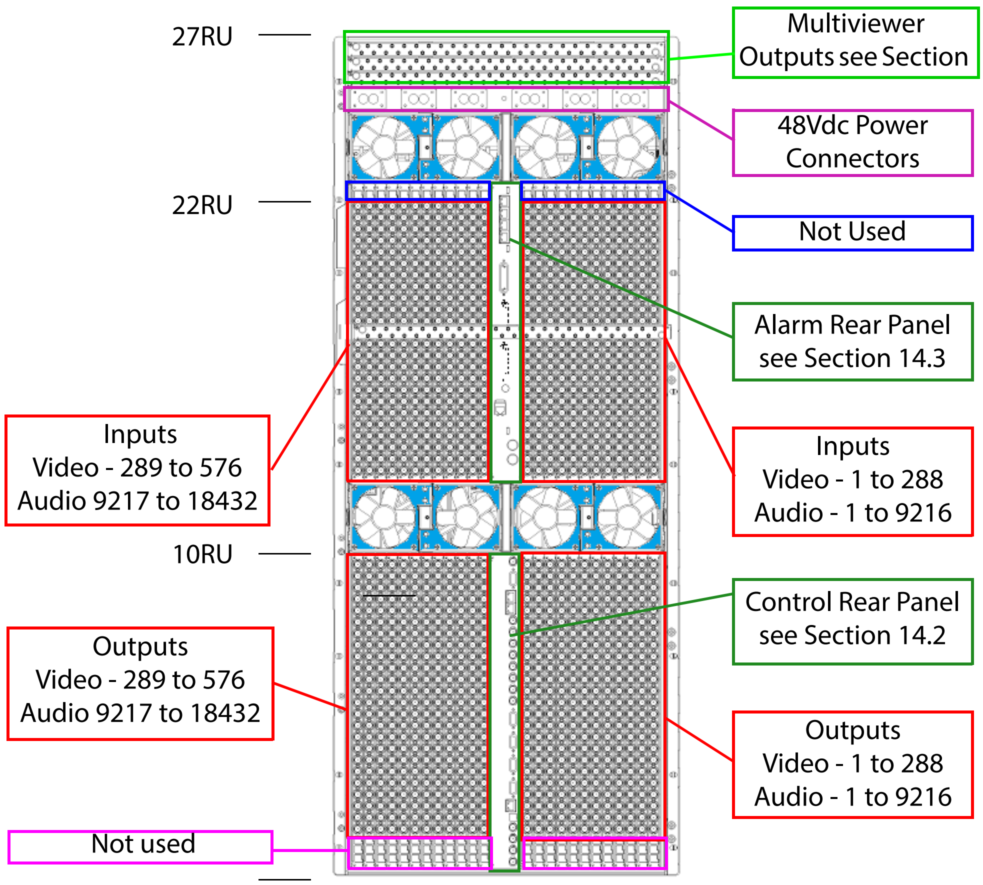


Figure 14 Sirius 840 frame with BNC Input/Output, Rear View

- For details of the Sirius 840 BNC and Fiber rear connectors see Section 6.3.7.

1.11.4 Video IP I/O Module S840 Frame Compatibility

The Video IP I/O modules (5960 and 5970, and their associated Rear Panels) should only be fitted to Mark 3 Sirius 840 frames. See Table 11.
For any other Sirius 840 frame combination, please contact Grass Valley customer support.

Table 11 Video IP I/O Module Sirius 840 Frame compatibility

Video IP I/O Module	**Mark 1 Frame** (Standard Unmodified Frame)	**Mark 2 Frame** (Original Modified Frame)	**Mark 3 Frame** (Standard & Modified Blue Fan Frame)
5960 1825	NO	NO	**Yes**
5970 1832	NO	NO	**Yes**

1.11.5 Frame Architecture

Figure 15 shows the main features of an expandable Sirius 850 router frame.

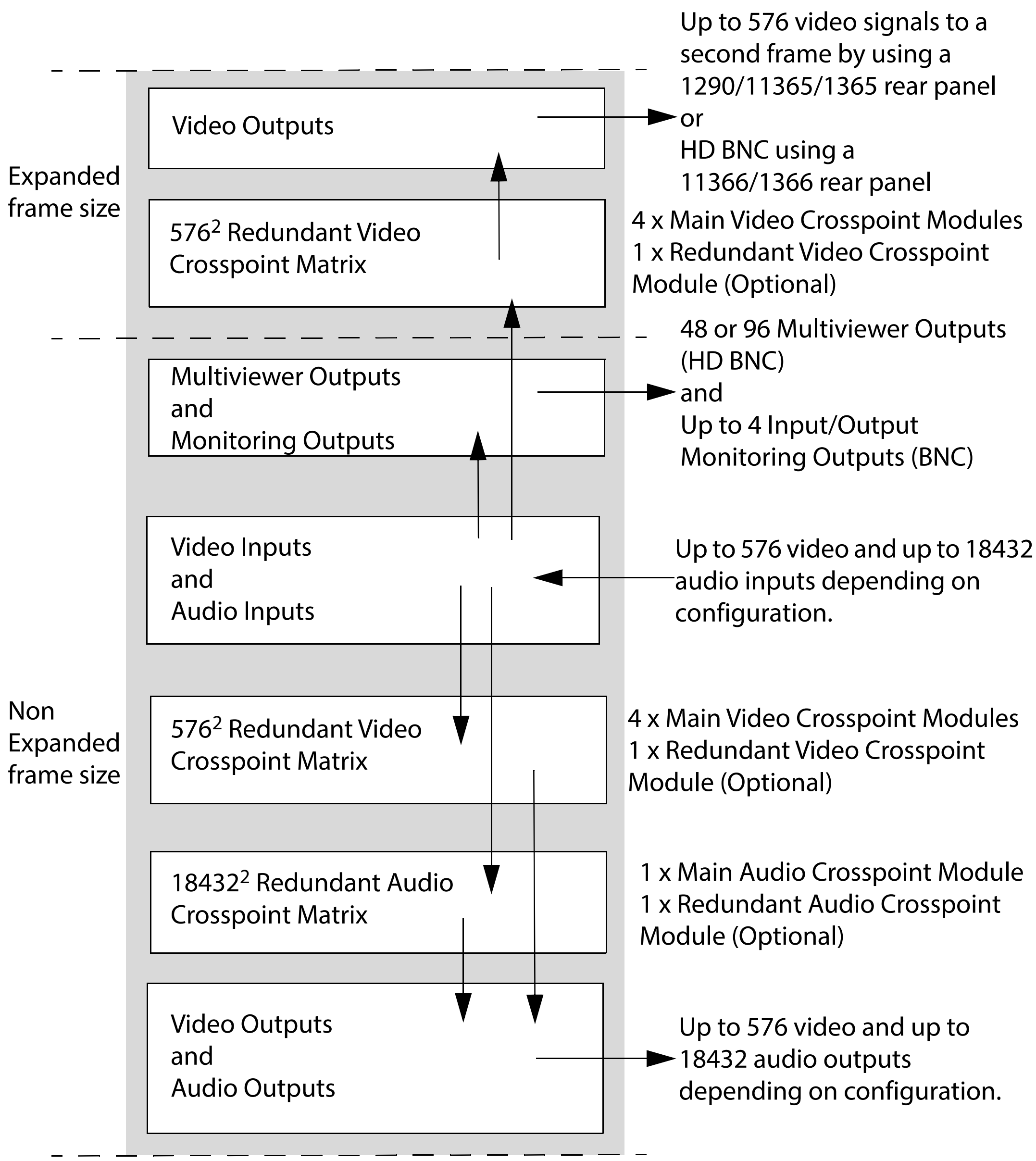


Figure 15 Single Sirius 850 Router Frame Architecture

1.11.6 Signal Flow Through the Router

The Sirius 850 routes video and/or audio signals by using the video and audio crosspoint modules. The Sirius 850 can be fitted with Multiviewer outputs and Input/Output monitoring as required (Figure 16). Full details of the options are shown sections 11.4.1, 11.4.2, 11.4.3 and 11.4.4

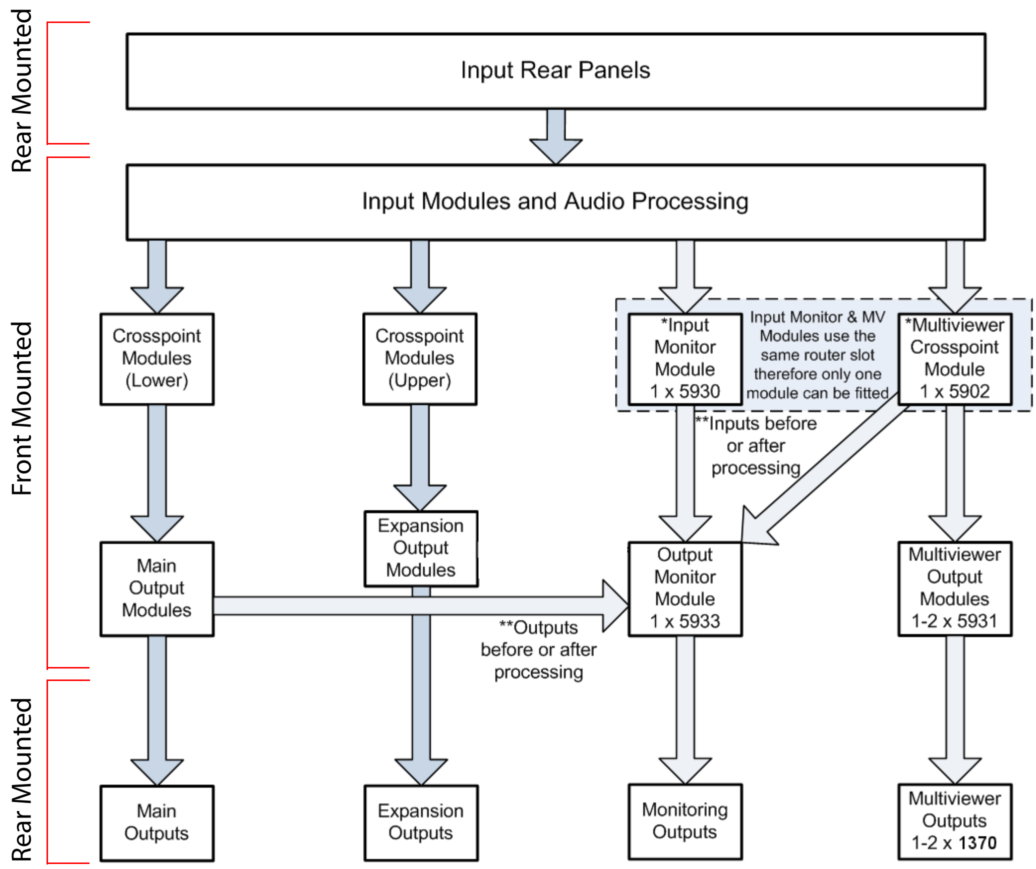
Multiviewer Outputs

If the Multiviewer Crosspoint Module is fitted it receives signals from the input modules after any processing has been carried out.

Input/Output Monitoring Outputs

If an Input/Output Monitoring Module is fitted each monitoring output can be independently configured to display either an input or an output signal. Each monitoring output can also be independently configured to display a signal before or after processing has been applied to it (processing modules only).

Up to four monitor signals are passed to the BNC connectors on the 1287 Control rear panel (see Section 14.2).



** The "before or after processing" option is only available for processing modules

*Monitor Input Module (5930) only required if the Multiviewer Crosspoint Module (5902) is not fitted.

Figure 16 Sirius 850 Signal Flow Diagram

1.11.7 Rear Connectors

Figure 17 shows a fully populated Sirius 850 frame with BNC Inputs and Outputs. See section 6.3.3 for rear panel input/output connector configuration details.

Cables connected to the router must be fitted with adequate vertical and horizontal strain relief to avoid twisting of the rear panels causing damage to the router connectors and loss of electrical/signal connection to the router.

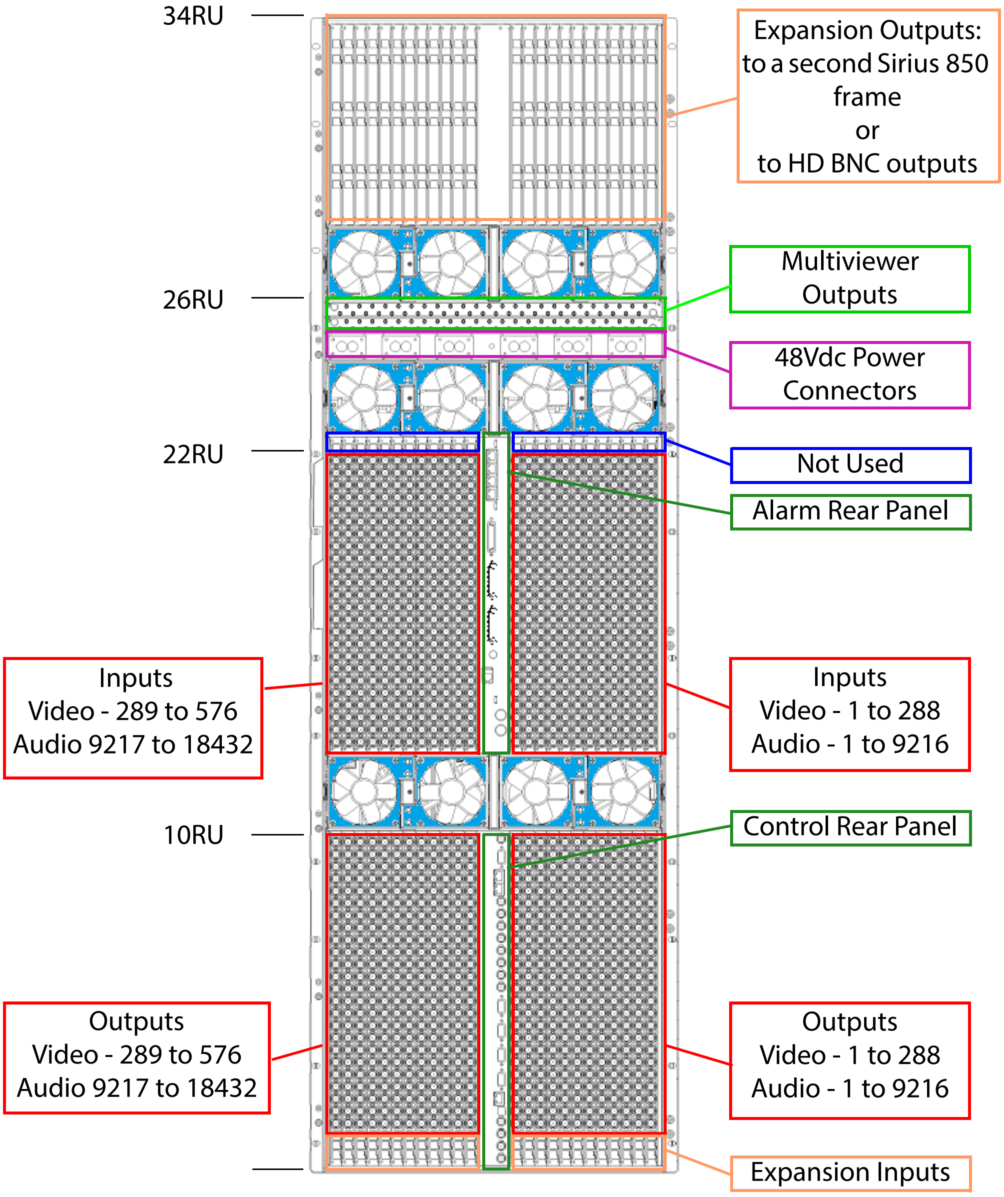


Figure 17 Sirius 850 frame with BNC Input/Output, Rear View

- For details of the Sirius 850 BNC and Fiber rear connectors see Section 6.3.7.
- For details of the Sirius 850 inter-frame expansion rear connectors see Section 6.3.8.1.
- For details of the Sirius 850 HD-BNC expansion rear connectors see Section 6.3.8.2.

1.11.8 Video IP I/O Module S850 Frame Compatibility

The Video IP I/O modules (5960 and 5970, and their associated Rear Panels) should only be fitted to Mark 3 Sirius 850 frames. See Table 12.
For any other Sirius 840 frame combination, please contact Grass Valley customer support.

Table 12 Video IP I/O Module Sirius 850 Frame compatibility

Video IP I/O Module	**Mark 1 Frame** (Standard Unmodified Frame)	**Mark 2 Frame** (Original Modified Frame)	**Mark 3 Frame** (Standard & Modified Blue Fan Frame)
5960 1825	NO	NO	**Yes**
5970 1832	NO	NO	**Yes**

1.12 Video Reference Inputs

The video reference signal inputs are used to ensure that the router crosspoint switch is compatible with SMTPE RP168-2009 for that video standard, switching within the 'active picture' part of the requisite line. The Nucleus controller automatically detects the incoming signal and therefore it can be configured to switch on a specific standard.

The Workbench Switch Point Editor specifies which reference type the signal can switch from. Set from **Edit Configuration**, **Routers**, **Advanced Configuration, References....** See the Workbench user manual for details on how to configure the switching points.

Important: If there is no reference signal, the router will crash switch on receiving the switch command.

The Sirius 800 router has four analogue BNC video reference inputs:

- 4 x analogue video, all auto sensing to 525 and 625 B&B, or HD tri-level reference

See section 14.2 for the video reference connector locations.

1.12.1 Derived Video References (Nucleus2 Controllers Only)

Derived video references enable the router to use a reference signal standard that is not available from outside of the router frame as if it is a standard physical video reference input.

Important: Ensure module address 279 is configured as "ReferenceControl". If the module address isn't configured correctly derived references will not work. Configured in Workbench: **Edit Configuration**, **Local Router Hardware**, **Advanced Configuration**, **Edit Module Configurations...**
See the Workbench user manual for full setting details.

Video reference signals are derived (created) from the BNC video reference inputs on the rear of the router. These derived video references can be a different format than the signal on the BNC reference input but they must share the same frame rate as the original reference signal they are created from.

Each router has a maximum of four references in total in any mix of BNC and Derived references.

See section 3.3.5 for details on setting references for the router using the Door screen. Alternatively Derived references can be configured in Workbench from: **Edit Configuration**, **Local Router Hardware**, **Advanced Configuration**, **Edit Derived References....**
See the Workbench user manual for full setting details.

Example (also shown in Figure 18)

- 525 59 Hz BNC Video Ref 1 used directly as a video reference.
  This uses up one of the four available references.
- 625 50 Hz BNC Video Ref 2 used directly as a video reference and to produce a 1080i 50 Hz derived reference.
  This uses up two of the four available references.
- 1080P 60 Hz BNC Video Ref 3 used to produce a 720P 60 Hz derived reference.
  This uses up one of the four available references.
- BNC Video Ref 4 not available as the maximum of four references are already in use.

Note:

- A BNC video reference input can be used to create between one and four derived video reference signals for use in the router.
- Each router has a maximum of four video references in total in any mix of BNC and derived references.

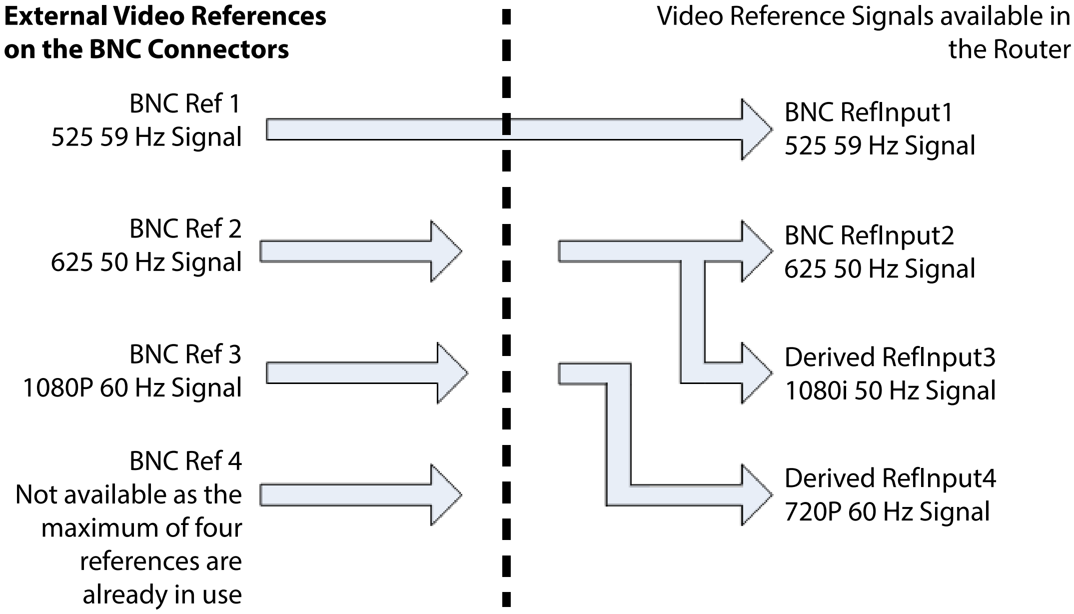


Figure 18 References Example (Nucleus2 2464/2463 Router Controller Only)

1.12.2 Video Switching Point References

Table 13 lists the video switching point references:

Table 13 Switching Point Video References

Video Reference	Video Signal
RefAuto	Sets the reference type based on the signal type detected on the input. All inputs are set to RefAuto in the default database.
Ref525i59	525 interlaced 59 Hz
Ref625i50	625 interlaced 50 Hz
Ref720p60	720 progressive 60 Hz
Ref720p59	720 progressive 59 Hz
Ref720p50	720 progressive 50 Hz
Ref1080i60	1080 interlaced 60 Hz
Ref1080i59	1080 interlaced 59 Hz
Ref1080i50	1080 interlaced 50 Hz
Ref1080p60	1080 progressive 60 Hz
Ref1080p59	1080 progressive 59 Hz
Ref1080p50	1080 progressive 50 Hz

Table 13 Switching Point Video References (Continued)

Video Reference	Video Signal
RefInput1 to RefInput4	Overrides the Auto detection by using one of the fixed reference inputs which allows the same standard but offset for timing issues to be resolved (see section 1.12.3). There can be a mix of the physical reference inputs and the derived reference inputs depending on which Nucleus controller type is fitted and how it is configured (see the following notes). **Notes:** • If Nucleus 2450 controllers are fitted only the physical reference inputs are available. • If Nucleus2 router controllers are fitted then a mix of physical and derived reference inputs are available for use depending on router configuration. see Section 1.12.1 for details on derived references.
SDIInput1 and SDIInput2	Not Available

- 12G inputs switch at same time as their 3G counterparts (12G is routed internally as 4x 3G)
- 6G inputs switch at same time as their 1G5 counterparts (6G is routed internally as 4x 1G5).

1.12.3 Reference Offset (Nucleus2 Controllers Only)

In some circumstances it is necessary to set an offset on a reference signal to accommodate system timing and to make sure the video signal switches at the correct point. see Section 1.12.5 and section 1.12.6 for examples of when this may be required. Reference offsets can be set from Door screen (see section 3.3.5) or from Workbench (see section 1.12.1).

1.12.4 RefAuto Selected

RefAuto is set for all signals when the default database is being used.

When RefAuto is selected for a signal the Nucleus controller will look for a derived reference (2464 or 2463) or a physical reference (2450) that exactly matches the signal.

Note:

- Derived references are only available when Nucleus2 controllers are fitted. see Section 1.12.1 for details.
- If RefAuto is selected for a Dual Link 1080p input signal the Nucleus controller will look for a 1080i reference with the same frame rate as the input signal.

- If a matching reference signal (physical or derived) is present, the controller will switch routes compatible with SMPTE RP168.
- If a matching reference signal (physical or derived) is not present the router will crash switch.

1.12.5 Manual Reference Standard Selected

When a reference standard, such as Ref720p60, is selected manually the Nucleus controller will look for a derived reference (2464 or 2463) or a physical reference (2450) that exactly matches the selected standard.

Note: Derived references are only available when Nucleus2 controllers are fitted.
see Section 1.12.1 for details.

- If the selected standard reference signal (physical or derived) is present then the controller will switch in accordance with SMPTE RP168.
- If the selected standard reference signal (physical or derived) is not present the router will crash switch.
- If the selected standard reference signal (physical or derived) is present but different to the actual signal being switched, for example Ref1080i50 for a 1080p50 signal, then the timing must be adjusted to make sure the switch happens at the correct point.

1.12.6 Reference Input (Physical or Derived) Selected

When a reference input is selected manually (a physical or derived reference) the Nucleus controller will use the specified reference input.

Note: Derived references are only available when Nucleus2 controllers are fitted.
see Section 1.12.1 for details.

- If the signal on the specified reference input (physical or derived) exactly matches the signal to be switched then the router will switch compatible with SMPTE RP168.
- If the signal on the specified reference input (physical or derived) does not exactly match the signal being switched the router will switch according to the specified reference. The timing must be adjusted to make sure the switch happens at the correct point.
- If the signal on the specified reference input (physical or derived) is not valid the router will crash switch.

1.13 Audio Reference Input

The Sirius 800 routers support a single 48kHz AES audio reference which can be either unbalanced or balanced. (see Section 14.2 for connection details.) Connector types on router rear:

- 1 x BNC unbalanced AES input, 75 Ω termination.
- 1 x 9-Way D Type balanced AES input, 110 Ω termination.

Important: Only one audio reference (balanced or unbalanced) should be connected to the router. Connecting both audio references will stop the audio routing from functioning correctly.

A controller can be configured to distribute an AES reference around the router so that the audio output modules can lock to it. The AES reference generated is either a free-running clock set to an AES clock rate of 48 kHz, or it can be locked to a physical input reference on the router (either the AES reference, or one of the video references).

The audio reference is configured in Workbench from: **Controller Configuration**, **Local Router Hardware**, **Advanced Configuration**, **Edit Derived References....**
See the Workbench user manual for full setting details.

These values are part of the database configuration so will need to be pushed to the controller along with the rest of the configuration data.

1.14 Audio Routing and AHP Router Modifications

Early Sirius 800 routers must be modified by Grass Valley before they can be used for audio routing/processing and video processing (see Table 14 to identify your current frame configuration and the level of routing and processing it is capable of).

Modifications to the router frame are carried out by Grass Valley and include:

- Front and Rear Fans upgraded (blue fan casings)
- Output Module fan door replaced with new door (Sirius 840/850 only)
- Input Module fan door replaced with new door (Sirius 840/850 only)
- Input/Output Module fan door replaced with new door (Sirius 830 only)
- New Control rear panel assembly fitted (Sirius 830 only)
- New Alarm rear panel assembly fitted (Sirius 840/850 only)
- New rating plate fitted
- Nucleus 2450 controllers replaced by Nucleus2 2464 controllers
- Control/fan interface modules replaced by 2457 control/fan interface modules (Sirius 830 only). 2457 Control/fan interface module boards are blue
- Control/fan interface modules replaced by 2458 control/fan interface modules (Sirius 840/850 only). 2458 control/fan interface module boards are blue

Note:

- The modifications must be carried out with the router powered down.
- The original shipping bars must not be refitted to a modified frame. The shipping bars are no longer required as the new fan doors perform the same function.

1.15 Frame Configuration and Module Compatibility

There are three possible configurations for each Sirius 800 router model in the field. These configurations are listed in Table 14 Each configuration enables the router to work with particular input/output modules and controllers.

Table 14 can be used to check if a router frame has been modified and identify which configuration it is. This can then be used to confirm what level of routing and processing the frame configuration supports.

Table 14 Router Frame Configuration

	Router Frame Configuration		
	Mark 1 Frame	**Mark 2 Frame**	**Mark 3 Frame**
Frame Description:	Standard Unmodified Frame	Original Modified Frame	Standard & Modified Blue Fan Frame
Frame Supports:	Video Routing Only (No Video or Audio Processing)	Video & Audio Routing, Audio Processing (No Video Processing)	Video & Audio Routing, Video & Audio Processing
Modules: **Router Controller(s)**	Nucleus 2450	Nucleus2 2464/2463	Nucleus2 2464/2463
Fan-Out Controller(s)	**Sirius 830**: 2453 **Sirius 840/850**: 2452	**Sirius 830**: 2455 **Sirius 840/850**: 2456	**Sirius 830**: 2457 (blue boards) **Sirius 840/850**: 2458 (blue boards)
Fans	Silver fan casings (front and rear) with no letters stamped on them	Silver fan casings, rear fan casings stamped with "HF"	Front and rear fans with blue fan casings
MV-8x0 Integrated Multiviewer(s)	Not compatible	Not compatible	Frame operating temperature range is reduced. See Table 159 in Appendix D.5.4 *All Sirius 800 Frames* on page 430.

WARNING:

- DO NOT fit Blue Control/Fan Interface modules (2457/2458) in a router equipped with fans with Silver casings because this will damage the router and the router will stop working.

WARNING:

- DO NOT fit Green Control/Fan Interface modules (2455/2456/2452/2453) in a router equipped with fans with Blue casings because this will damage the router and the router will stop working.

WARNING:

- Fit MV-8x0 Integrated Multiviewers to Sirius 800 Mark 3 Frames only.

Caution:

- Mark 3 Frame operating temperature range is reduced when one or more MV-8x0 Integrated Multiviewers are fitted.
  See Table 159 in Appendix D.5.4 *All Sirius 800 Frames* on page 430,

1.16 End-User License Agreement

See “End User License Agreement” on page 461.

1.17 Patents Information

This product is protected by one or more patents.

For further information, please visit: www.grassvalley.com/patents/

2 Powering the Sirius 800 Routers

Chapter contains:

Powering the Sirius 800 Routers

Before powering the router on ensure that the router has been installed in accordance with the appropriate Sirius 800 Installation and Quick Start guide and local safety regulations.

2.1 Powering Up the Sirius 800

When power is connected to the Sirius 800, the controllers and fans switch on immediately. The main signal modules within the Sirius 800 start to power up one second after the 48 V DC supply has been switched on. The Door PC will auto-start at power on.

Important: To avoid overloading the individual external power supply units, make sure that you power them all up as quickly as possible and at least half of the power supply units within one second of each other.

2.1.1 Power Sequencing

To reduce the inrush current when the whole unit is powered up the modules in the router power up over a period of six seconds starting with the controllers and fans, and ending with the audio crosspoints.

Note: When hot plugging in a module to the Sirius 800, there is a delay before the module powers up.

2.1.2 Power Up and Initialization

Once the controller has booted (see Figure 19 for LED states when the controller is running), it is ready to setup. Router Configuration is carried out using Workbench. If the system has already been configured, it returns to the state it was in (all signal routing and monitor settings) when it was last powered.

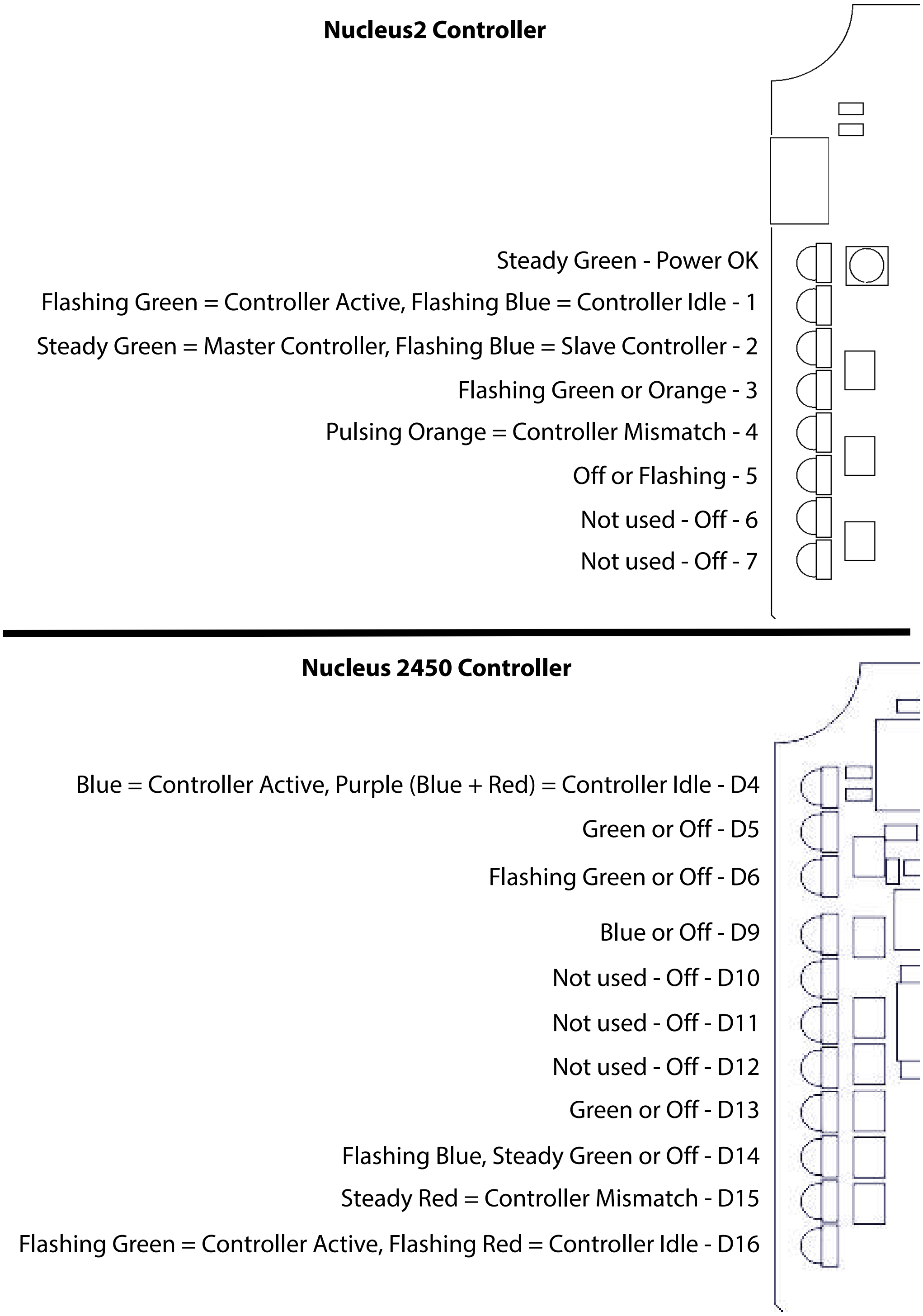


Figure 19 Nucleus2 & Nucleus 2450 Controller LED State when Running

Note:

- For full details of the Nucleus2 Controller LED colors see section 12.4.2.
- For full details of the Nucleus 2450 Controller LED colors see section C.8.

2.1.2.1 Configuration Errors

The router controller generates an error if one or more of the configured modules in the router fails to power up. Errors are displayed on the Door screen (see section 3.2.2) and the router controller LEDs (see Table 15 for LED color and Figure 19 for LED position).

Table 15 Controller Mismatch Notification

Router Controller	LED	LED Color
Nucleus2	4	Pulsing Orange
Nucleus 2450	D15	Steady Red

If the Door screen and router controller indicate that the configuration is not as expected (i.e. modules added or missing) then this can be resolved using Workbench. For details of how to add modules to the router see the Sirius 800 Maintenance & Upgrade manual.

2.1.3 Starting the Door PC Manually

The Door PC starts automatically when the Sirius 800 is powered up. If the Door PC has been shut down and needs starting manually the following procedure should be used.

1. With the Sirius 800 running open the frame door.
2. Inside the back of the door is the power switch for the Door PC (see Figure 20).
3. Switch the Door PC on by pressing and releasing the Door PC power switch (it will not latch in place). Wait until the computer is fully booted up before proceeding further.

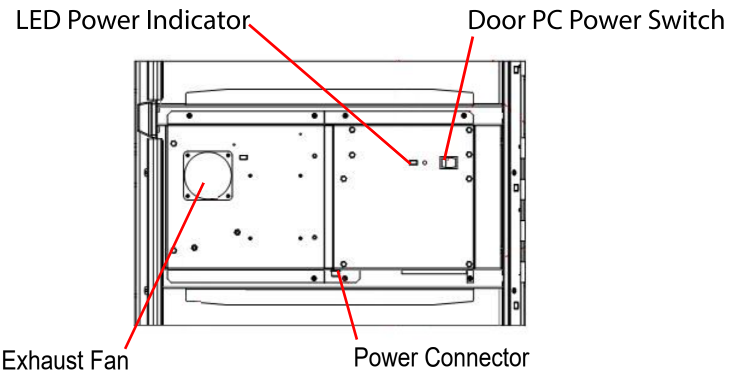


Figure 20 Door PC Rear View

2.2 Powering Down the Sirius 800

Before powering down the Sirius 800 router switch the Door PC off using one of the following methods:

Method 1

1. Navigate to the Door PC main menu and touch the *Exit* button on the screen.
2. A new screen will be displayed with a *Shutdown* button.
3. Touch the *Shutdown* button and the Door PC will shutdown.
4. Wait until Microsoft Windows closes and the screen goes black, then power down the Sirius 800. Make sure that all the external power supply shelves are switched off as soon as possible.

Method 2

1. Alternatively open the door and press and release the Door PC power switch (see Figure 20). The power switch does not latch in place.
2. This causes LiveRunner to close and Microsoft Windows to shut down.
3. Wait until Microsoft Windows closes and the screen goes black, then power down the Sirius 800. Make sure that all the external power supply shelves are switched off as soon as possible.

Once the Door PC has shutdown the Sirius 800 can be powered down. Make sure that all of the external power supply shelves are switched off as quickly as possible to avoid individual power supply units having to supply excessive power to the Sirius 800.

Important: To avoid overloading the individual external power supply units, make sure that all the external power supply shelves are switched off as quickly as possible.

3 Door PC

Chapter contains:

Door PC

The Grass Valley Workbench LiveRunner program runs on the Door PC screen and monitors the status of the Sirius 800. The Door screen can also be used to control some aspects of the router. There are numerous default screens that provide easy control of the Sirius 800 router.

This section shows examples of the default door screens for the Sirius 800 range of routers.

Note:

- The Door PC and controllers must be connected to an Ethernet switch using Ethernet cables and the Ethernet connectors on the rear of the router (see Section 14 for connector positions). If the switch is on a network the IP addresses of the controllers and Door PC must be changed to match the host network requirements (see the Sirius 800 Maintenance & Upgrade manual for details).
- The actual Door PC screens available on your system depends on the version of LiveRunner installed and the actual Sirius 800 router the door PC is on. Although it is not recommended the door screens can be created, deleted and modified by the user so the actual Door screens on your system may differ.

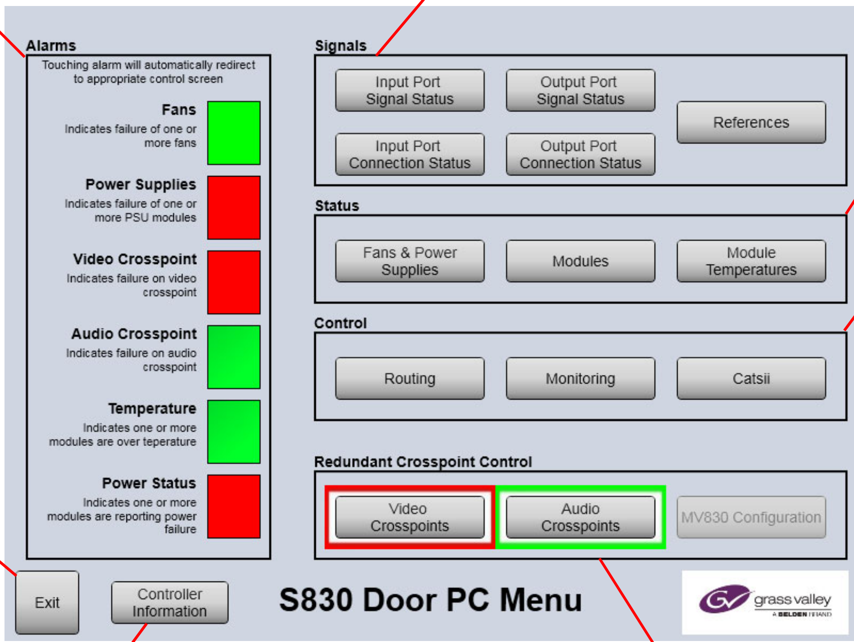
3.1 Main Menu

The Door screen gives quick access to the monitoring and control functions of the router.

All sub-screens have a **Menu** button, touching the **Menu** button this will return you to this main menu screen.

Signals
see Section 3.3 *Signals box* on page 55

Alarms
see Section 3.1.1 *Alarms box* on page 48



Status box
see Section 3.2 *Status box* on page 49

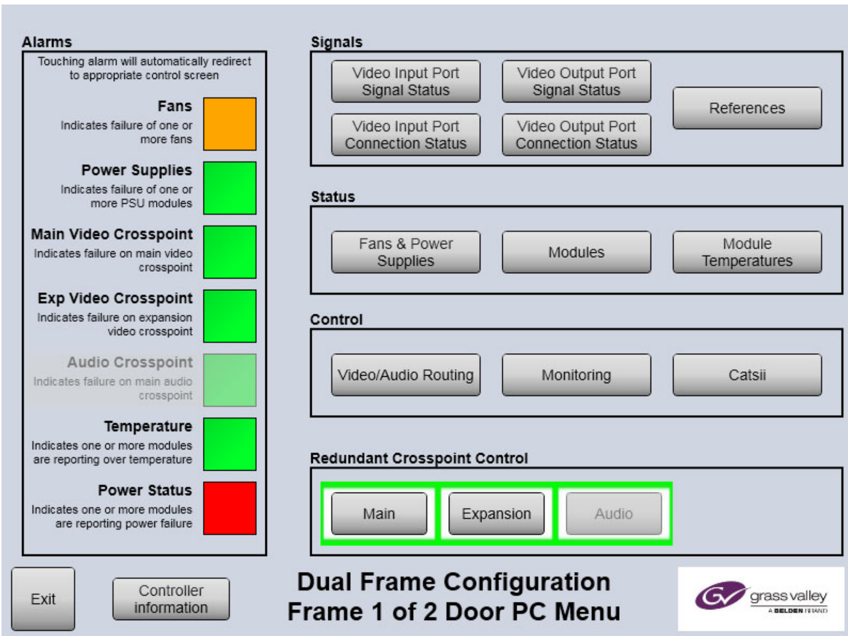
Control
see Section 3.6 *Control box* on page 77

Exit
see below

a) S830 Example

Router Controller Information
see Section 3.5 *Router Controller Information* on page 76

Redundant Crosspoint Control
see Section 3.4 *Redundant Crosspoint Control box* on page 66



b) S850 Expansion Example

Figure 21 Main Menu Examples: a) Sirius 830; b) Sirius 850 Expansion shown

Important:

- If LiveRunner is closed or the door PC is shut down the door screen cannot notify the user of the status of the router or any router alarms. Status and alarm monitoring on the door screen will not resume until the door PC and LiveRunner have been restarted. See section 2.1.3 for details on starting the door PC manually.
- Router status and alarm notifications are still available to external control and monitoring systems while the door screen is off.

The **Exit** button on the main menu screen is used to access the following options:

- **Close** button- Closes LiveRunner and displays the Door PC desktop.
- **Shutdown** button - Closes LiveRunner and shuts down the Door PC.
- **Menu** button - Displays the door screen main menu.

3.1.1 Alarms box

The **Alarms** box on the main menu screen (see Figure 21) gives direct access to router alarm and status information pages. (Pages also accessible from the main menu with a button press.) Several items are listed in the **Alarms** box and overall status is indicated red/green. Touch an item to see alarm details for:

- Fans.
- Power Supplies.
- Video or Audio Crosspoints
- Module Temperature
- Module Power Status.

3.2 Status box

The **Status** box on the main menu screen gives access to: *Fans & Power Supplies Alarms* information; *Modules Present* information; and module temperature alarms.

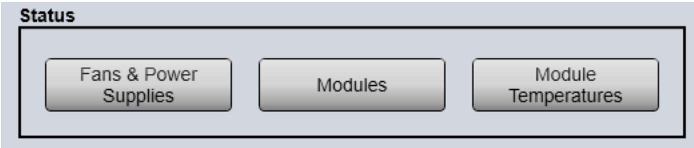


Figure 22 Status Box

3.2.1 Fans & Power Supplies Alarms

Touch the **Fans** or **Power Supplies** item in the **Alarms** box on the main menu screen to view the router **Alarms** screen (see Figure 23).
Alternatively, touch the **Fans & Power Supplies** button in the main menu **Status** box.

a) S830 Example

b) S850 Expansion Example

Figure 23 Alarms Screen Examples: a) S830; b) S850 Expansion

3.2.2 Modules

Touch the **Modules** button in the **Status** box on the main menu screen to view details of the modules mounted in the router. Alternatively, touch the **Power Status** item in the **Alarms** box on the main screen. The most recently viewed module screen will be displayed.

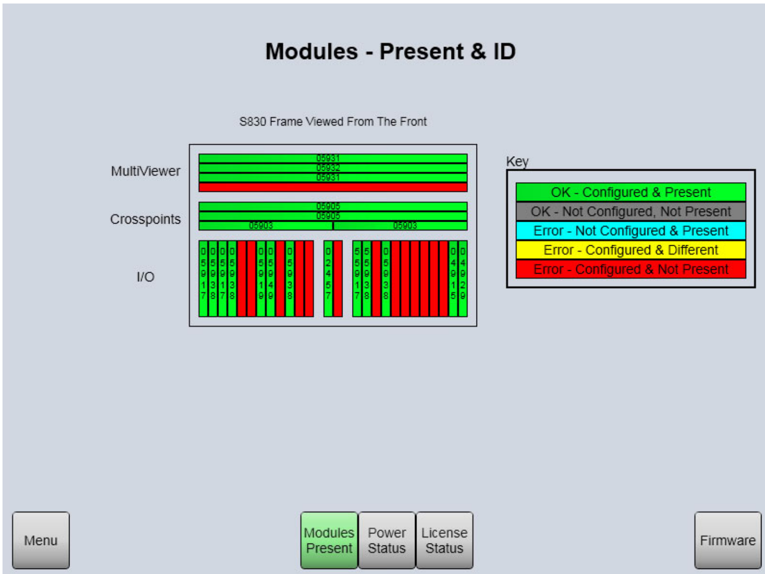
Use the buttons at the bottom of the screen to navigate to the module screen you want to display:

- *Modules Present*;
- *Module Power Status*;
- *Module Licensing Status*; or
- *Module Firmware Information*.

3.2.2.1 Modules Present

This screen displays the configuration status of each module slot. See the on-screen Key for details.

a) S830 Example



b) S850 Expansion Example

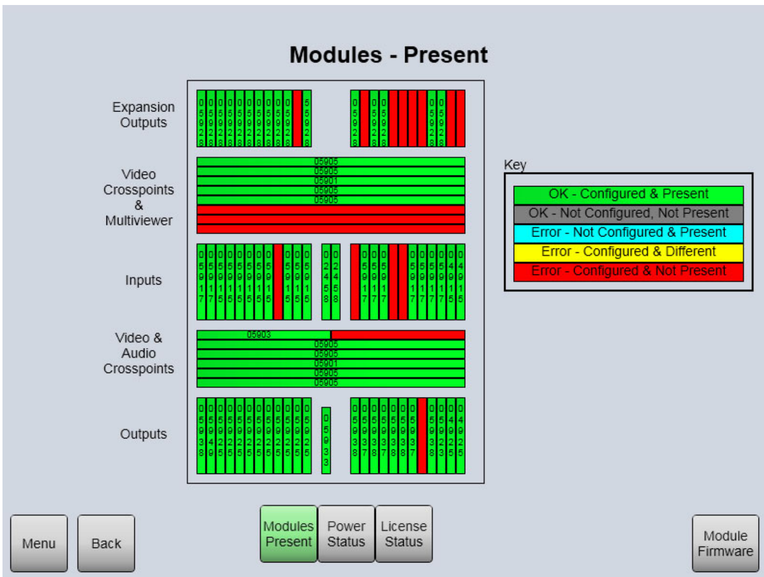


Figure 24 Modules Present Screen Examples: a) S830; b) S850 Expansion

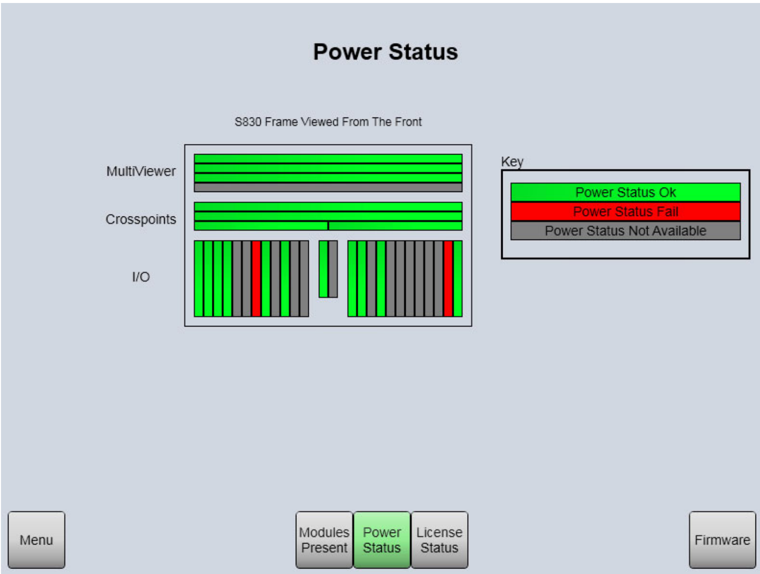
Note:
- Modules are configured from the **Local Router hardware** tab | **Advanced Configuration | Edit Module Configurations...** in Workbench. See the Workbench manual for full details.
- See the Sirius 800 Maintenance & Upgrade manual for an example of adding one or more modules to the router.

3.2.2.2 Module Power Status

This screen displays the power status for each module. See the on screen Key for details.

Note: Unpopulated slots (configured or unconfigured) are displayed as “Power Status Not Available”, this is not a fault.

a) S830 Example



b) S850 Expansion Example

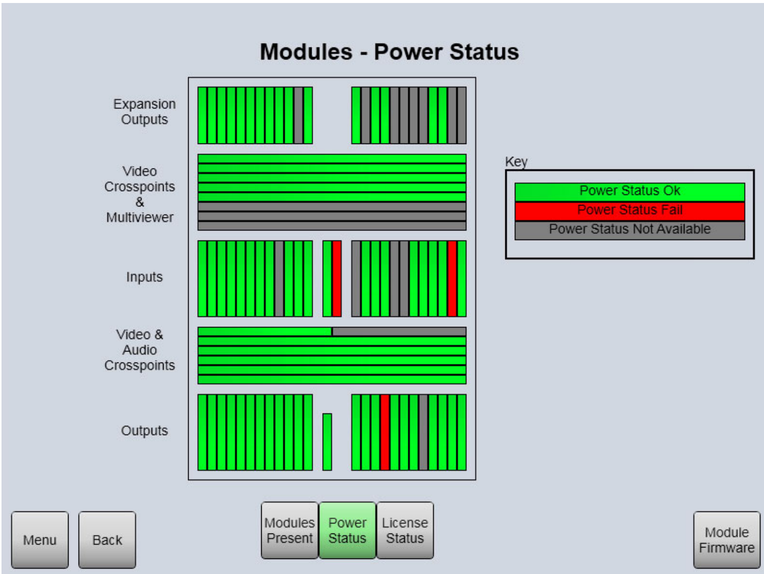


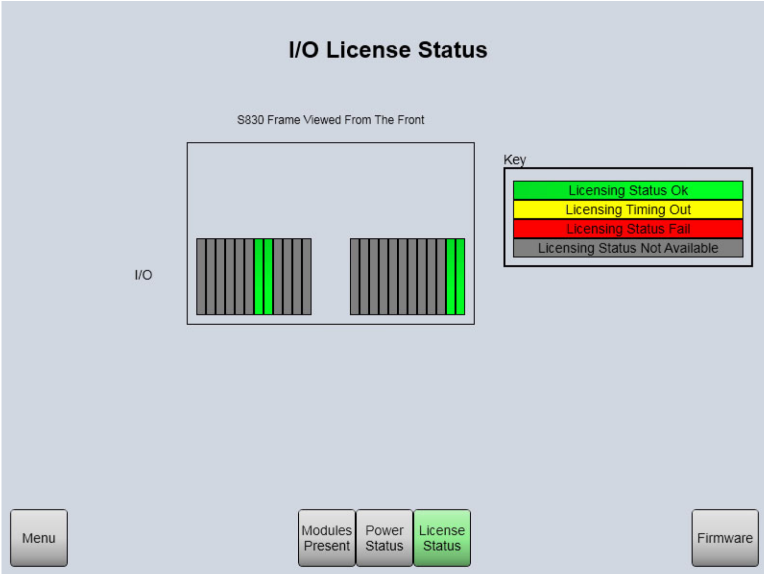
Figure 25 Modules Power Status Screen Examples: a) S830; b) S850 Expansion

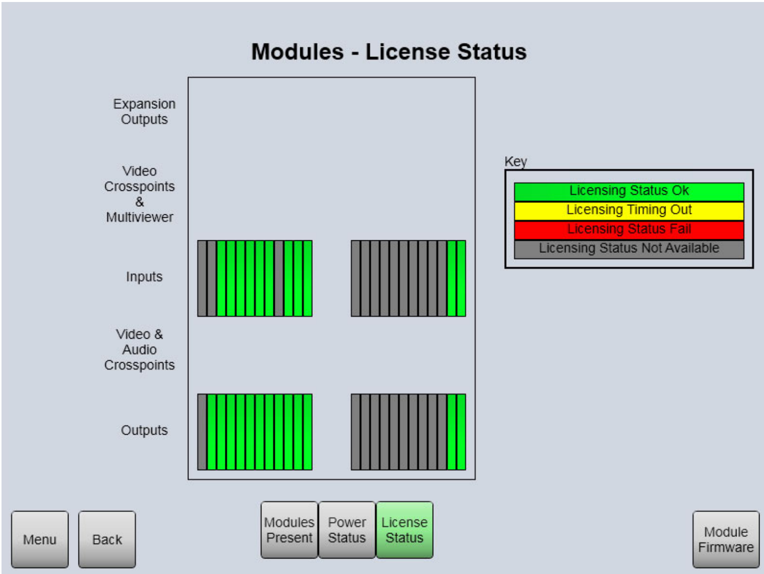
3.2.2.3 Module Licensing Status

This screen displays the License status of each AHP module fitted in the router. See the on screen Key for details.

Note:	Non AHP modules are displayed as "Licensing Status Not Available", this is not a fault.

a) S830 Example





b) S850 Expansion Example

Figure 26 Modules License Screen Examples: a) S830 Example; b) S850 Expansion Example

3.2.2.4 Module Firmware Information

This screen displays the firmware version of each AHP module fitted in the router.

Use the lower buttons on the screen to select the modules to be viewed.

Use the **Next** and **Previous** buttons to move through the modules.

See the firmware release note for details of the Module Firmware screen content of each module type.

Note: The number of Firmware Pages containing information varies depending on the AHP module being viewed. The number of pages that should contain information is shown in Firmware pages line (see Figure 27). Firmware pages that are not used will be empty.

Touch the **Modules** button to return to the modules screen.

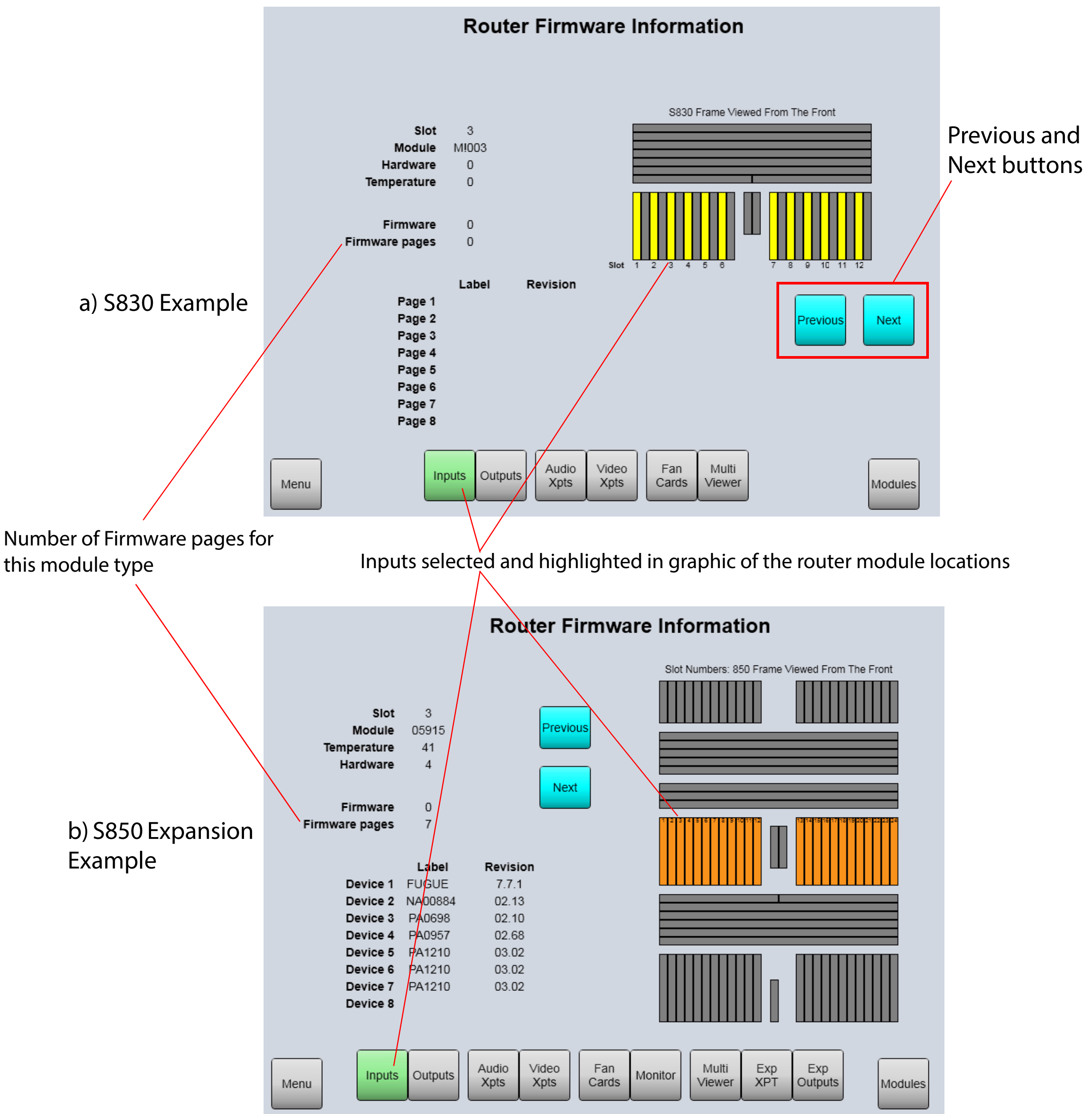


Figure 27 Module Firmware Screen Examples: a) S830; b) S850 Expansion

3.2.3 Temperature

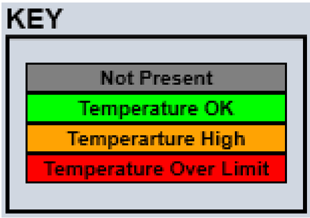
This screen displays the temperature of each module fitted in the router. Slot color indicates temperature status, see the on screen Key for details.

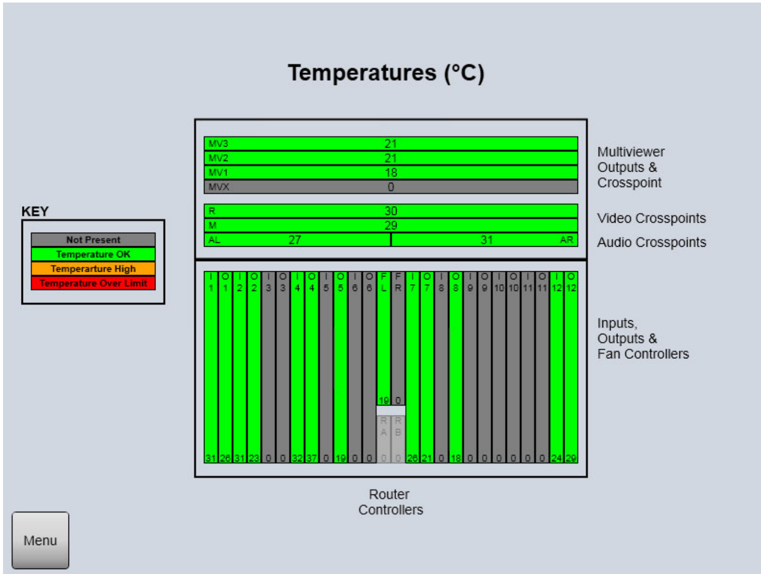
Note: **Temperature Status:**

Green = OK:
Amber/Yellow = Warning;
and Red = over-temperature.

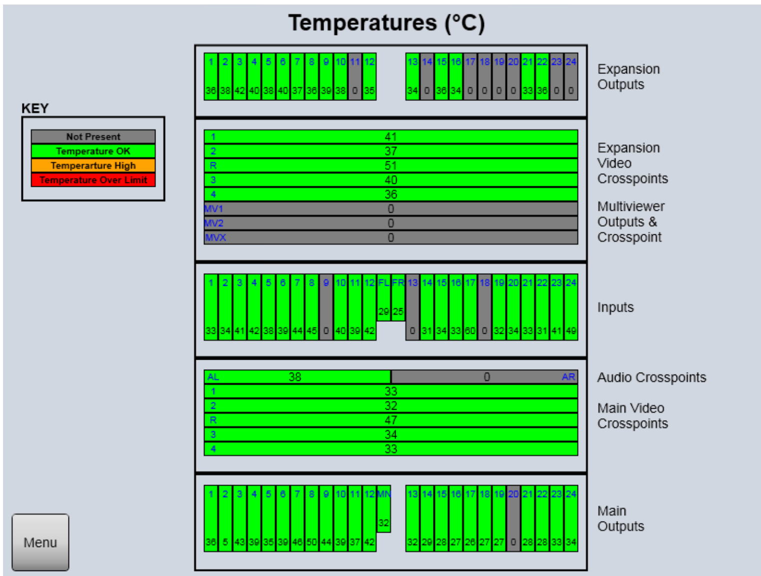
The temperature levels at which the state changes is automatically set by the Router Controller and depends on the card/module type fitted to a each slot in the router frame.

For a given system installation, a request can be made to adjust the levels. Contact Grass Valley customer support for more information.





a) S830 Example



b) S850 Expansion Example

Figure 28 Module Temperatures Screen Examples: a) S830; b) S850 Expansion

3.3 Signals box

The **Signals** box on the main menu screen allows access to information about:

- Signal and connection status of each input and output port of the router.
- Router references.

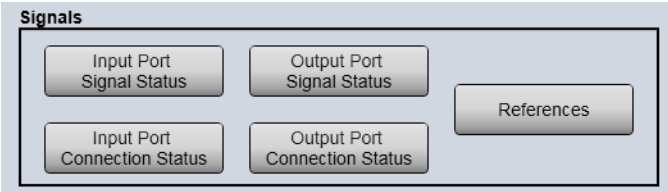


Figure 29 Signals Box

Note:

- Modules are configured from the **Local Router hardware** tab | **Advanced Configuration | Edit Module Configurations...** in Workbench.
  See the Workbench manual for full details.

3.3.1 Input Port Signal Status

Touch the **Input Port Signal Status** button in the **Signals** box on the main menu to see the signal status screens.
Use the lower buttons to select the screen required: *Signal Formats*, or *Switch References*.
Use the **Next** and **Previous** buttons to move through the modules.

3.3.1.1 Signal Formats

Touch the **Signal Formats** button to see the 'signals formats' **Input Signals** screen.

This screen displays details of the physical, incoming video signal at each router input and at the router crosspoint for each module fitted in the router.

Figure 30 Video Inputs (Slot 1)

3.3.1.2 Switch References

Touch the **Switch References** button to see the 'switch references' **Input Signals** screen.

The screen shows the switching point references configured for use by the incoming video signals on router modules. (For details on using switch point references see Section 1.12 *Video Reference Inputs* on page 34.)

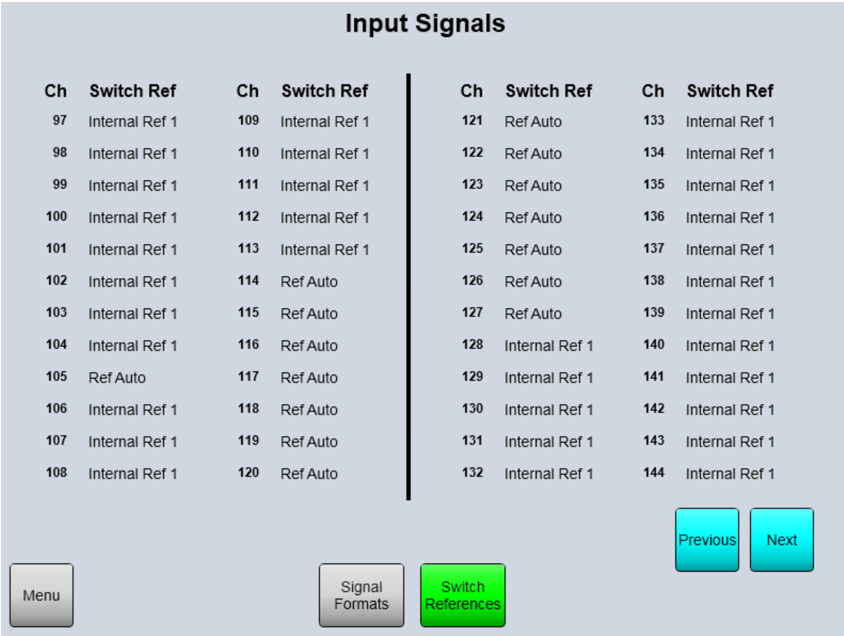


Figure 31 Video Input Reference Switching Points

3.3.2 Input Port Connection Status

Touch the **Input Port Connection Status** button in the **Signals** box on the main menu to see the **Input Connection** status screen. Use the **Next** and **Previous** buttons to move through the modules.

The **Input Connection** screen is applicable to 12G rears only and may be shown grayed out. The screen is aimed at a *future option* with both HD-BNC and IP SFP connectivities. This option is a future feature and is not currently available.

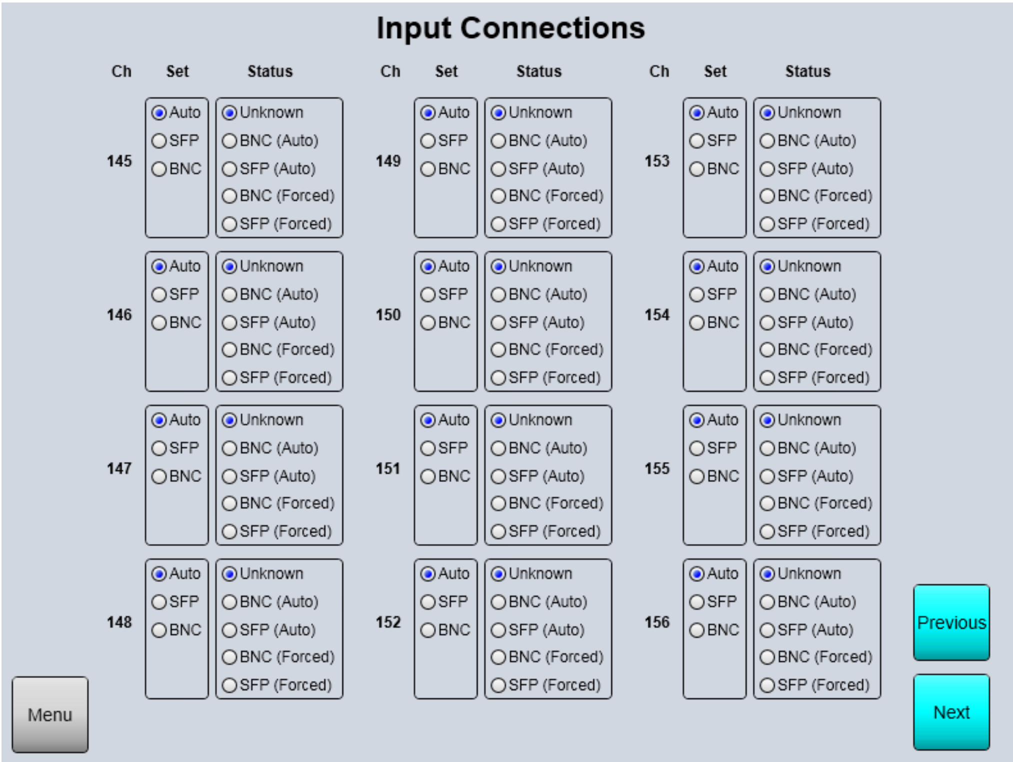


Figure 32 Input Connections Status

3.3.3 Output Port Signal Status

Touch the **Output Port Signal Status** button in the **Signals** box on the main menu to see the status screen.
Use the **Next** and **Previous** buttons to move through pages of output channels.

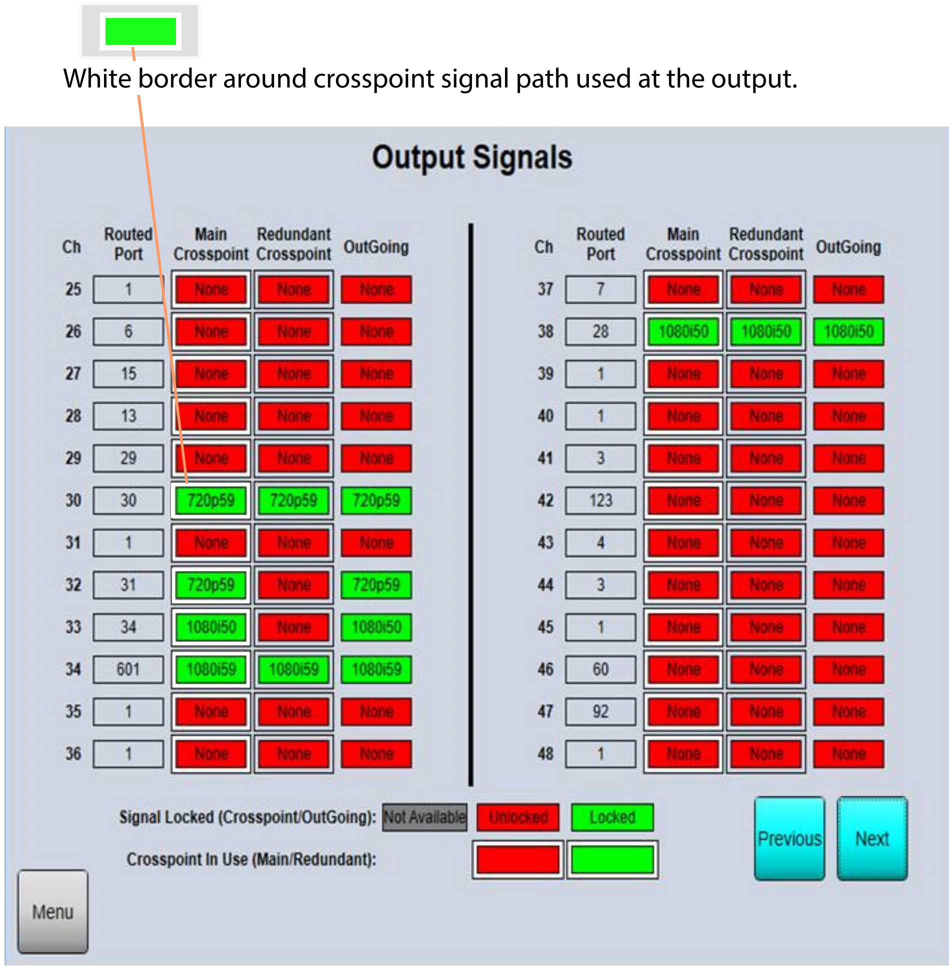


Figure 33 Output Signals Screen (v5.4.4 onwards)

For each output channel of the router (destination), the following are shown:

- **Ch** - Output channel/port number.
- **Routed Port** - Router source port number routed to this destination.
- **Main Crosspoint** - The main crosspoint's signal standard for this output port.
- **Redundant Crosspoint** - The redundant crosspoint's signal standard for this output port.
- **Outgoing** - The signal standard of the outgoing signal actually leaving the router port.

There is a white rectangular box around items in either the 'Main' or 'Redundant' crosspoint columns, which indicates which internal route (i.e. through the Main or Redundant crosspoint) is being used for final output.

3.3.4 Output Port Connection Status

Touch the **Output Port Connection Status** button in the **Signals** box on the main menu to see the status screen.
Use the **Next** and **Previous** buttons to move through the modules.

Use the **Type** and **Mode** buttons to see the type status or mode status.

3.3.4.1 Type Connection Status

The **Output Connections** screen is applicable to 12G rears only and may be shown grayed out. The screen is aimed at a *future option* with both HD-BNC and IP SFP connectivities. This option is a future feature and is not currently available.

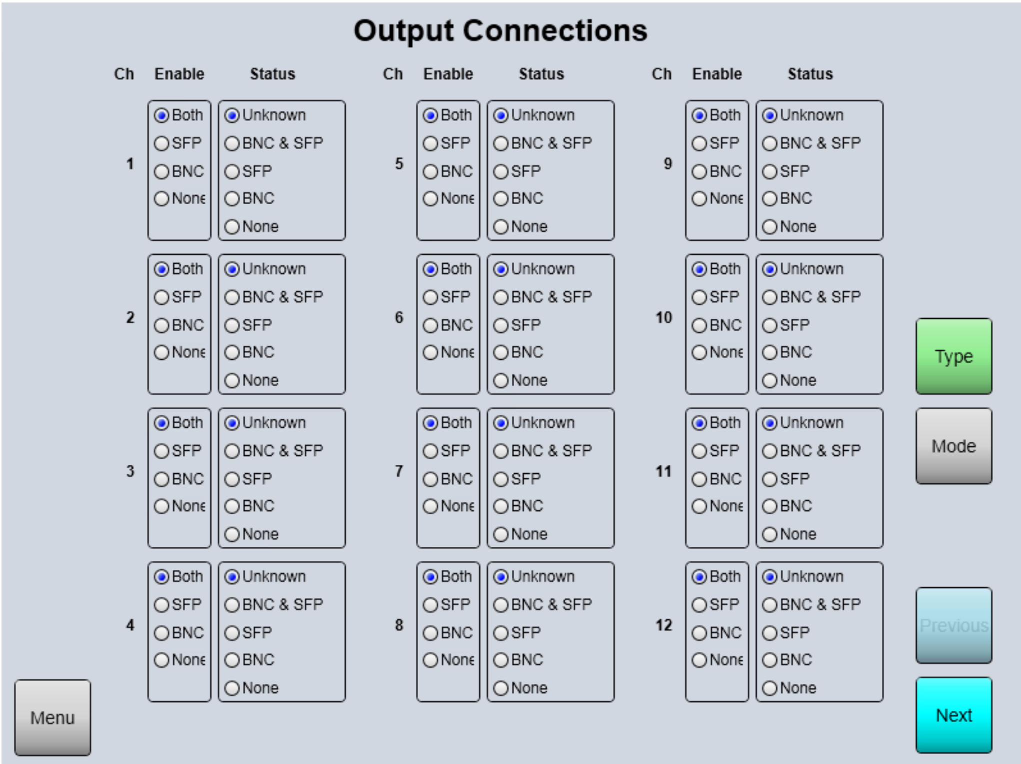


Figure 34 Output Connections Type Screen

3.3.4.2 Mode Connection Status

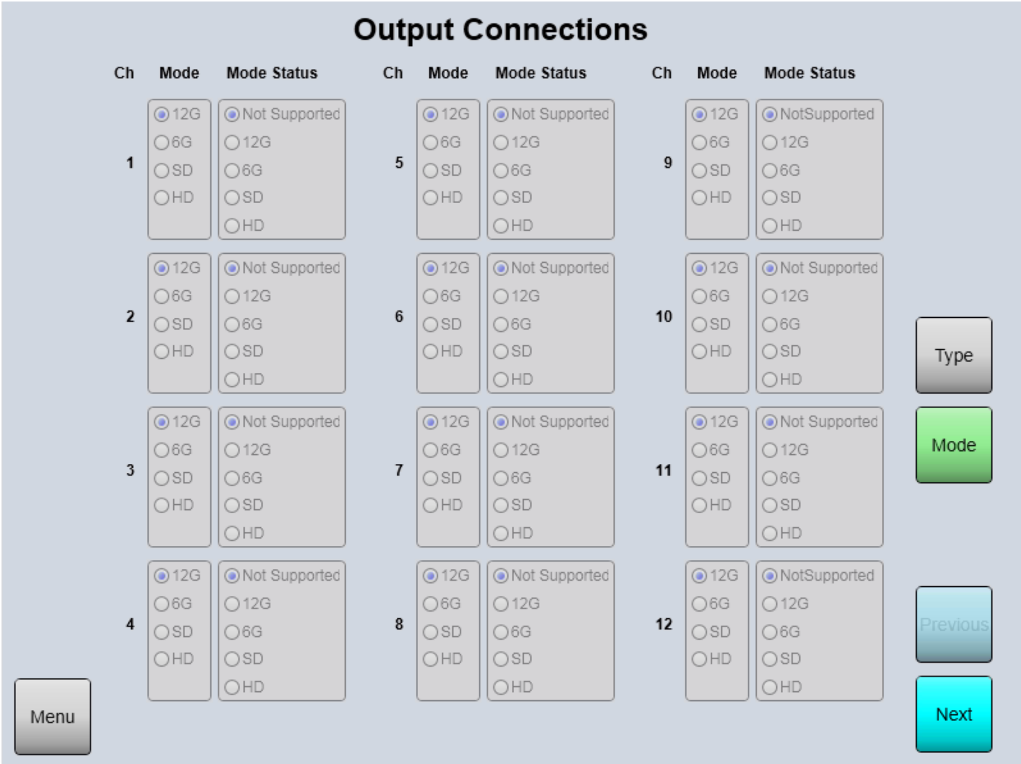


Figure 35 Output Connections Mode Screen

3.3.5 References

Touch the **References** button in the **Signals** box on the main menu to see the status screen. Use the **Reference Crosspoint** and **Reference Mode** buttons to see the two different screens.

The reference screens are used to view the status of the references and also to configure the derived references and offsets.

For details on video references see Section 1.12 and for the audio reference see Section 1.13.

3.3.5.1 Derived References - Crosspoint Screen

Touch the **Reference Crosspoint** button on the Reference screen to select the 'Derived References - Crosspoint' screen.

This screen displays the status of the external references, offsets and derived references. See the on screen Key for details. This screen is used to configure the router video references, the configuration is displayed dynamically so that you have a pictorial representation of the reference setup. Before making any configuration changes please see Section 1.12.

Derived video references enable the router to use a reference signal standard that is not available from outside of the router frame as if it is a standard physical video reference input.

Video reference signals are derived (created) from the BNC video reference inputs on the rear of the router. These derived video references can be at a higher or lower resolution than the signal on the BNC reference input but they must share the same frame rate as the original reference signal they are created from. For further details on derived video references see Section 1.12.

The pictorial status screen displays the video standard of each of the external BNC reference inputs. The screen also shows whether the external references are passed straight to one of the four internal references or are used to create one or more derived references. Any of the references can have an offset applied if required. The audio reference input status is also displayed.

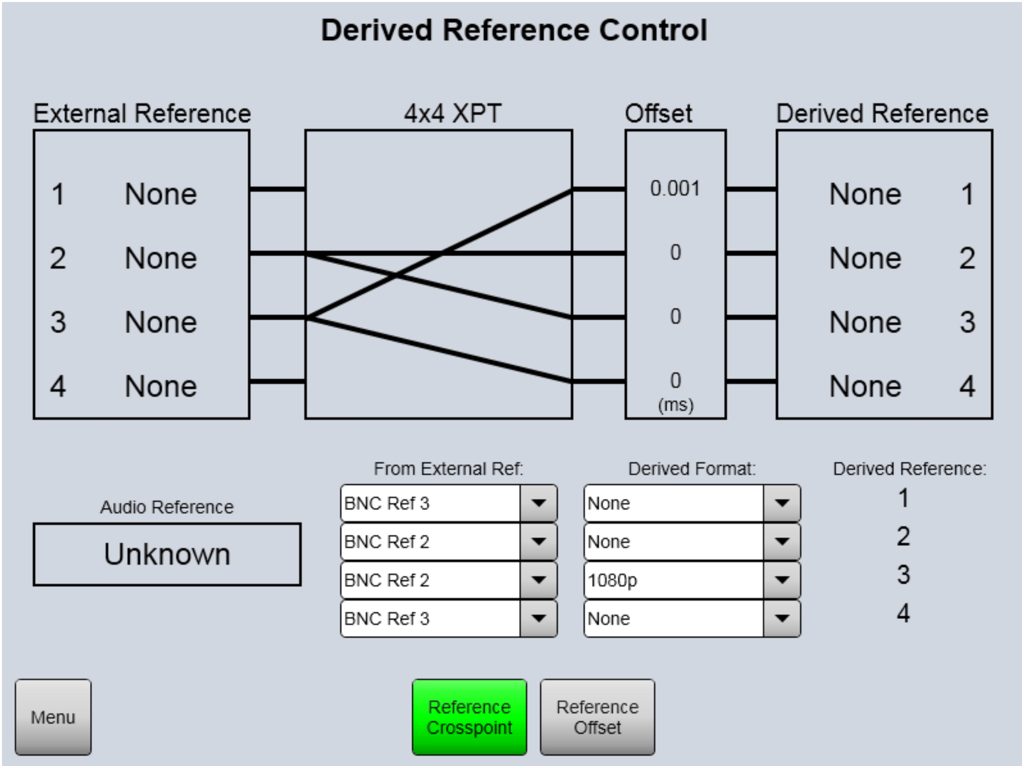


Figure 36 Derived Reference Crosspoint Status (Nucleus2 only)

Alternatively references can be configured from Workbench and pushed to the controllers, see the Workbench manual for information. For details on configuring the audio reference see Section 1.13.

3.3.5.2 Derived References

The router has up to four derived references that can be configured to be used by the router when switching video signals. Each of the four derived reference configurations work in the same way and are described below:

From External Ref drop down menus:

- Select one of the four external BNC references (BNC Ref 1 to BNC Ref 4) to be used for the derived reference. BNC external references can be used for one or more derived references.

Derived Format: drop down menus:

- **None** - The selected BNC external reference signal is passed straight through to the derived reference.
- **SD** - the selected external reference signal will be used to create a derived SD reference of the same frame rate as the external reference signal.
- **720p** - the selected external reference signal will be used to create a derived 720p reference of the same frame rate as the external reference signal.
- **1080i** - the selected external reference signal will be used to create a derived 1080i reference of the same frame rate as the external reference signal.
- **1080p** - the selected external reference signal will be used to create a derived 1080p reference of the same frame rate as the external reference signal.

If an offset is required for one or more derived references touch the Reference Offset button (see Figure 37).

To return to the Derived Reference status screen touch the Back button.

3.3.5.3 Reference Offset Screen

Touch the **Reference Offset** button on the Reference screen to select the screen.

This screen is used to configure offsets for the derived references if they are required. Offsets are set in milliseconds, lines or frames. An offset can be set on a reference signal to negate timing issues to make sure the video signal switches at the correct point, see Section 1.12.5 and section 1.12.6 for examples of when this may be required.

Important: Before making any configuration changes please see Section 1.12.

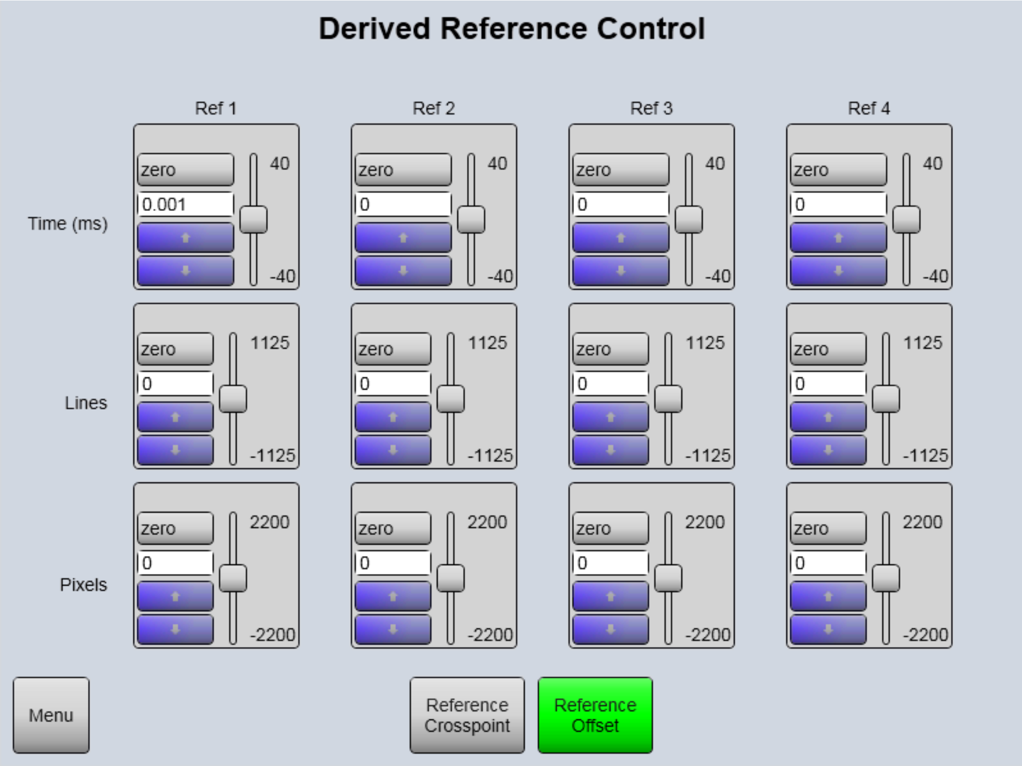


Figure 37 Derived References Offset Configuration (Nucleus2 only)

The offset is set by using the Up and Down arrows or dragging the slider. To set the offset back to zero touch the Zero button. The maximum offset that can be set for all video standards is one frame.

Note: If the derived reference standard is altered after an offset has been set then the previous offset time will remain as the offset. This will probably need to be changed for the new reference standard.

To return to the 'Derived Reference -Crosspoint' screen touch the **Reference Crosspoint** button (see Figure 37).

3.3.6 MADI Inputs

This screen is a system configuration option and not part of a standard Sirius 800 system configuration. The screen is available in specific system install cases. Please refer to Grass Valley customer support.

The screen displays details of the main and redundant MADI input signals for each audio input module fitted in the router. See the on-screen Key for details.

The main and redundant inputs are detailed on the rear panel drawings detailed in Table 16.

MADI channel a = Main input
MADI channel b = Duplicate input

Table 16 Rear Panel Drawing Locations

Router	MADI Input Rear Panels
Sirius 830	1303 BNC Input Rear Panel (see Section 7.5)
	1304 Fiber Input Rear Panel (see Section 7.6)
Sirius 840/850	1285 BNC Input Rear Panel (see Section 7.9)
	1286 Fiber Input Rear Panel (see Section 7.10)

The drop-down box to the right of each pair of MADI signals is used to set the MADI input signal used by the router. Options are:

- **AutoInputSelector** - Select for automatic changeover between the main and redundant MADI inputs in the event of a MADI input failure.
  Operation:
  If the main MADI input fails the input module will automatically switch to the redundant input for that feed. Once it has switched the input module will continue to use the redundant input even if the main input is restored. If, subsequently, the redundant input fails the input module will automatically switch back to the main MADI input.
- **Main** - Overrides automatic input selection and selects the Main MADI input as the input used by the router.

Important: This is an override and will prevent the router automatically switching to the redundant input if the main input stops working.

- **Redundant** - Overrides automatic input selection and selects the Redundant MADI input as the input used by the router.

Important: This is an override and will prevent the router automatically switching to the main input if the redundant input stops working.

- **EnableOverride** - Not Used.

Use the **Next** and **Previous** buttons to move through the modules.

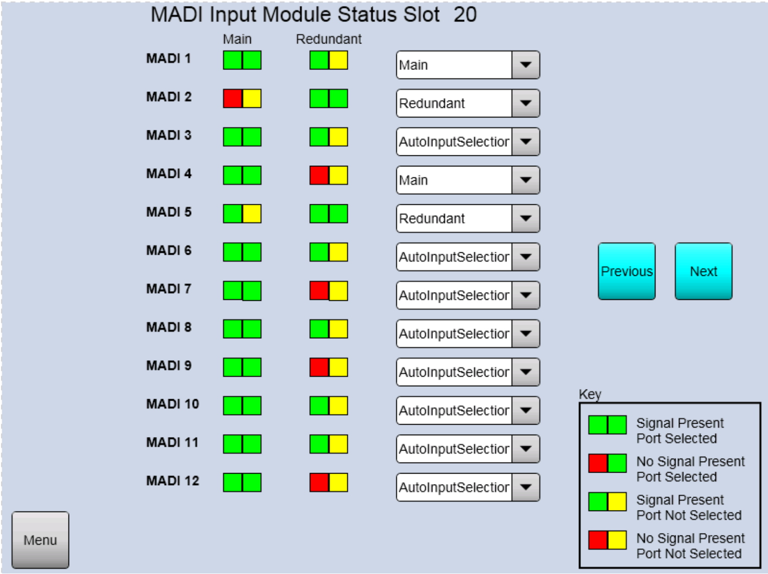


Figure 38 MADI Inputs (Slot 20)

3.4 Redundant Crosspoint Control box

The **Redundant Crosspoint Control** box on the main menu screen allows access to information about the router crosspoints.

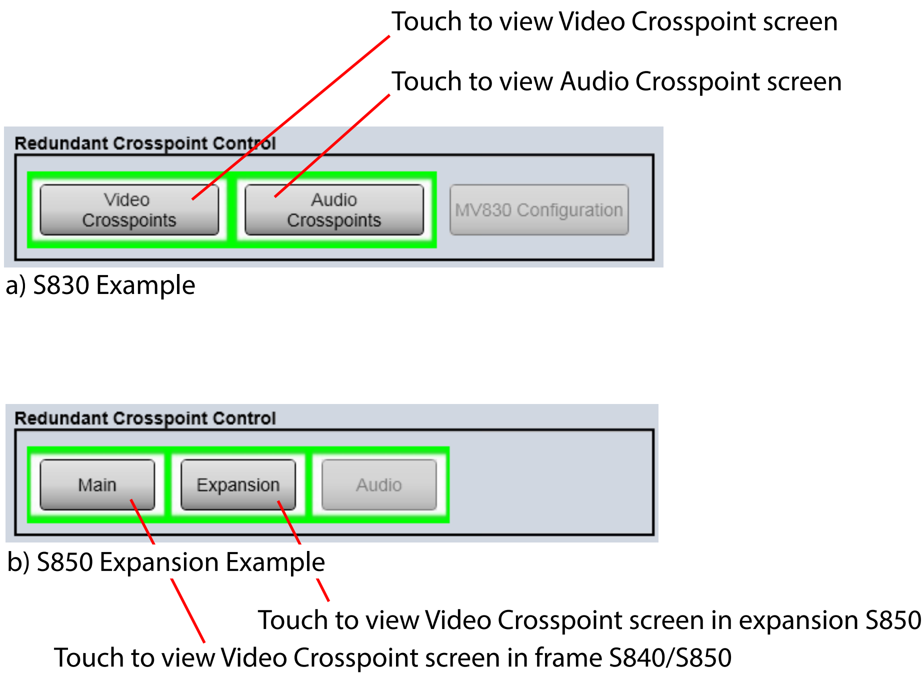


Figure 39 Redundant Crosspoint Control Box Examples: a) S830; b) S850 Expansion

Touch the buttons in the box to see th respective screens, see Figure 39. Alternatively, in the **Alarms** box on the main menu, touch the:

- **Video Crosspoint** item to see the video crosspoint status screen; or
- **Audio Crosspoint** item for the audio crosspoint status screen.

3.4.1 Video Crosspoint Matrix Status Screens

The (Main) Video Crosspoint Matrix Status screen displays the status of the main and redundant video crosspoint modules. The Expansion Video Crosspoint Status screen displays the same information for the expansion video crosspoints (Sirius 850 only).

The screens are also used to switch between video crosspoint modules if a video crosspoint module needs to be replaced.

Note:

- The Main Video Crosspoint Matrix Status screen for the Sirius 830 differs from the Sirius 840 and 850 screen because the Sirius 830 has a maximum of two crosspoint cards compared with the maximum of five crosspoint modules that can be fitted to the 840 and 850 routers.
- The Expansion Video Crosspoint Matrix Status screen displays the expansion video crosspoint modules in the remote frame (expansion frame) when a dual frame Sirius 850 system is being used.
- The operation of the screen is essentially the same for all of the Sirius 800 routers and is described in this section.
- For information on replacing a failed crosspoint module see Section 8.4.1.

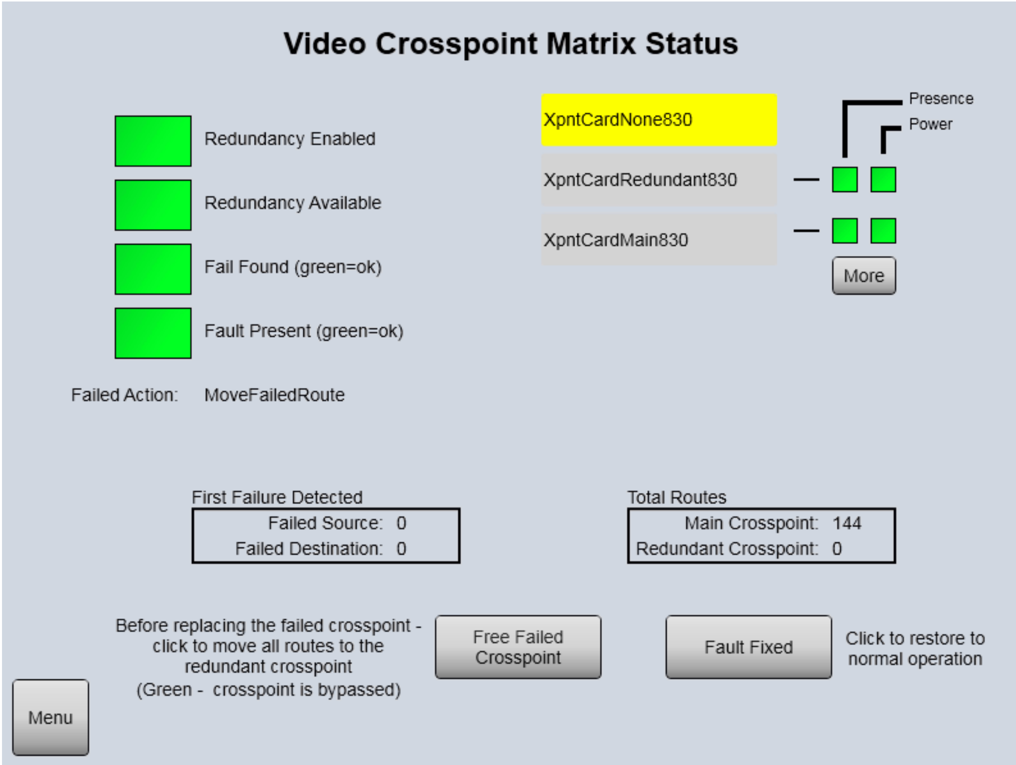


Figure 40 Sirius 830 Crosspoint Matrix Status and Crosspoint Switching

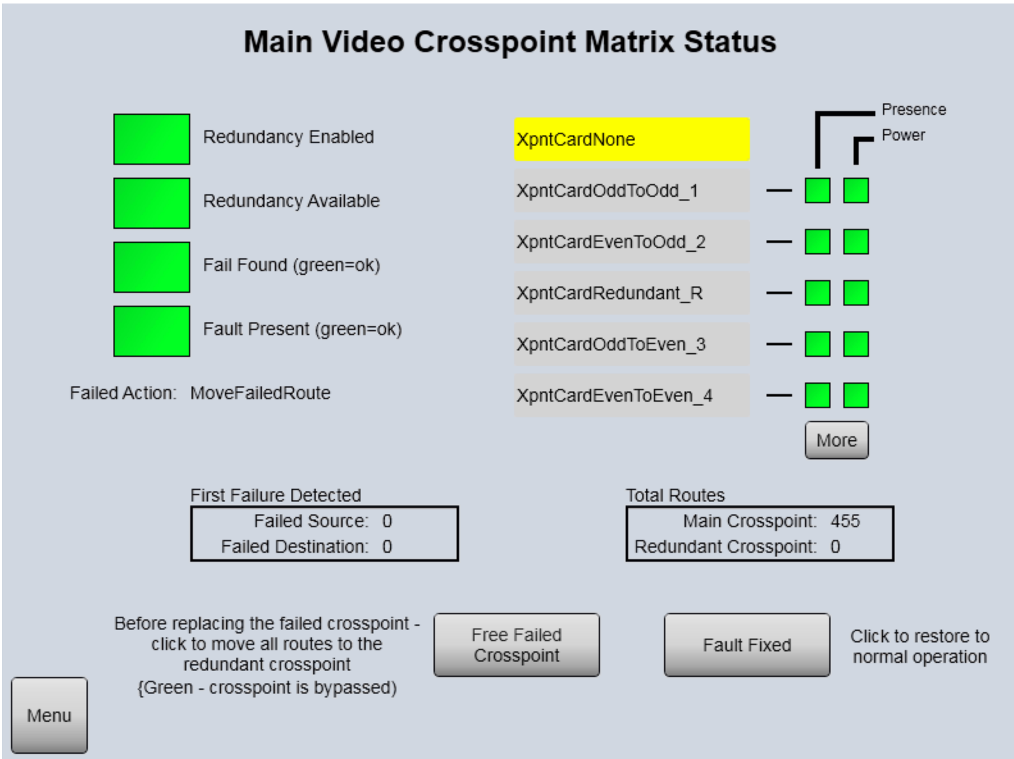


Figure 41 Sirius 840/850 Crosspoint Matrix Status and Crosspoint Switching

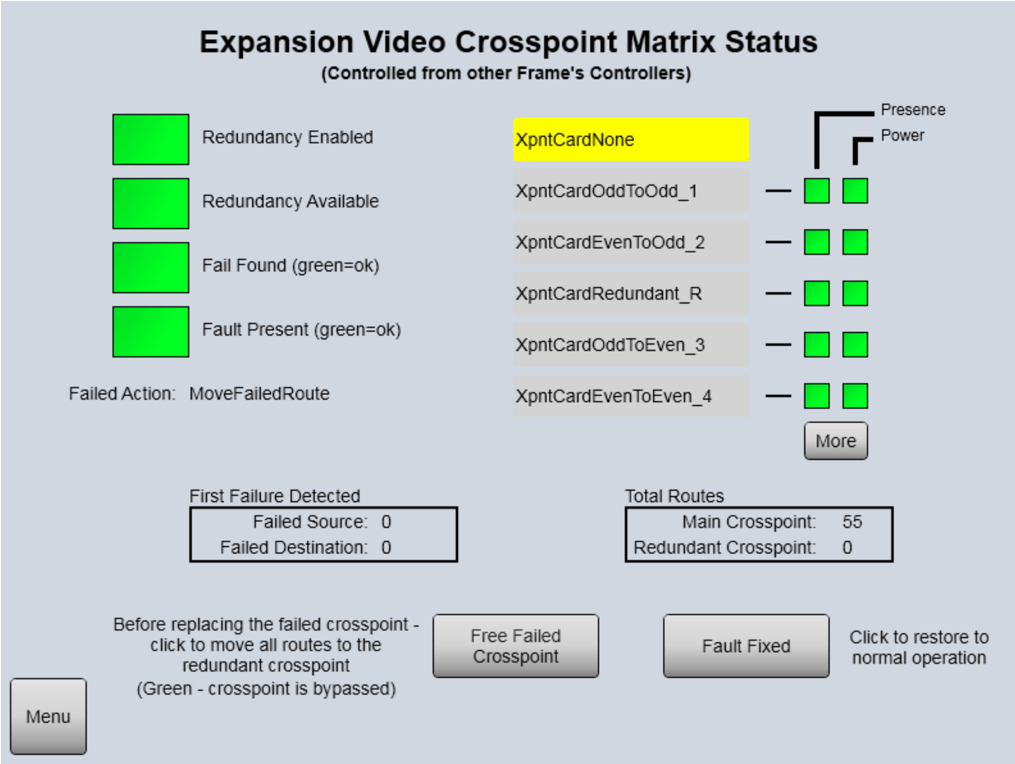


Figure 42 Sirius 850 Expansion Crosspoint Matrix Status and Crosspoint Switching

Table 17 Video Crosspoint Matrix Status Screen

Screen Item	Description
Indicators:	
Redundancy Enabled	Green = Redundant crosspoint checking enabled. Red = Redundant crosspoint checking is not enabled. The video crosspoint redundancy algorithm is disabled by default. For details on enabling the video crosspoint redundancy algorithm see Section 8.6.
Redundancy Available	Green = A full set of crosspoint modules is configured for the matrix. Sirius 830 - 1 main and 1 redundant Sirius 840/850 - 4 main and 1 redundant) Red = A full set of crosspoint modules is not configured for the matrix and therefore there is no crosspoint redundancy. Note: If the Sirius 800 is configured for redundancy and, when powered up, one or more crosspoint modules are missing or faulty the indications displayed will be: Redundancy Available displays Green Fail Found displays Red
Fail Found (green = ok)	Green = A failure has not occurred in the crosspoint matrix. Red = A failure has occurred in the crosspoint matrix. This may be a failure that has now cleared, check the Fault Present status to see if the fault is still present in the crosspoint matrix.
Fault Present (green = OK)	Green = The crosspoint matrix is currently working correctly. Red = There is currently a fault present in the crosspoint matrix.

Table 17 Video Crosspoint Matrix Status Screen (Continued)

Screen Item	Description
First Failure Detected:	
Failed Source Failed Destination	The Failed Source and Failed Destination parameters show the first failed route through the crosspoint that was detected. If both display zero and the Fail Found status is red then an entire crosspoint card has failed. Check the Crosspoint Status of each crosspoint card to determine which card has failed. If both display zero and the Fail Found and Fail Present LEDs are green then no fault has been found.
Total Routes:	
Main Crosspoint	Displays the total number of routes passing through the Main crosspoint module(s).
Redundant Crosspoint	Displays the total number of routes passing through the Redundant crosspoint module.
Failed Action	Displays the action that will be carried out by the router when a crosspoint fails. This is configured in Workbench, see Section for configuration details. Configuration options available are: • Move the failed route to the redundant crosspoint (default when shipped). • Move all routes from the crosspoint module with the failure to the redundant crosspoint module • Notify the user and leave them to take appropriate action.
Crosspoint Status:	
XpntCardNone	Yellow = Main and redundant crosspoint modules working correctly. Grey = A fault has occurred or a crosspoint has been by-passed.
Fault Fixed button	Switches the routes back to the main crosspoint module once it has been replaced.
Presence	Green = Crosspoint module present Red = Crosspoint module not present
Power	Green = Crosspoint module is powered Red = Crosspoint module is not powered
More button	Displays the Modules screen, see Section 3.2.2 for details.
Free Failed Crosspoint button	Moves all of the routes from the failed crosspoint module to the redundant crosspoint module allowing the failed crosspoint module to be replaced. The “Active” LED on the failed crosspoint module will go off. The failed crosspoint card can be replaced without interrupting any crosspoint routing once the routes have been switched to the redundant crosspoint module, see Section 8.4.1 for details.

Table 17 Video Crosspoint Matrix Status Screen (Continued)

Screen Item	Description
Sirius 830 Crosspoint Card Status Buttons:	
XpntCardRedundant830 button	Touch the button to bypass the redundant crosspoint card. Grey = Redundant crosspoint card is working correctly. Yellow = Redundant crosspoint card has failed or been bypassed.
XpntCardMain830 button	Touch the button to bypass the main crosspoint card. Grey = Main crosspoint card is working correctly. Yellow = Main crosspoint card has failed or been bypassed.
Sirius 840/850 Crosspoint Card Status Buttons:	
XpntCardOddToOdd_1 button	Touch the button to bypass crosspoint card 1. Grey = Crosspoint card 1 is working correctly. Yellow = Crosspoint card 1 has failed or been bypassed.
XpntCardEvenToOdd_2 button	Touch the button to bypass crosspoint card 2. Grey = Crosspoint card 2 is working correctly. Yellow = Crosspoint card 2 has failed or been bypassed.
XpntCardRedundant_R button	Touch the button to bypass the redundant crosspoint card. Grey = Redundant crosspoint card is working correctly. Yellow = Redundant crosspoint card has failed or been bypassed.
XpntCardOddToEven_3 button	Touch the button to bypass crosspoint card 3. Grey = Crosspoint card 3 is working correctly. Yellow = Crosspoint card 3 has failed or been bypassed.
XpntCardEvenToEven_4 button	Touch the button to bypass crosspoint card 4. Grey = Crosspoint card 4 is working correctly. Yellow = Crosspoint card 4 has failed or been bypassed.

3.4.1.1 Video Crosspoint Failure

When a video crosspoint routing failure is detected by the redundant crosspoint checking algorithm the Nucleus router controller performs one of the following actions based on the configuration in Workbench:

- Move the failed route to the redundant crosspoint (default when shipped).
- Move all routes from the crosspoint module with the failure to the redundant crosspoint module
- Just notify the user and leave them to take appropriate action.

Note:
- See section 8.6 for details on enabling/disabling video redundancy and section for details on setting the redundancy action on crosspoint failure.
- For information on replacing a failed crosspoint module see Section 8.4.1.

If one or more routes fail on a video crosspoint module this will be displayed on the Main or Expansion Video Crosspoint Matrix Status screen. A typical example of how the buttons will look is listed below (see Figure 40 on page 67 or Figure 41 on page 67 for button and parameter locations):

  - **Fail Found indicator** - Red
  - **Fault Present indicator** - Red
  - **First Failure Detected** - Failed Source and Destinations will display the first failed route
  - **XpntCardNone** - Grey
  - **Failed Action**: - text as configured in Workbench
- **Sirius 830**
  - **XpntCardMain830** Yellow (indicates the crosspoint has failed)
- **Sirius 840/850**
  - **XpntCardxxxToxxx_x** - Yellow (where xxx is the failed crosspoint module)

3.4.2 Audio Crosspoint Matrix Status Screens

The Main Audio Crosspoint Matrix Status screen displays the status of the main and redundant audio crosspoint modules. The screen is also used to switch between audio crosspoint modules if an audio crosspoint module needs to be replaced.

Note: **Audio Crosspoint Failures:**

The audio crosspoint facility within the router uses time-division multiplexed (TDM) audio data streams to inter-connect the input modules, audio crosspoint, and output modules. Audio crosspoint failures are based on reporting data stream failures, which are monitored on this screen.

Note: For information on replacing a failed crosspoint card see Section 8.5.5.

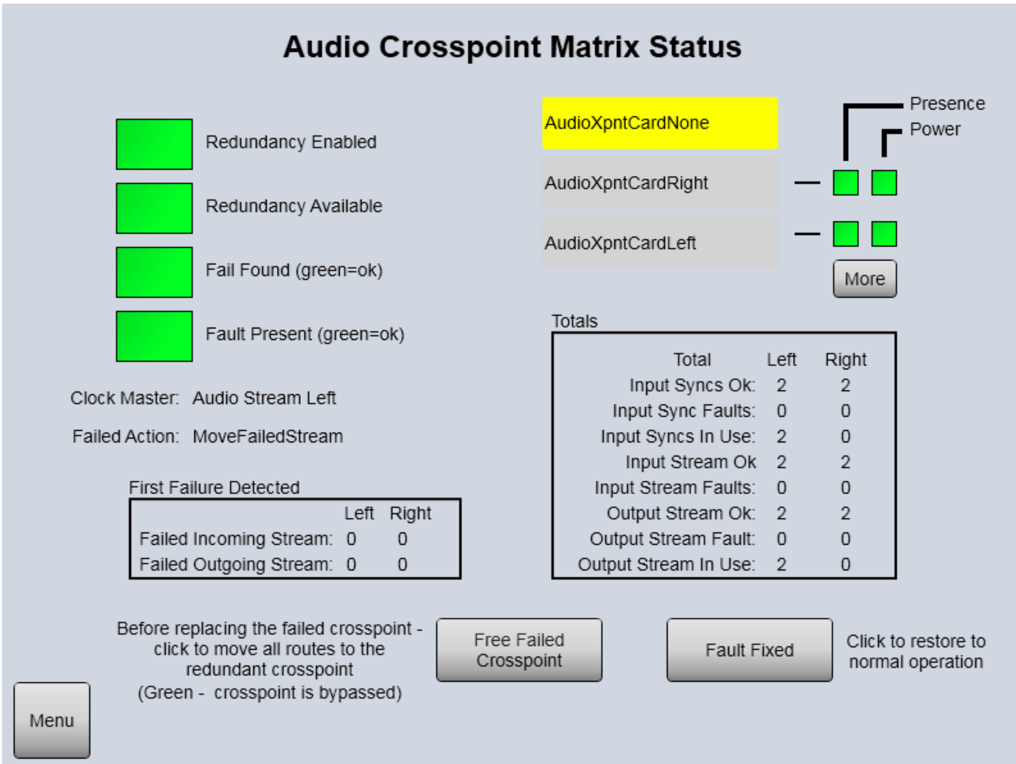


Figure 43 Sirius 800 Audio Crosspoint Matrix Status and Crosspoint Switching

Table 18 Sirius 800 Audio Crosspoint Matrix Status and Crosspoint Switching

Screen Item	Description
Indicators:	
Redundancy Enabled	Green = Redundant crosspoint checking enabled. Red = Redundant crosspoint checking is not enabled. The audio crosspoint redundancy algorithm is enabled by default. For details on disabling the audio crosspoint redundancy algorithm see Section 8.6.
Redundancy Available	Green = The crosspoint modules are configured for the matrix. 1 main and 1 redundant Red = The crosspoint modules are not configured for the matrix and therefore there is no crosspoint redundancy. Note: If the Sirius 800 is configured for redundancy and, when powered up, one or more crosspoint modules are missing or faulty the indications displayed will be: Redundancy Available displays Green Fail Found displays Red
Fail Found (green = ok)	Green = A failure has not occurred in the crosspoint matrix. Red = A failure has occurred in the crosspoint matrix. This may be a failure that has now cleared, check the Fault Present status to see if the fault is still present in the crosspoint matrix.
Fault Present (green = OK)	Green = The crosspoint matrix is currently working correctly. Red = There is currently a fault present in the crosspoint matrix.
Clock Master	Displays the Audio Crosspoint module that is supplying the audio system clock (Left or Right). The Audio Crosspoint module either generates the audio system clock (Clock Master) or uses the clock generated on the other crosspoint (if fitted). In normal operation the main crosspoint module generates the audio system clock and the redundant crosspoint module is slaved to that.
Failed Action	Displays the action that will be carried out by the router when a crosspoint fails. This is configured in Workbench, see Section for configuration details. Configuration options available are: • Move the failed stream to the redundant crosspoint (default when shipped). • Move all streams from the crosspoint module with the failure to the redundant crosspoint module

Table 18 Sirius 800 Audio Crosspoint Matrix Status and Crosspoint Switching (Continued)

Screen Item	Description
First Failure Detected: (shown for Left and Right Audio Crosspoint Modules)	
Failed Incoming Stream	Displays the first incoming and first outgoing streams to fail on each Audio Crosspoint module. If all display zero and the Fail Found status is red then an entire crosspoint module has failed. Check the Crosspoint Status of crosspoint modules to determine which card has failed. If both display zero and the Fail Found and Fail Present LEDs are green then no fault has been found.
Failed Outgoing Stream	
Totals (shown for Left and Right Audio Crosspoint Modules)	
Input Syncs OK	Displays the total number of successful input syncs for the audio crosspoint module.
Input Sync Faults	Displays the total number of failed input syncs for the audio crosspoint module. 0 = No input sync faults (good)
Input Syncs in Use	Displays the total number of input syncs in use on the audio crosspoint module.
Input Stream OK	Displays the total number of input streams without faults on the audio crosspoint module.
Input Stream Faults	Displays the total number of input stream faults for the audio crosspoint module. 0 = No failed input streams (good)
Output Stream OK	Displays the total number of output streams without faults on the audio crosspoint module.
Output Stream Fault	Displays the total number of output stream faults for the audio crosspoint module. 0 = No failed output streams (good)
Output Stream in Use	Displays the total number of output streams in use on the audio crosspoint module.

Table 18 Sirius 800 Audio Crosspoint Matrix Status and Crosspoint Switching (Continued)

Screen Item	Description
Crosspoint Status:	
XpntCardNone	Yellow = Main and redundant crosspoint modules working correctly. Grey = A fault has occurred or a crosspoint has been by-passed.
XpntCardRedundant button	Touch the button to bypass the redundant crosspoint card. Grey = Redundant crosspoint card is working correctly. Yellow = Redundant crosspoint card has failed or been bypassed.
XpntCardMain button	Touch the button to bypass the main crosspoint card. Grey = Main crosspoint card is working correctly Yellow = Main crosspoint card has failed or been bypassed.
Presence	Green = Crosspoint module present Red = Crosspoint module not present
Power	Green = Crosspoint module is powered Red = Crosspoint module is not powered
More button	Displays the Modules screen, see Section 3.2.2 for details.
Fault Fixed button	Switches the routes back to the main crosspoint module once it has been replaced.
Free Failed Crosspoint button	Moves all of the routes from the failed crosspoint module to the redundant crosspoint module. Also makes the redundant crosspoint module the Clock Master allowing the failed crosspoint module to be replaced. The "Route Active" LED on the failed crosspoint module will go off. The failed crosspoint card can be replaced without interrupting any crosspoint routing once the routes have been switched to the redundant crosspoint module, see Section 8.5.5.

3.4.2.1 Audio Crosspoint Failure

If an output module detects an error in the audio transport stream from the main audio crosspoint module or if the stream is not present it will use the transport stream from the redundant audio crosspoint module (if fitted). The Route Fail LED on the audio crosspoint module with the failure will flash red, see Section 8.5.1 for the location of the status LEDs.

Note:
- For information on replacing a failed crosspoint card see Section 8.5.5.

A typical example of how the buttons will look is listed below, for button and parameter locations see Figure 43 on page 72.

- **Fail Found indicator** - Red
- **Fault Present indicator** - Red
- **First Fail Detected** - **Failed Incoming Stream** and/or **Failed Outgoing Stream** will display the first failed stream(s)
- **XpntCardNone** - Grey
- **XpntCardMain** Yellow (indicates the main audio crosspoint has failed)

3.5 Router Controller Information

Touch the **Controller Information** button on the main menu to see the **Nucleus Controller Information** screen.

This screen displays summary information for the Nucleus controllers fitted in the router.

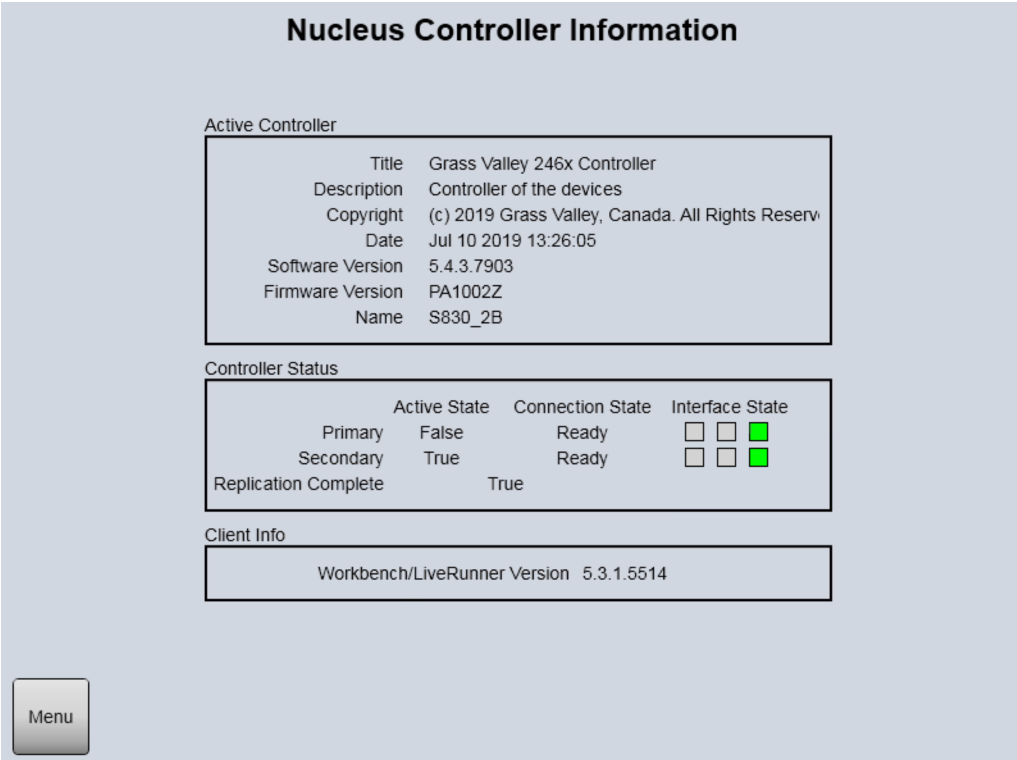


Figure 44 Nucleus Controller Information

3.6 Control box

The **Control** box on the main menu screen allows access to information screens about:

- *Routing Dial Up (Video and Audio)*;
- *Dial Up Monitor*; and
- *Catsii*.

3.6.1 Routing Dial Up (Video and Audio)

The **Routing Dial Up** screen shown in Figure 45 is used to route single signals in the video matrix and cannot be used to route signals in the audio matrix.

To access this screen:

1. Touch the Routing / 'Dial-Up Routing (Video)' button from the main menu screen in the Control box.
2. Then touch any Continue buttons as they are displayed.
3. Finally touch the Dial-Up button when it is displayed to access the screen.

Note: This procedure avoids the dial-up panel being enabled accidentally in a live environment.

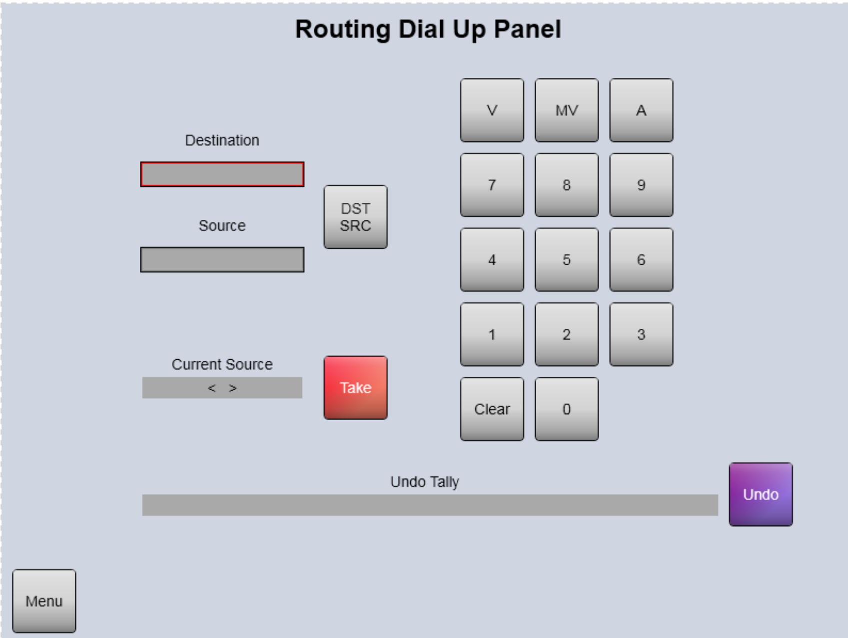


Figure 45 Routing Dial Up Screen (Video)

The controls on the screen are:

- **DST/SRC** button - Touch the **DST/SRC** button to toggle between the **Destination** and **Source** text boxes. The text boxes have a red border to indicate when they are selected for data entry.
- **Destination** text box - enter the video destination here. A red border indicates the text box is selected for data entry.
- **Source** text box - enter the video source here. A red border indicates the text box is selected for data entry.
- **Current Source** text box (read only) - displays the source currently being routed to the destination entered in the **Destination** text box.

- **Clear** button - deletes the contents of the selected text box (destination or source).
- **Dial Up** keypad number buttons - used to enter the destination and source numbers.
- **Take** button - touch to complete the routing once the destination and source have been entered in the text boxes.
- **Undo** button - touch the **Undo** button to undo a Take and go back to the previously selected source.

3.6.1.1 Example

Dial Up Routing Operation Example:

Routing video input 1 to video output 2.

1. If the Dial Up screen is not already displayed touch the **Dial-Up Routing (Video)** button from the main menu screen and then touch the **Continue** buttons as they are displayed. Finally touch the **Dial-Up** button when it is displayed to access the screen.
2. Select the **Destination** text box using the **DST/SCR** button and enter **2** using the numeric keypad and the configured destination name is displayed in the **Destination** text box.

Note: The source for the currently selected destination is displayed in the Current Source text box.

3. Select the **Source** text box using the **DST/SCR** button and enter **1** using the numeric keypad and the configured source name is displayed in the **Source** text box.
4. To set the route, touch the **Take** button.
5. If you have routed the wrong source to the destination touch the **Undo** button. This will undo the Take and go back to the previously selected source.

3.6.2 Dial Up Monitor

Touch the **Monitoring** button in the **Control** box on the main menu screen to display the **Monitor Dial Up** panel.

The **Monitor Dial Up** panel is used to route any video or audio signal to any one of the four monitor outputs on the Input/Output monitoring rear panel (see Section 11).

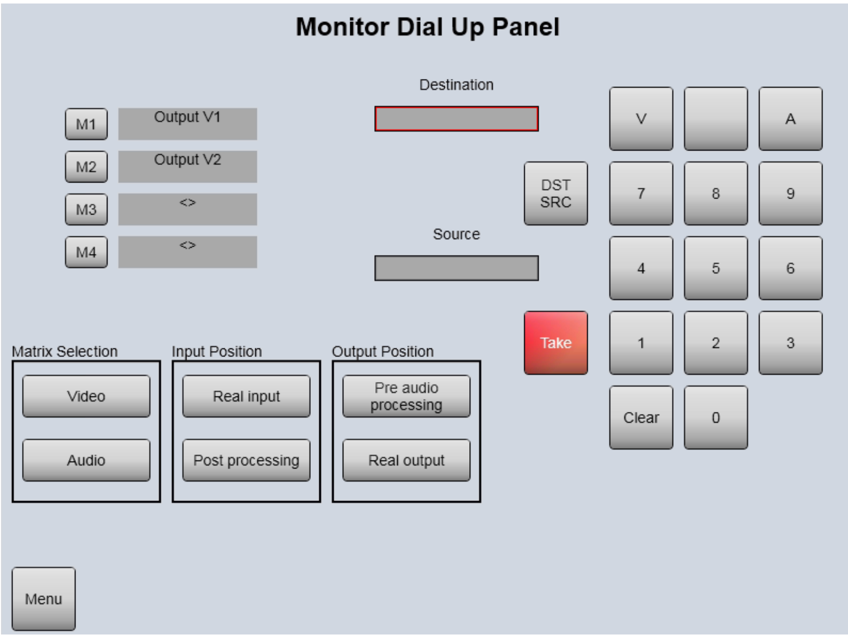


Figure 46 Monitor Dial Up Panel

3.6.2.1 Example: Routing a signal to a monitoring output:

Note: Each monitoring output must be configured to output either a video signal (including embedded audio) or discrete audio signal (see Table 79 on page 275 for details). This means that you must know how each monitoring output is configured so that you route the correct signal type to each monitoring output.

1. Touch the button for the monitoring output that the signal will be routed to (button **M1** to **M4** on the door PC screen). The monitor output button will change to red to indicate that it has been selected.
2. If the selected monitor output is already set to output a signal the current settings for that output are displayed as red buttons on the door PC (see Figure 46).
3. These settings can now be changed if required (see steps 7. or 8.) or a new input/output signal can be selected (see step 4.).
4. From the Matrix Selection box touch the **Video** or **Audio** button to set the signal type to be routed to the output monitor (see the note on page 79).
5. Touch the **DST**/**SRC** button to toggle between the Destination and Source text boxes as required (highlighted with a Red box around the selected text box).
6. Enter the signal channel number in the selected text box (Destination or Source) by touching keypad numbers and then touch the **Take** button to route the signal to the selected monitor output.
   If you make a mistake touch the **Clear** button and then enter the channel number correctly.
7. If the signal to be monitored is an Input signal touch the appropriate button from the **Input Position** box:
   - **Real Input** button - selects the actual input received by the router before any processing is applied to the signal.
   - **Post audio processing** button (Video AHP modules only) - selects the input signal after audio processing has been applied to the signal.

Note: The Post-audio processing button is present for all input modules but is only used for video AHP modules. The button setting is ignored for all other input modules.

8. If the signal to be monitored is an Output signal touch the appropriate button from the **Output Position** box:
   - **Pre audio processing** button (Video AHP modules only) - selects the output signal before audio processing has been applied to the signal by the output module.
   - **Real Output** button - selects the actual output from the router after any processing has been applied to the signal by the output module.

Note: The Pre-audio processing button is present for all output modules but is only used for video AHP modules. The button setting is ignored for all other output modules.

3.6.3 Catsii

Touch the **Catsii** button in the **Control** box on the main menu screen to display the **Catsii Control** screen.

This screen is used to:

- switch Global Catsii feature on/off; and
- locate input/output connectors on the rear of the router.

Catsii LEDs are fitted to the video and MADI rear panels for the main Inputs and outputs. The expansion output rear panels are not fitted with Catsii LEDs.
For detailed information on Catsii functionality see Section 4 *Catsii Functionality* on page 82.

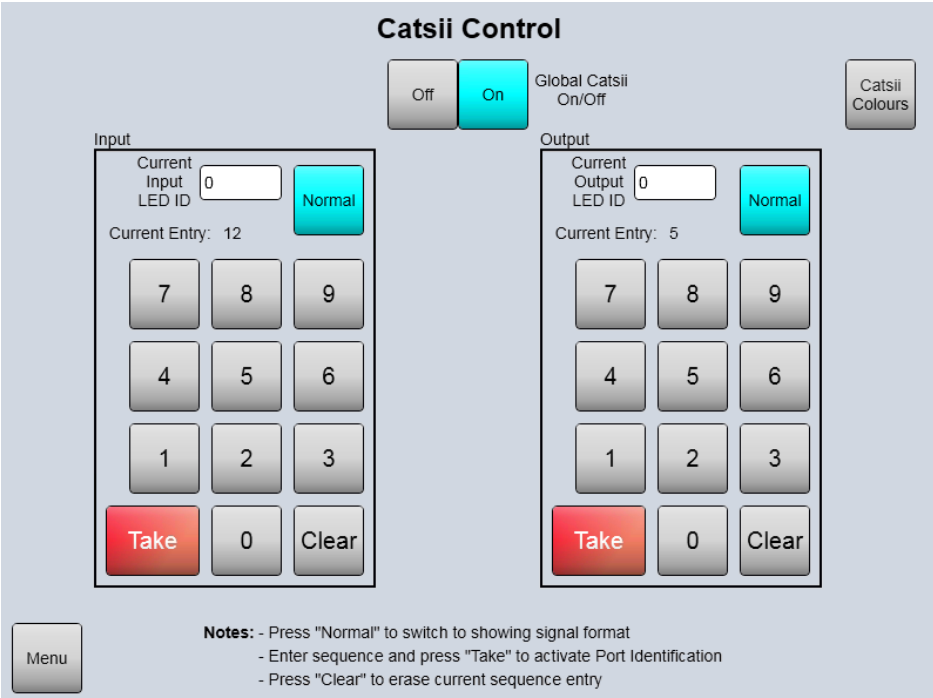


Figure 47 Catsii Control Screen

Global Catsii On/Off:

- **On** button - enables Catsii signal status on the rear of the router. The Catsii colors used on your system can be viewed by touching the **Catsii Colours** button on the Catsii Control screen. This displays the Catsii configuration screen shown in Figure 49.
- **Off** button - disables Catsii signal status display.

Catsii Colours button

Touch the **Catsii Colours** button on the Catsii Control screen to display the Catsii configuration screen, see Figure 49.

Input/Output location:

The Catsii LEDs can be used to locate a specific router input or output connector. When Catsii is used in this way the Catsii LEDs are lit in the form of a cross hair with the specified input or output connector is at the center of that cross hair (see Figure 48).

Note: With the recent adoption of higher-density HD-BNC rears, and with a mixture of rear panel types, the Catsii LED location alignment indication may be affected.

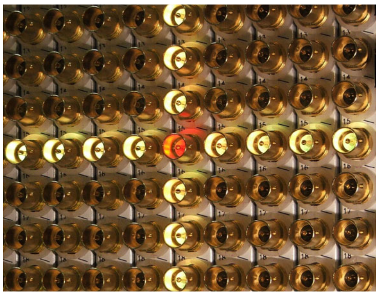


Figure 48 Example of Catsii LEDs being used to locate a specific BNC connector

3.6.3.1 Connector Location Example

Locating video input channel 35.

1. If there is already a number entered in the left Dial-Up keypad touch the **Clear** button on left Dial-Up keypad to delete it.
2. Touch button **3** and then button **5** on the left Dial-Up keypad so 35 is displayed.
3. Touch the **Take** button on the left Dial-Up keypad.
4. The connector for channel 35 will be in the center of the cross hair on the rear of the router.
5. Once you have located the connector touch the **Clear** button on the left Dial-Up keypad to remove the cross hair.

Note: The Clear button must also be touched before entering a new source or destination.

6. Touch the **Normal** button on the left Dial-Up keypad to return the Catsii LEDs to their previous state.

3.6.3.2 Catsii Color Configuration

Touch the **Catsii Colours** button on the Catsii Control screen (see Figure 47) to see the colors listed. The Catsii colors can be changed from Workbench, see Section 4.4 for details.

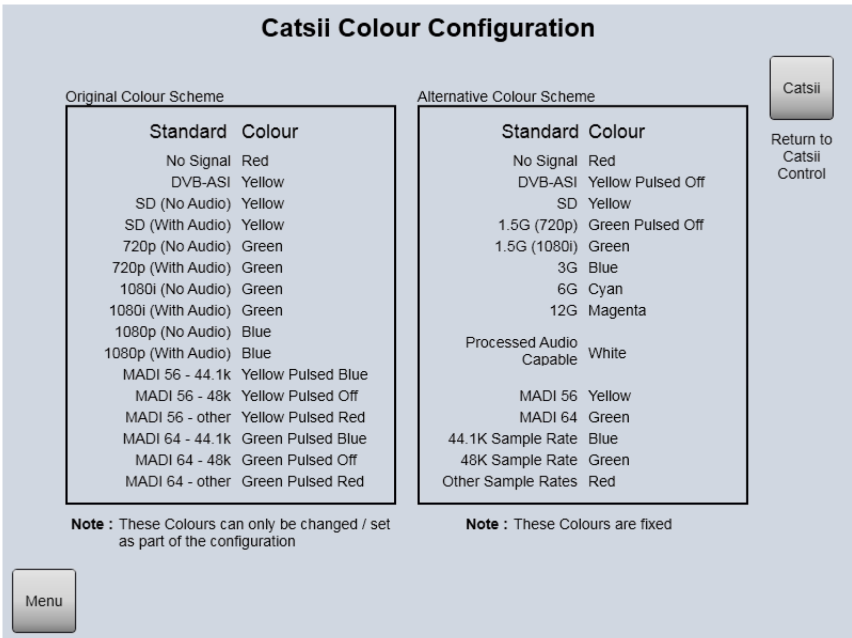


Figure 49 Catsii Colors Screen

4 Catsii Functionality

Chapter contains:

Catsii Functionality

Catsii LED's are a unique feature to the Sirius 800 router range and allow easy identification of the status of an input or of an output. And Catsii 2 now extends support to 6Gb/s and 12Gb/s SDI video signals and Catsii 2 must be enabled in the router configuration (see *Catsii 2 Enabling* on page 84).

Catsii LEDs can be lit in different color states depending on the signal type, and can be used in a "Cross Hair" formation to highlight and pinpoint a specific input or output. Catsii LEDs are fitted to the Video and MADI rear panels for the main inputs and outputs. The expansion output rear panels are not fitted with Catsii LEDs.

The Catsii LEDs have two functions:

- To indicate signal status
- To identify a specific BNC, HD BNC or Fiber connector

The Catsii LED's switch between these two functions, so they never operate at the same time. If any port identification is active, the port identification function is operational. If all the port identifications are inactive, the signal status function is operational.

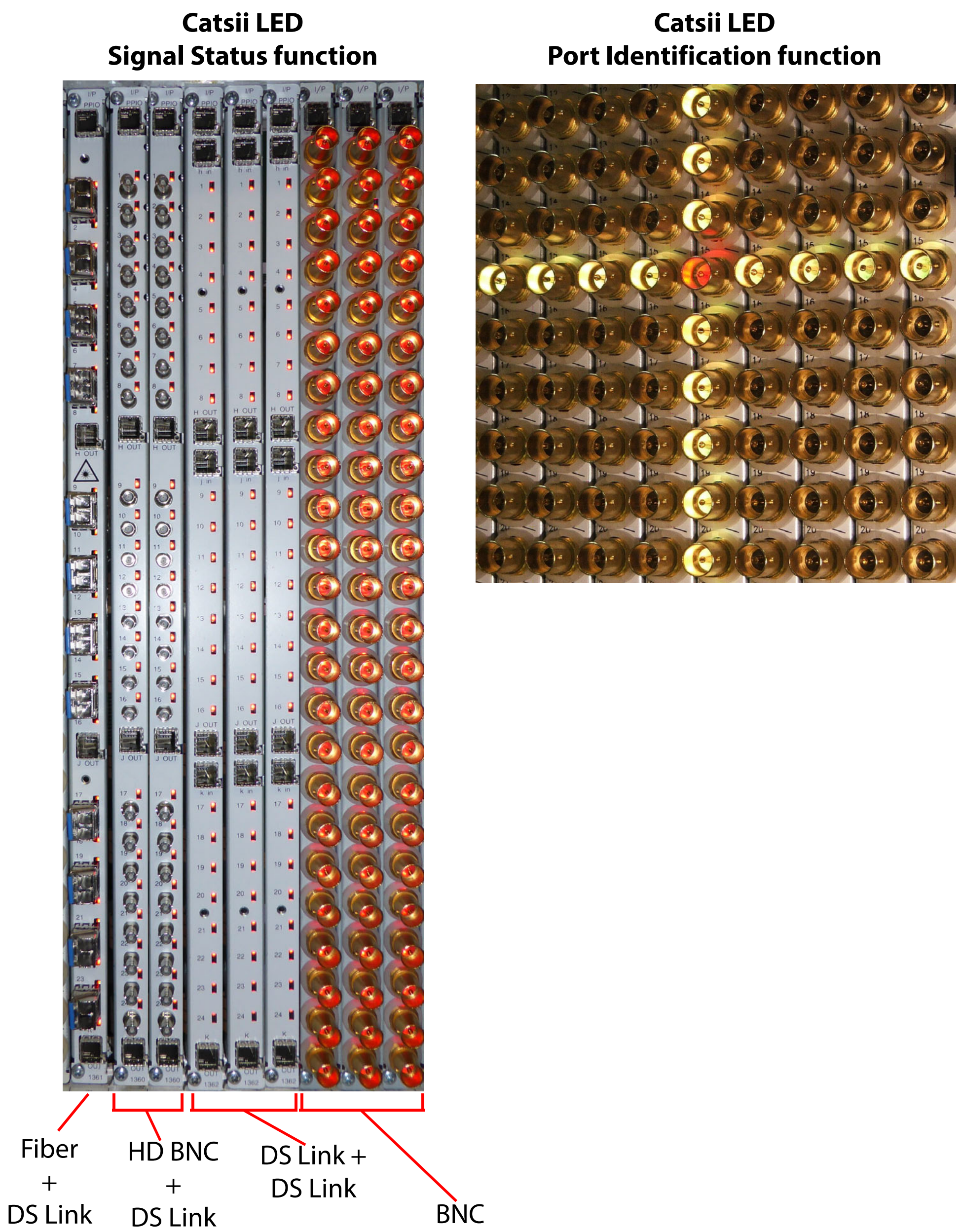


Figure 50 Example Catsii LEDs

4.1 Catsii 2 Enabling

This involves the following steps:

1. Upgrade Fan Control cards. (See *Upgrading Fan Control Cards* on page 84.)
2. Enable Catsii 2. (See *Enabling Catsii 2* on page 84.)

4.1.1 Upgrading Fan Control Cards

For 12G/6G SDI input/output, in order for the Catsii feature to function correctly, the Sirius 800 Fan control cards (FGAEY 2457 for S830, and FGAEY 2458 for S840/S850) - should be upgraded for the new Catsii 2 standard, which supports 6G and 12G SDI and adds 12G and 6G colors.

Note: Failure to upgrade for Catsii 2 will result in wrong color display for Catsii.

Note: Router systems may be configured and operated with both the Catsii and Catsii 2 standards being operational. Where Catsii 2 exists, this will take precedence over the older Catsii.

Catsii 2 is supported in the following Fan Control Card Firmware version:

- FGAEY 2457 - PA1103 Ver. 2.02, available in Firmware distribution PA1250N onwards.
- FGAEY 2458 - PA1102 Ver. 2.02, available in Firmware distribution PA1250N onwards.

The new color regimes will be available on the Door PC screen.

4.1.2 Enabling Catsii 2

'Catsii 2' is an additional virtual module within a Sirius S800 series frame. It is located at module number 278. (The original 'Catsii' virtual module is at module number 280.)

To enable Catsii 2, the router configuration needs to be changed via the Grass Valley Workbench software router configuration tool:

1. Work on a backup of the current router configuration or a router configuration 'Pull' from the current router controller.

In WorkBemch:

2. Select the **Active Controller** and click **Edit Controller Config**.

   The **Controller Configuration** window is displayed.
3. Select **LocalRouterDevice** and click **Local Router Configuration**.

   The **Local Router Hardware** tab is displayed.
4. Select **Advanced Configuration** and click **Edit Module Configurations**.

   This displays the **Module Configuration Editor** window.
5. Scroll down to module **278** and select it in the 'Type' column.
6. Select **CatsiiControlVariant2** in the drop-down menu. (See Figure 51.)
7. Click **OK**.

This has modified the router database.
This router configuration should be Pushed back to the router controllers.

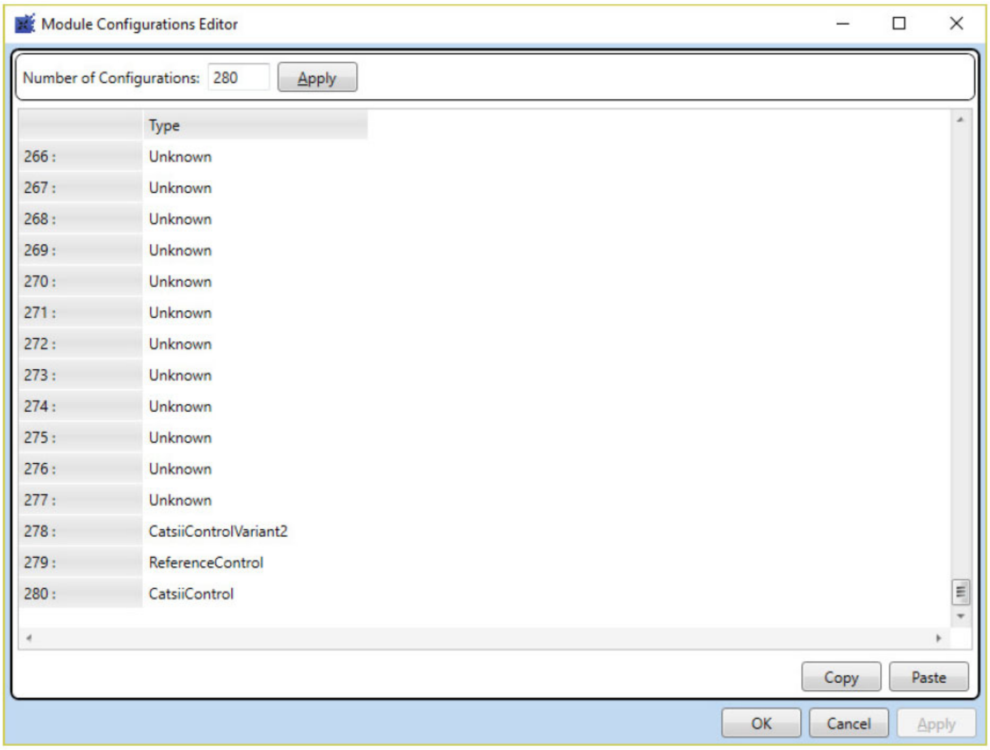


Figure 51 WorkBench Module Configuration Editor - Module 278, CatsiiControlVariant2

4.2 Signal Status

Catsii LED signal status is driven directly from the input and output modules, and changes quickly when a Fiber, HD BNC or BNC cable is connected to the Sirius 800.

4.2.1 Video Signal Catsii Colors

Note: 'Pulsed' means 75% solid color, 25% pulsed color at ~ 1Hz.

Table 19 Default Video Catsii Configuration

Signal Condition	**Default Color [1] at a Rear Audio/Video Module...**	
	...with no AHP processing: **Video Input Modules (5913/5914/5916/5917) & Output Modules (5923/5924/5926/5937/5938)**	**...with AHP processing:** **Video Input Modules (5919/5915) & Output Modules (5949/5925)**
No valid signal	Red	Red
Valid SD signal	Yellow	Yellow - pulsed White
DVB-ASI Signal	Yellow - pulsed off	Yellow - pulsed Off
Valid 1080i or 1080p (30 Hz or lower) signal	Green	Green - pulsed White
Valid 720p signal	Green - pulsed off	Green - pulsed White
Valid 3G signal	Blue	Blue - pulsed White
Valid 6G signal (Catsii 2)	Cyan	Cyan - pulsed White
Valid 12G signal (Catsii 2)	Magenta	Magenta - pulsed White

[1] **Note: Default Catsii Colors:** The current default Catsii colors are shown on the Door PC (see Section 4.3.1 "Door PC Catsii Control", on page 87) and can be changed through Workbench (see Section 4.4 "Workbench Catsii Control", on page 88).

4.2.2 MADI Audio Catsii Colors

Table 20 Default Audio Catsii Configurations

Signal Condition - MADI Input (4915) & Output (4929/4925)	**Default color [1]**
No valid MADI signal	Red
56 Channel MADI @ 48 kHz	Yellow - pulsed Off
56 Channel MADI @ 44.1 kHz	Yellow - pulsed Blue
56 Channel MADI @ other sample rates	Yellow - pulsed Red
Valid 56 Channel MADI Redundant signal (input only)	Yellow
64 Channel MADI @ 48 kHz	Green - pulsed Off
64 Channel MADI @ 44.1 kHz	Green - pulsed Blue
64 Channel MADI @ other sample rates	Green - pulsed Red
Valid 64 Channel MADI Redundant signal (input only)	Green

[1] The current default Catsii colors are shown on the Door PC (see section 4.3.1) and can be changed through Workbench (see section 4.4).

4.3 I/O Port Connector Identification

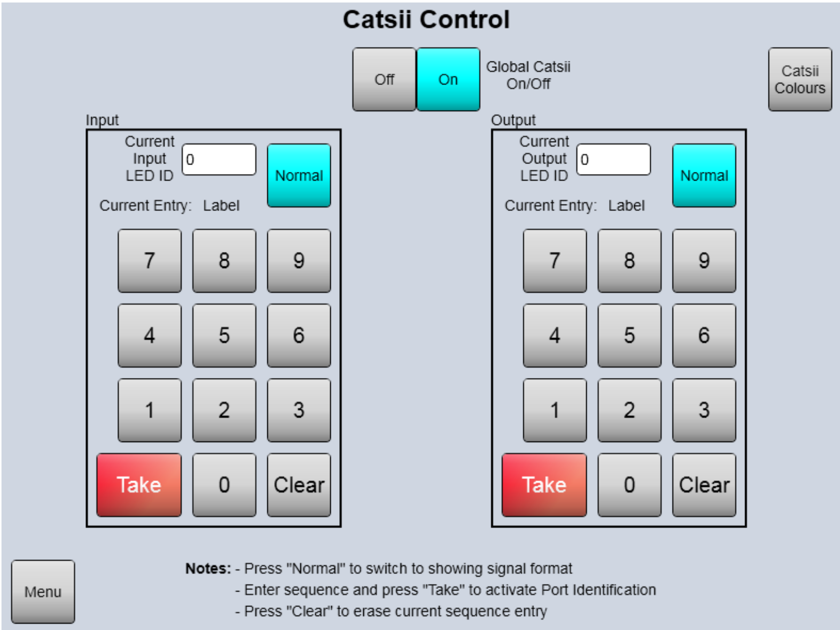
For connector identification, when an input or output is selected from Workbench, the following happens:

All LEDs turn off except:

- Yellow - The column of the selected connector
- Yellow - The row of the selected connector
- Flashing Red/Yellow - The selected connector

4.3.1 Door PC Catsii Control

The Catsii inputs and outputs can be identified using the Door PC, Figure 52



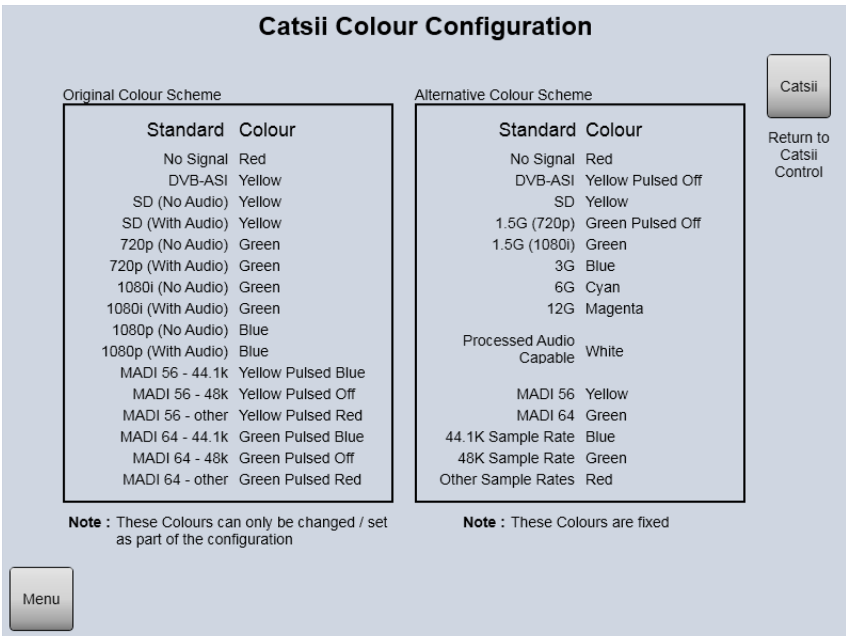


Figure 52 Door PC Catsii Control

4.4 Workbench Catsii Control

4.4.1 Catsii Colors

To apply a user-assigned color configuration through Workbench from a remote PC:

1. In Workbench Configuration mode click on **Edit Controller Config**, select the **Generic** tab and click on the **Edit Controller** button. This opens the **Generic Editor**.

   For **Nucleus2 Controllers**, navigate to:

```
Devices | Devices[1]: LocalRouterDevice | LocalRouterConfig |
ModuleConfigurations | ModuleConfigurations[280]: CatsiiControl
```

2. Select a parameter and then select the color from the drop down list.

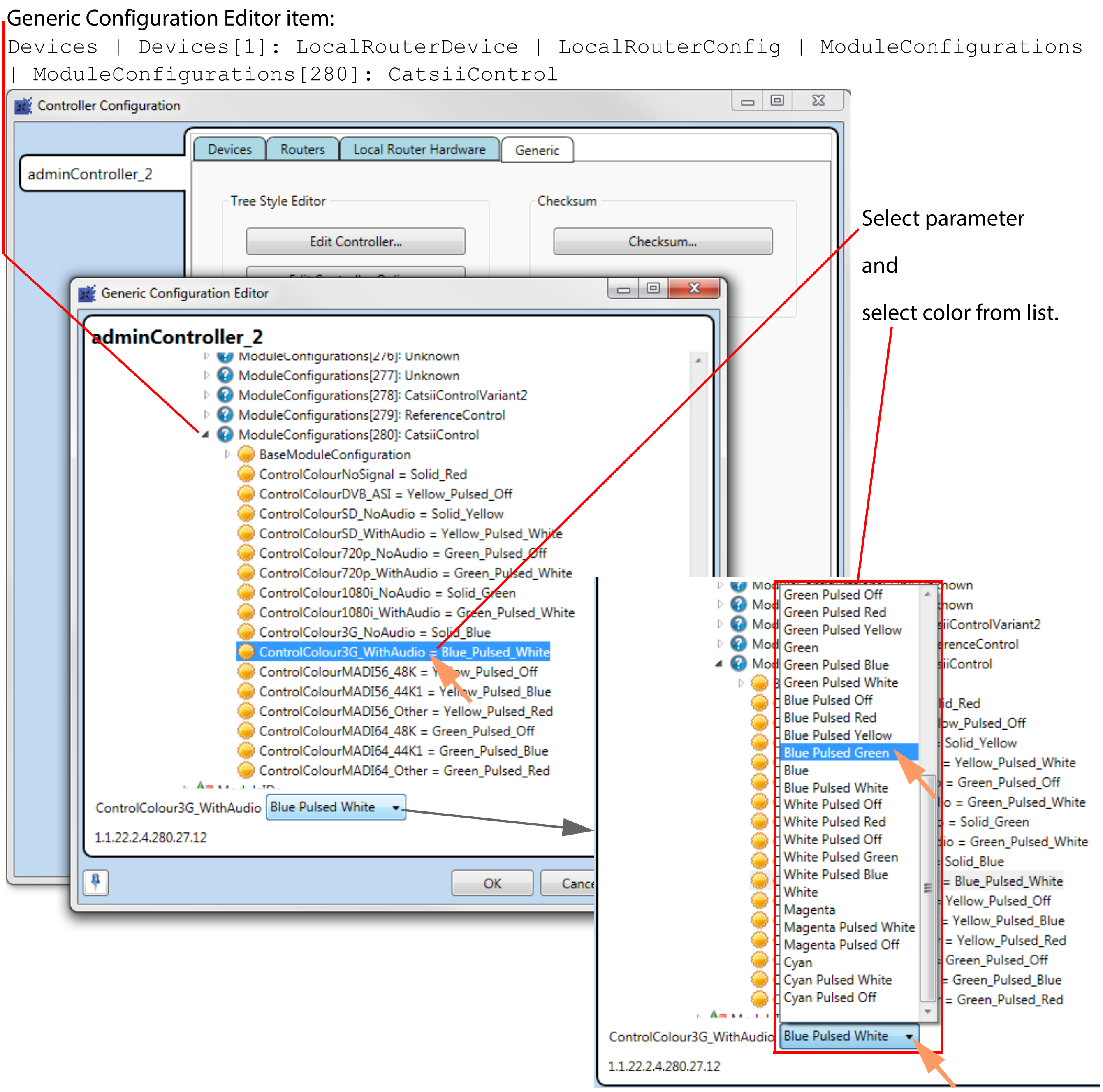


Figure 53 Example Catsii LEDs

5 External Control

Chapter contains:

External Control

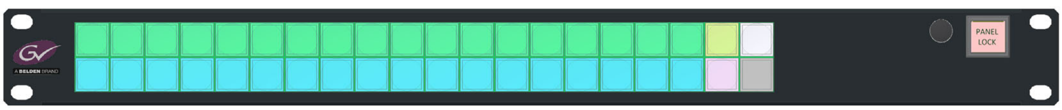
5.1 Control Panels

The Nucleus controller supports the following control panels:

5.1.1 G2 Series 1RU Router Control Panels

The G2 Series 1U panels are configurable as BPX or XY panels and are available as:

- 40key LED button panel (1RU40LED-BK-K)
- 32key LCD button panel (1RU32LCD-BK-K)



a) 1RU40LED-BK-K

b) 1RU32LCD-BK-K

Figure 54 G2 Series 1U Router Control Panels

5.1.2 High Density Button Panels(7028-000)

The high density button panels are configurable as BPX or XY panels and are available as:

- 78 key High density button panel
- 60 key High density panel

Figure 55 High Density Button Panel

5.1.3 Standard Density Panels (7028-100/201)

The standard density panels are configurable as BPX or XY panels and are available as:

- 42 key Standard density button panel
- 24 key Standard density panel

Figure 56 Standard Density Panel

5.1.4 2RU Dial-up XY Panel (6026)

Dial-up XY panel.

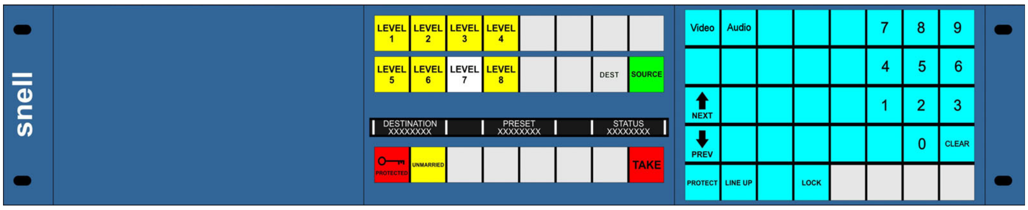


Figure 57 2RU Dial-up XY Panel

5.1.5 2RU Dial-up Multibus (8 Bus) Panels(6026)

Range of Dial-up Multibus (8 bus) panels.

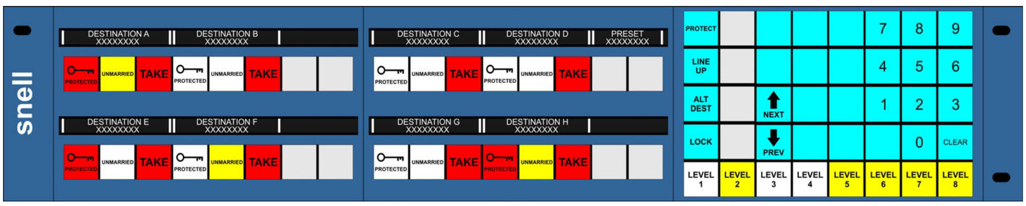


Figure 58 2RU Dial-up Multibus (8 bus) Panel

5.1.6 2RU Dial-up Multibus (4 Bus) Panels(6026)

Range of Dial-up Multibus (4 bus) panels.

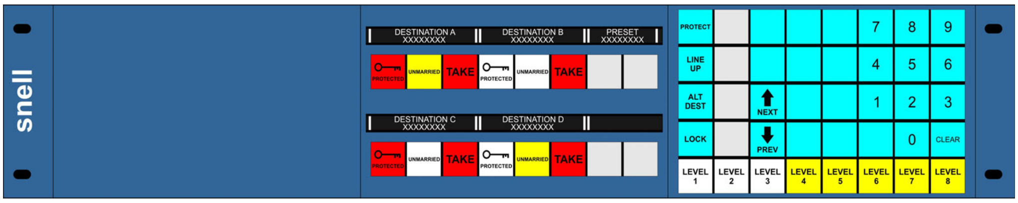


Figure 59 2RU Dial-up Multibus (4 bus) Panel

These panels can be controlled serially through RS485. When controlled through RS485 the 1U panels can mimic 6700 series Nucleus control panels and the 2U panels can mimic the 6276 and 6277 series Nucleus control panels. See the 1U Panels User Manual and 2U Panels User Manual respectively for details.

For more flexibility, they can be controlled over Ethernet, see the Workbench User Manual.

The Sirius 800 routers are supplied with a default database. Serial port 3 (COM 5) is configured, in the default database, to use the control panels for BPX and XY control.

5.1.7 KKT Panels (6026-KKT)

Range of control panels for complex routing systems that require manipulation of signal processing functionality.

Figure 60 2RU KKT Panel

The 6026KKT 2RU control panel combines traditional LCD push button keys with LCD display panel and rotary controls. to provide the user optimum user experience.

The LCD pushbuttons can be configured with ‘Smart Search’, to enable a filtered, reduced-size list of router sources/destinations to be easily displayed for selection.

The LCD push buttons provide excellent tactile feedback and the LCD touchscreen greatly enhances the readability of information, particularly for the display of long router source/destination names.

5.1.8 1RU Large Button Panel (7028-071)

Figure 61 1RU Large-button Panel

15-key large LCD-button 1RU panel with rotary control.

5.1.9 2RU Large Button Panel (6026-481)

Figure 62 2RU Large-button Panel

44-key large LCD-button 2RU panel with rotary control.

5.2 Older Control Panels

Note:	The control panels below are no longer manufactured or supplied and are shown here for users that already have them fitted.

The Nucleus controller supports the following external control panels:

5.2.1 6700 series 1RU

BPX and XY Panels.

Figure 63 6700 series 1RU BPX and XY panels

5.2.2 6276 2RU

Dial-up XY panel.

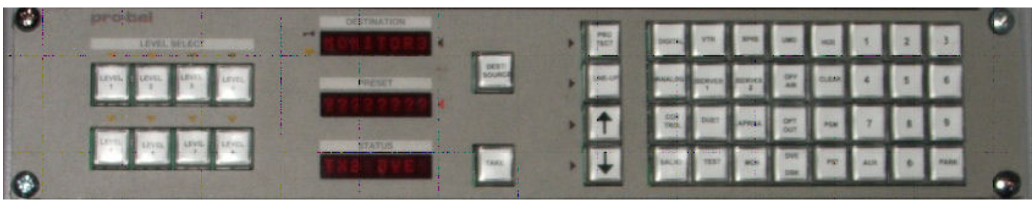


Figure 64 6276 2RU Dial-up XY Panel

5.2.3 6277 2RU

Range of Dial-up Multibus panels.

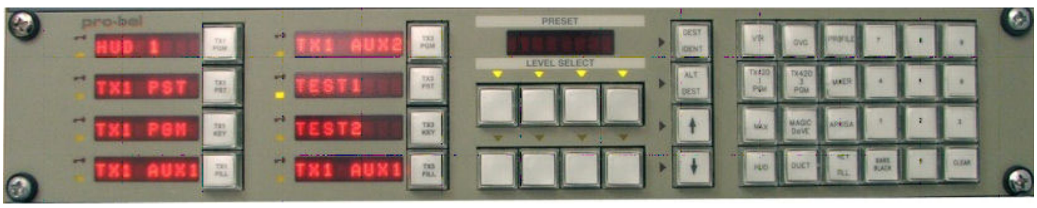


Figure 65 6277 2RU Dial-up Multibus Panel

To connect these panels to a Sirius 800, use a multi-drop pin to pin RS485 cable and connect to one of the four RS485 connectors on the Control Rear Panel.

For configuration details refer to the Workbench manual. These RS485 connectors correspond to COM 3 to COM 6 in Workbench.

For details on switch settings refer to the User Manuals supplied with the control panel.

Each serial port can be configured to connect to up to 16 panels.

5.3 Default Serial Port Configuration

When the sample/default database is loaded on the router control module(s) the four RS485 serial communications ports on the rear of the router (see section 14) are configured as shown in Table 21

If a custom database is loaded on the router control module(s) the ports may be configured differently. Port configuration can be checked and modified using the Workbench software, see the Workbench User Manual for details.

- **RS485 1 (COM 3)** = General Switcher In (SW-P-02) for Centra or Aurora control
- **RS485 2 (COM 4)** = General Switcher In (SW-P-02) for Centra or Aurora control
- **RS485 3 (COM 5)** = Panel Protocol for up to 16 controllers on addresses 1 to 16 as shown in the table below:

Table 21 Controllers and Addresses in the Default Database

Address	Controller	Sources	Destinations
1	Dial-up X-Y panel	All	All
2	Dial-up Multibus (8 Bus) panel	All	1 to 8
3	Dial-up Multibus (6 Bus) panel	All	1 to 6
4	Dial-up Multibus (4 Bus) panel	All	1 to 4
5	Dial-up Multibus (2 Bus) panel	All	1 and 2
6	16 x 1 BPX panel	1 to 16	1
7	32 x 1 BPX panel	1 to 32	2
8	48 x 1 BPX panel	1 to 48	3
9	Dual 16 x 1 BPX panel	1 to 16	1 and 2
10	16 x 4 X-Y panel	1 to 16	1 to 4
11	32 x 4 X-Y panel	1 to 32	1 to 4
12	48 x 4 X-Y panel	1 to 48	1 to 4
13	32 x 16 X-Y panel	1 to 32	1 to 16
14	24 x 12 X-Y panel	1 to 24	1 to 12
15	Not Used		
16	16 x 16 X-Y panel	1 to 16	1 to 16

- **RS485 4 (COM 6)** = General Switcher In (SW-P-02) for Centra or Aurora control

“Auto” mode has been configured in the default database as the primary reference source for all inputs (see section 1.12 for information on video and audio reference inputs).

6 Module Locations

Chapter contains:

Module Locations

6.1 Front Module and Rear Panel Compatibility

Table 22 shows the front module and rear panel numbers that are currently ordered and shipped for new Sirius 800 router systems. Table 22 also shows which front modules and rear panels can be used together.

Table 23 shows the front module and rear panel numbers that were shipped with earlier Sirius 800 router systems. These can still be supplied for use when expanding the router or as replacements if required.

Note:

- A Sirius 800 router can contain a mix of front modules from Table 22 and Table 23 as long as the correct rear panels are used for each front module.
- All modules in Table 22 and Table 23 will work with any of the crosspoint modules.
- The 5905 video crosspoint module and the 5901 video crosspoint module (Appendix C "Modules No Longer Supplied With New Systems", *5901 Sirius 800 Series Video Crosspoint Module* on page 367) can be mixed in a frame, for details see section 8.
- A rear blanking panel must be fitted where a rear slot is not occupied. This maintains consistent cooling airflow and router frame performance. This applies to *all* Sirius 800 router frames.

Table 22   New Router Systems - Front Module and Rear Panel Compatibility

Front Module		**Rear Panel**
4915 * (Section 7.21)	Sirius 800 AES/MADI input module:	
	120 AES Pairs and up to 3 MADI Inputs (MADI inputs not supported by 1299 and 1297 rear panels)	**Sirius 830**: 1354 Balanced AES, see section 7.18.1 1357 Unbalanced AES, see section 7.19.1 1299 Balanced AES, see Appendix C.1.3
		Sirius 840/850: 1352 Balanced AES, see section 7.18.2 1355 Unbalanced AES, see section 7.19.2 1297 Balanced AES, see Appendix C.1.4
	or 12 MADI (Main & Redundant)	**Sirius 830**: 1303 BNC, See Section 7.5 1304 Fiber, See Section 7.6
		Sirius 840/850: 1285 BNC, See Section 7.9 1286 Fiber, See Section 7.10
4929 * (Section 9.1)	Sirius 800 AES/MADI output module with audio delay:	
	120 AES Pairs and up to 3 MADI outputs (MADI outputs not supported by 1298 rear panel)	1353 Balanced AES, see section 9.12 1356 Unbalanced AES, see section 9.13 1298 Balanced AES, see Appendix C.5.1
	or 12 MADI (Main & Redundant)	1295 BNC, See Section 9.10
		1296 Fiber, See Section 9.11
55917, or 5917 (Section 7.22)	Sirius 800 Standard Video BNC/Fiber input module	**Sirius 830**: 1234/1235 BNC, see section 7.1 1372 HD BNC + DS-Link, see section 7.2 1236 Fiber, see section 7.3 1373 Fiber + DS-Link, see section 7.4
		Sirius 840/850: 1349/1289 BNC, see section 7.11 1305 Fiber, see section 7.13 1360 HD BNC + DS-Link, see section 7.12 1361 Fiber + DS-Link, see section 7.14 1362 DS-Link + DS-Link, see section 7.15

Table 22 New Router Systems - Front Module and Rear Panel Compatibility (Continued)

Front Module		Rear Panel
5919 * (Section 7.23)	Sirius 800 Video AHP input module with delay and sync capability	**Sirius 830**: 1234/1235 BNC, see section 7.1 1372 HD BNC + DS-Link, see section 7.2 1236 Fiber, see section 7.3 1373 Fiber + DS-Link, see section 7.4 1840 12G-SDI HD-BNC Input rear panel, see Section 7.8.
		Sirius 840/850: 1349/1289 BNC, see section 7.11 1305 Fiber, see section 7.13 1360 HD BNC + DS-Link, see section 7.12 1361 Fiber + DS-Link, see section 7.14 1362 DS-Link + DS-Link, see section 7.15 1841 12G-SDI HD-BNC Input rear panel, see Section 7.17.
55926, or 5926 (Section 9.2)	Sirius 800 Standard Video output module (non-expandable)	1294 BNC, see section 9.5
		1302 Fiber, see section 9.7
		1363 HD BNC + DS-Link, see section 9.6
		1364 DS-Link + DS-Link, see section 9.8
5928 (Section 10.4)	Sirius 850 Standard Video Expansion output module Only fitted if expansion of a Sirius 850 frame is required	1290 Expansion Output to a second Sirius 850 frame, see section 10.6
		1365 Expansion Output to a second Sirius 850 frame, see section 10.7
		1366 HD BNC, see section 10.8
55928 (Section 10.4)	Sirius 850 Standard Video Expansion output module Only fitted if expansion of a Sirius 850 frame is required	11365 Expansion Output to a second Sirius 850 frame, see section 10.7
		11366 HD BNC, see section 10.8
55938, or 5938 (Section 10.3)	Sirius 850 Standard Video output module (expandable) Only fitted if expansion is required between two Sirius 850 frames	1294 BNC, see section 9.5
		1302 Fiber, see section 9.7
		1363 HD BNC + DS-Link, see section 9.6
		1364 DS-Link + DS-Link, see section 9.8

Table 22 New Router Systems - Front Module and Rear Panel Compatibility (Continued)

Front Module		**Rear Panel**
55949, or 5949* (Section 9.3)	Sirius 800 Video embedding & AHP output module with delay and sync capability	1294 BNC, see section 9.5
		1302 Fiber, see section 9.7
		1363 HD BNC + DS-Link, see section 9.6
		1364 DS-Link + DS-Link, see section 9.8
		1842 12G-SDI HD-BNC Output rear panel, see Section 9.14.
5931 (Section 11.6)	Sirius 830/840 External Multiviewer output module **Sirius 830/840**: up to 3 Modules, **Sirius 850**: up to 2 modules	**Sirius 830/840**: 1369 Ext. MV HD BNC, see section 11.10 **Sirius 850**: 1370 Ext. MV HD BNC, see section 11.11
5960 (Section 7.23)	Video IP Input module.	**Sirius 830**: 1824 Video IP Input (40Gb/s), see section 7.7 **Sirius 840/850**: 1825 Video IP Input (40Gb/s), see section 7.9
5970 (Section 9.3)	Video IP Output module.	**Sirius 830/840/850**: 1832 Video IP Output (40Gb/s), see section 9.9

Important:

*** Early Sirius 800 routers:**

Early S800 routers must be modified by Grass Valley before they can be used for audio routing and processing (4915, 5919, 4929, 5949, 4925, 5915, 5925 or 5903 modules in use). See Section 1.14 to check if the router needs modifying.

Important:

For Video IP I/O module Sirius 800 router frame compatibility, see:

- *Video IP I/O Module S830 Frame Compatibility* on page 26 for Sirius 830;
- *Video IP I/O Module S840 Frame Compatibility* on page 29 for Sirius 840; and
- *Video IP I/O Module S850 Frame Compatibility* on page 33 for Sirius 850.

Table 23 shows which front modules and rear panels can be used together on earlier Sirius 800 router systems.

Table 23 Early Router Systems - Front Module and Rear Panel Compatibility

Front Module (on Earlier Sirius 800 Router Systems)		Rear Panel
4925 * (Section C.4.1)	Sirius 800 AES/MADI output module (no audio delay):	
	120 AES Pairs and up to 3 MADI outputs (MADI outputs not supported by 1298 rear panel)	1353 Balanced AES, see section 9.12 1356 Unbalanced AES, see section 9.13 1298 Balanced AES, see Appendix C.5.1
	or 12 MADI (Main & Redundant)	1295 BNC, see section 9.10
		1296 Fiber, see section 9.11
5913 (Section C.2.1)	Sirius 840/850 Standard Video BNC Input module	1285 BNC, see section 7.9
5914 (Section C.2.1)	Sirius 840/850 Standard Video Fiber input module	1286 Fiber, see section 7.10
5915 * (Section C.2.2)	Sirius 800 Video AHP input module	**Sirius 830**: 1234/1235 BNC, see section 7.1 1372 HD BNC + DS-Link, see section 7.2 1236 Fiber, see section 7.3 1373 Fiber + DS-Link, see section 7.4
		Sirius 840/850: 1349/1289 BNC, see section 7.11 1305 Fiber, see section 7.13 1360 HD BNC + DS-Link, see section 7.12 1361 Fiber + DS-Link, see section 7.14 1362 DS-Link + DS-Link, see section 7.15
5916 (Section C.2.3)	Sirius 830 Standard Video BNC/Fiber input module	1234/1235 BNC, see section 7.1 1372 HD BNC + DS-Link, see section 7.2
		1236 Fiber, see section 7.3 1373 Fiber + DS-Link, see section 7.4
5923 (Section C.4.2)	Sirius 840/850 Standard Video BNC output module	1295 BNC, see section 9.10
5924 (Section C.4.2)	Sirius 840/850 Standard Video Fiber output module	1296 Fiber, see section 9.11
5925 * (Section C.4.3)	Sirius 800 Video AHP output module	1294 BNC, see section 9.5
		1302 Fiber, see section 9.7
		1363 HD BNC + DS-Link, see section 9.6
		1364 DS-Link + DS-Link, see section 9.8

Table 23 Early Router Systems - Front Module and Rear Panel Compatibility (Continued)

Front Module (on Earlier Sirius 800 Router Systems)		**Rear Panel**
5937 (Section C.4.4)	Sirius 830 Standard Video BNC/Fiber output module	1294 BNC, See Section 9.5
		1302 Fiber, see section 9.7
		1363 HD BNC + DS-Link, see section 9.6
		1364 DS-Link + DS-Link, see section 9.8
5928 (Section 10.4)	Sirius 850 Standard Video Expansion output module Only fitted if expansion of a Sirius 850 frame is required	1293 DIN 1.0/2.3 Coax see Appendix C.7.1
5931 (Section 11.6)	Sirius 830/840 External Multiviewer output module **Sirius 830/840**: up to 3 Modules, **Sirius 850**: up to 2 modules	**Sirius 830/840**: 1309 MV DIN 1.0/2.3 Coax, see Appendix C.6.1 **Sirius 850**: 1291 MV DIN 1.0/2.3 Coax, see Appendix C.6.2

Important: * Early Sirius 800 routers must be modified by Grass Valley before they can be used for audio routing and processing (4915, 5919, 4929, 5949, 4925, 5915, 5925 or 5903 modules in use). See Section 1.14 to check if the router needs modifying.

6.2 Sirius 830

6.2.1 Sirius 830 Module Locations

The Sirius 830 architecture allows different formats to be configured, up to 288 x 288 video channels and up to 9216 x 9216 audio channels (depending on configuration) in a single 15RU frame.

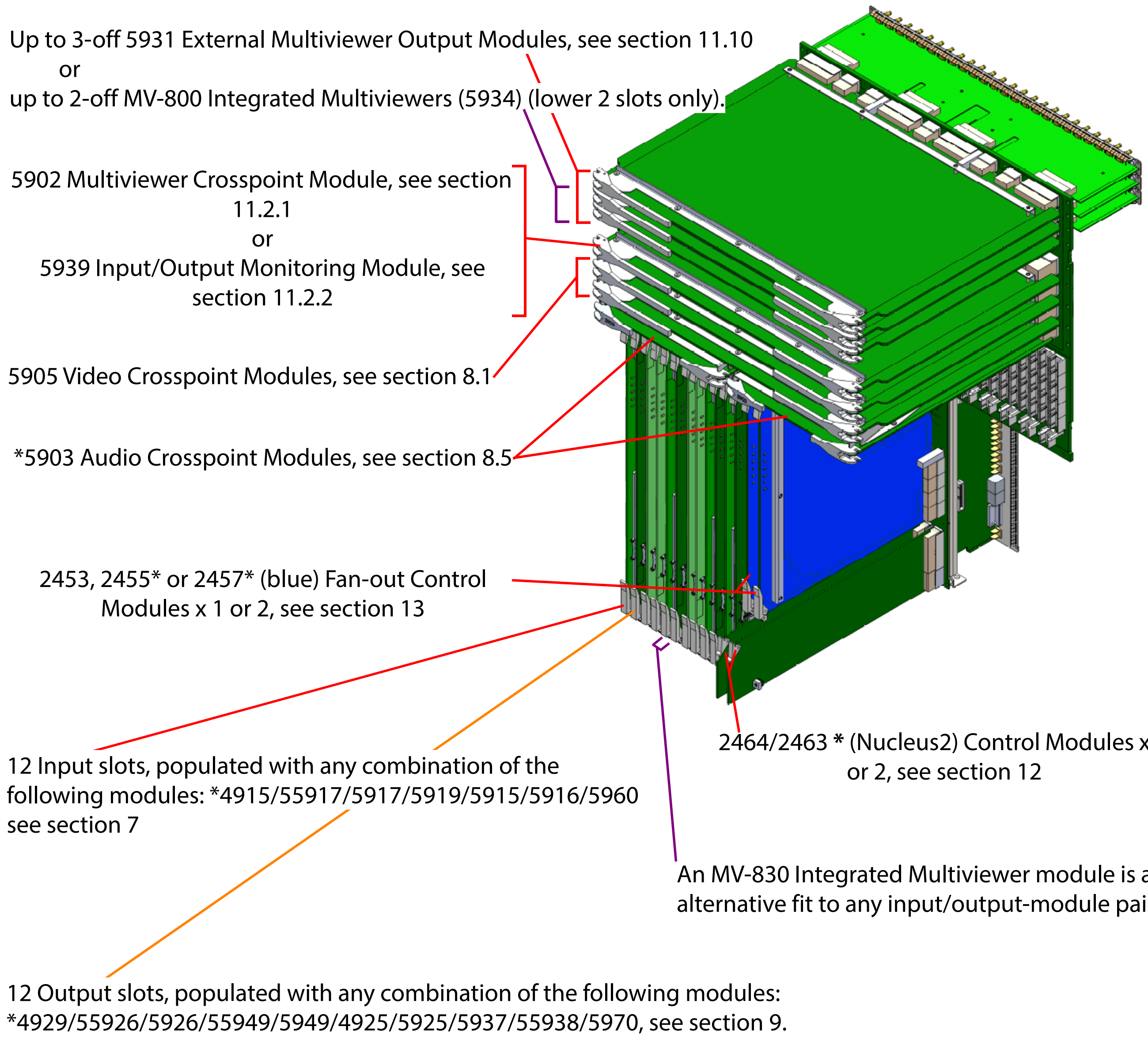


Figure 66 Sirius 830 Front Module Locations

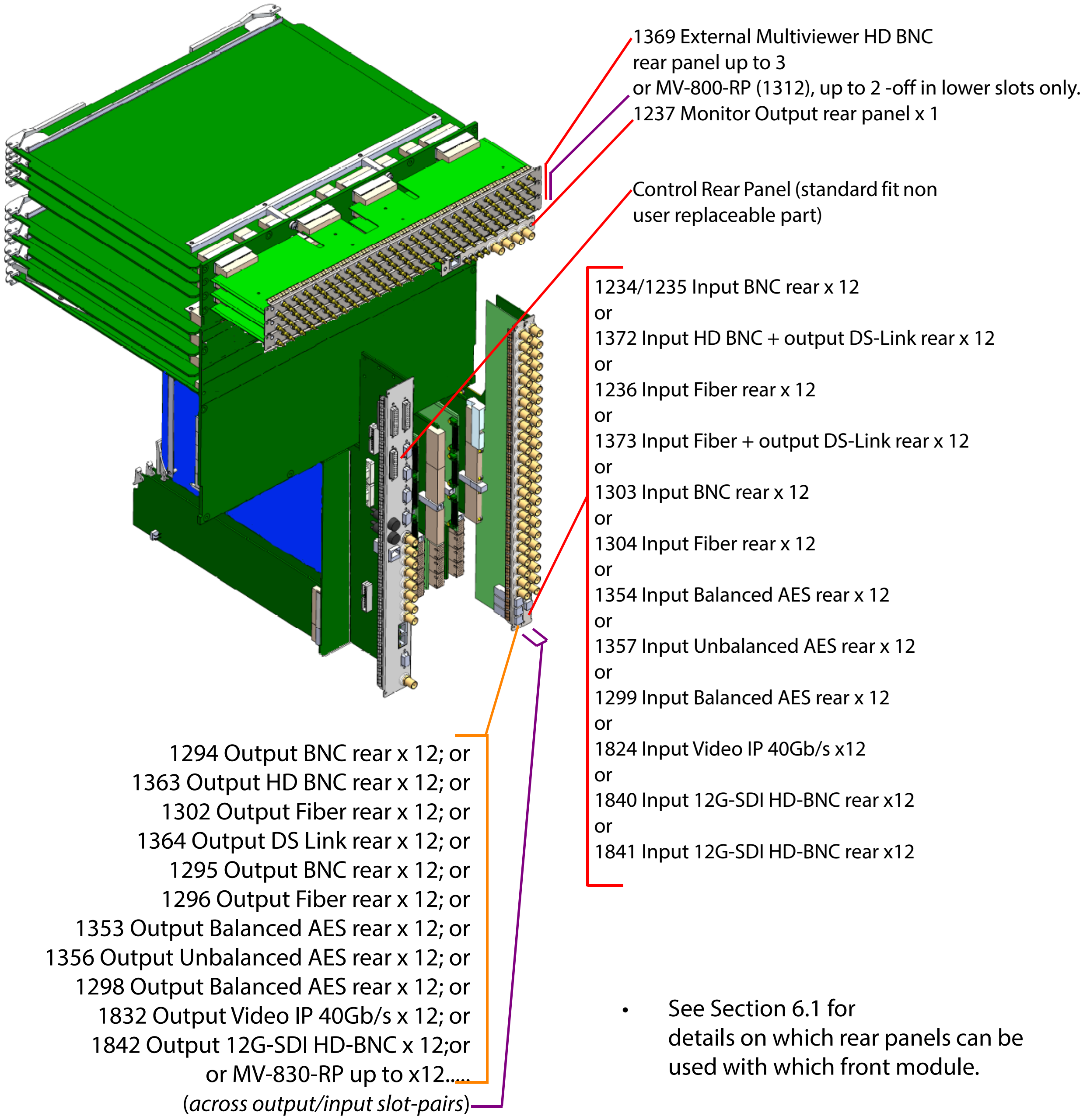
See Section 6.1 for details on which rear panels that can be used with which front module.

Important: * Early Sirius 830 routers must be modified by Grass Valley before they can be used for audio routing and processing (4915, 5919, 4929, 5949, 4925, 5915, 5925 or 5903 modules in use). See Section 1.14 to check if the router needs modifying.

6.2.2 Sirius 830 Rear Panel Locations

Frames that are not fully populated with input or output rear panels have blanking plates fitted in their place.

Cables connected to the router must be fitted with adequate vertical and horizontal strain relief to avoid twisting of the rear panels causing damage to the router connectors and loss of electrical/signal connection to the router.



- See Section 6.1 for details on which rear panels can be used with which front module.
- See Section 6.2.4 for BNC and Fiber rear panel channel numbers and layout.

Figure 67 Sirius 830 Rear Panel Locations

6.2.3 Sirius 830: Input and Output Module Locations

Important: Before adding modules to a Sirius 830 router check that the power supplies fitted can supply sufficient power to the router. The router power requirements are described in Appendix B.1.1.

Figure 68 shows the Input and Output Modules as they are located in the Sirius 830 frame.

Figure 68 Sirius 830 Input and Output Module Locations (Front View)

6.2.4 Sirius 830: Rear Input/Output Connector Configuration

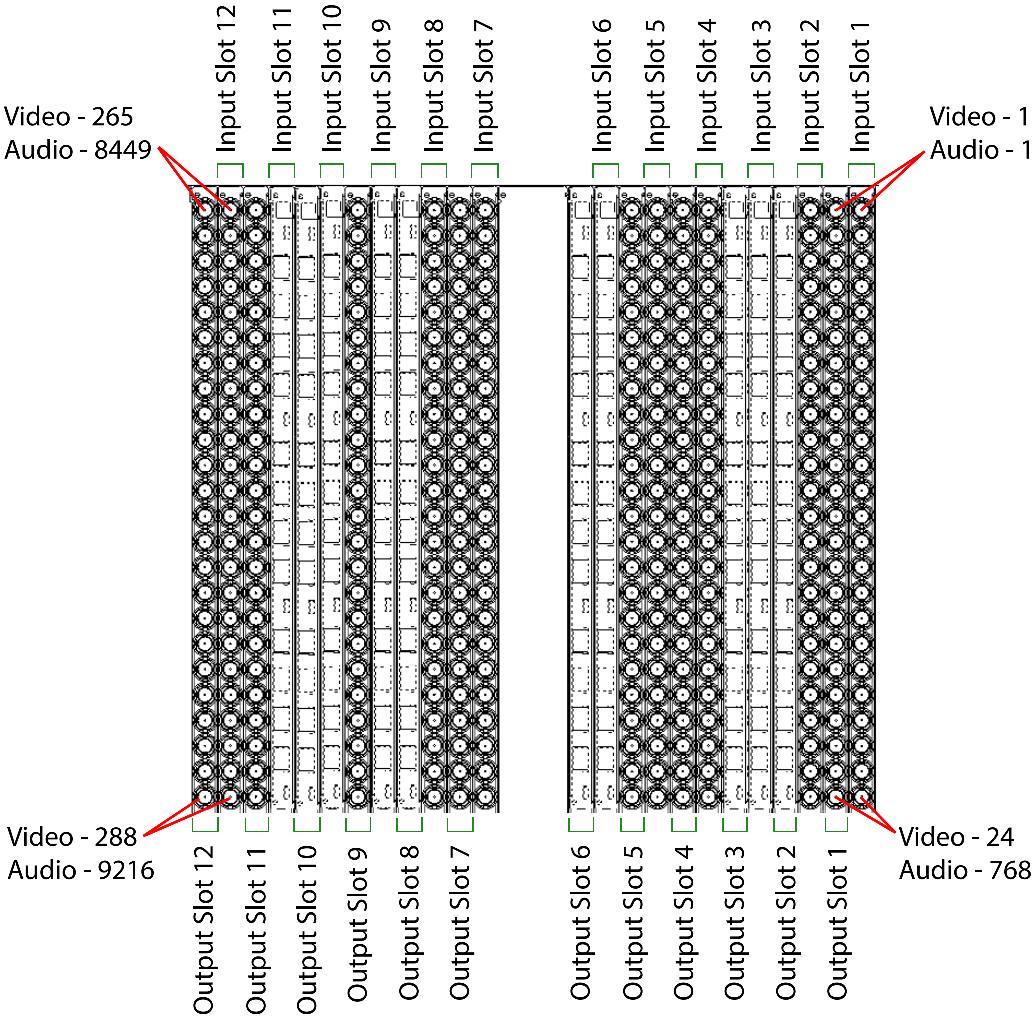
Frames that are not fully populated with input or output rear panels have blanking plates fitted in their place. Figure 69 shows a mix of fiber and BNC input and output rear panel connectors on the rear of a Sirius 830 router.

Note:

- The columns count down from top to bottom then back to top again and from right to left. The video and embedded audio channel numbers for input and output rear panel slots 1 and 12 are shown in Figure 69 The channel numbers for all of the rear panel connectors are listed in Table 24
- If MADI rear panels are fitted each input or output contains up to 64 mono audio channels.

Fiber

- Each fiber input and output rear panel has 12 SFP cages with two inputs or outputs per fiber SFP module.
- The main/redundant MADI streams alternate between the fiber SFP modules meaning that if one SFP module fails either the main or redundant MADI stream will still be available. See sections 7.6 and 7.21.1 (inputs) or sections 9.1.1 and 9.11 (outputs) for details.



The channel numbers for all of the rear panel connectors are listed in Table 24.

Figure 69 Example: Mixed BNC/Fiber Input/Output Rear Panel Connectors

6.2.4.1 Input, Output and Expansion Connections by Slot

Table 24 Connector Video and Embedded Audio Channels by Rear Panel Slot

Input/Output Rear Panel Slot Number	Input/Output Channels	
	Video Channels	Embedded Audio Channels
Rear Panel Slot 1	1 to 24	1 to 768
Rear Panel Slot 2	25 to 48	769 to 1536
Rear Panel Slot 3	49 to 72	1537 to 2304
Rear Panel Slot 4	73 to 96	2305 to 3072
Rear Panel Slot 5	97 to 120	3073 to 3840
Rear Panel Slot 6	121 to 144	3841 to 4608
Rear Panel Slot 7	145 to 168	4609 to 5376
Rear Panel Slot 8	169 to 192	5377 to 6144
Rear Panel Slot 9	193 to 216	6145 to 6912
Rear Panel Slot 10	217 to 240	6913 to 7680
Rear Panel Slot 11	241 to 264	7681 to 8448
Rear Panel Slot 12	265 to 288	8449 to 9216

6.3 Sirius 840/850

6.3.1 Sirius 840 Module Locations

The Sirius 840 architecture allows different formats to be configured, up to 576 x 576 video channels and up to 18432 x 18432 audio channels (depending on configuration) in a single 27U frame.

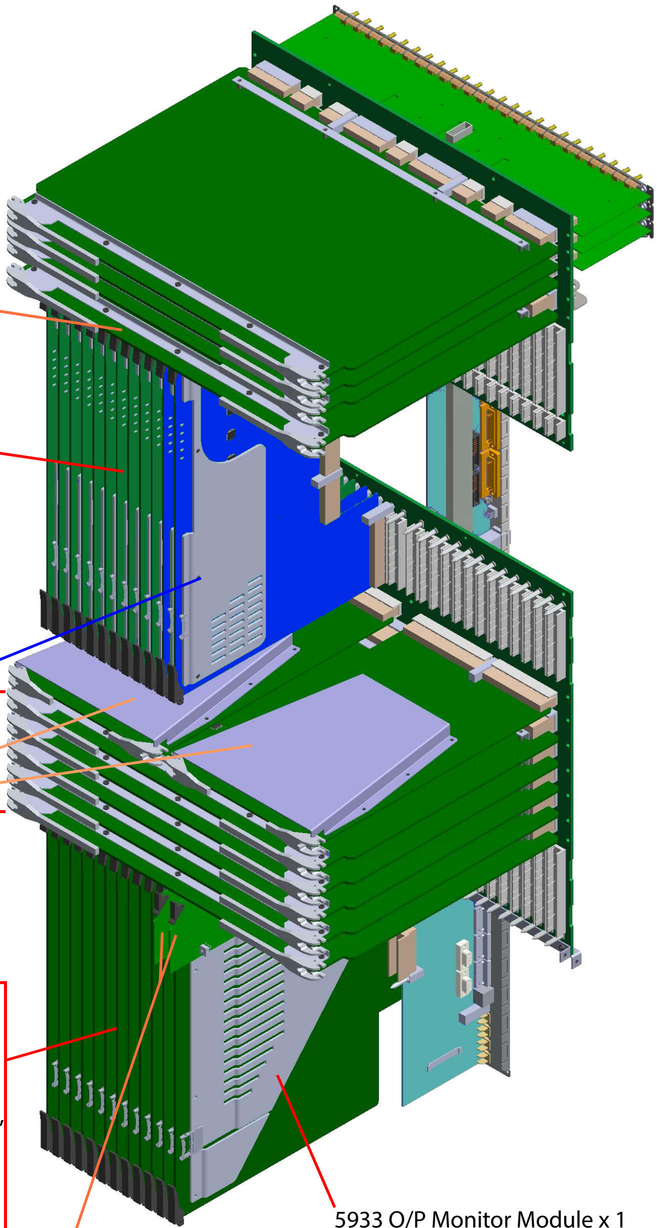


Figure 70 Sirius 840 Front Module Locations

See Section 6.1 for details on which rear panels that can be used with which front module.

Important:

* Early Sirius 840 routers must be modified by Grass Valley before they can be used for audio routing and processing (4915, 5919, 4929, 5949, 4925, 5915, 5925 or 5903 modules in use). See Section 1.14 to check if the router needs modifying.

6.3.2 Sirius 840 Rear Panel Locations

Frames that are not fully populated with input or output rear panels have blanking plates fitted in their place.

Cables connected to the router must be fitted with adequate vertical and horizontal strain relief to avoid twisting of the rear panels causing damage to the router connectors and loss of electrical/signal connection to the router.

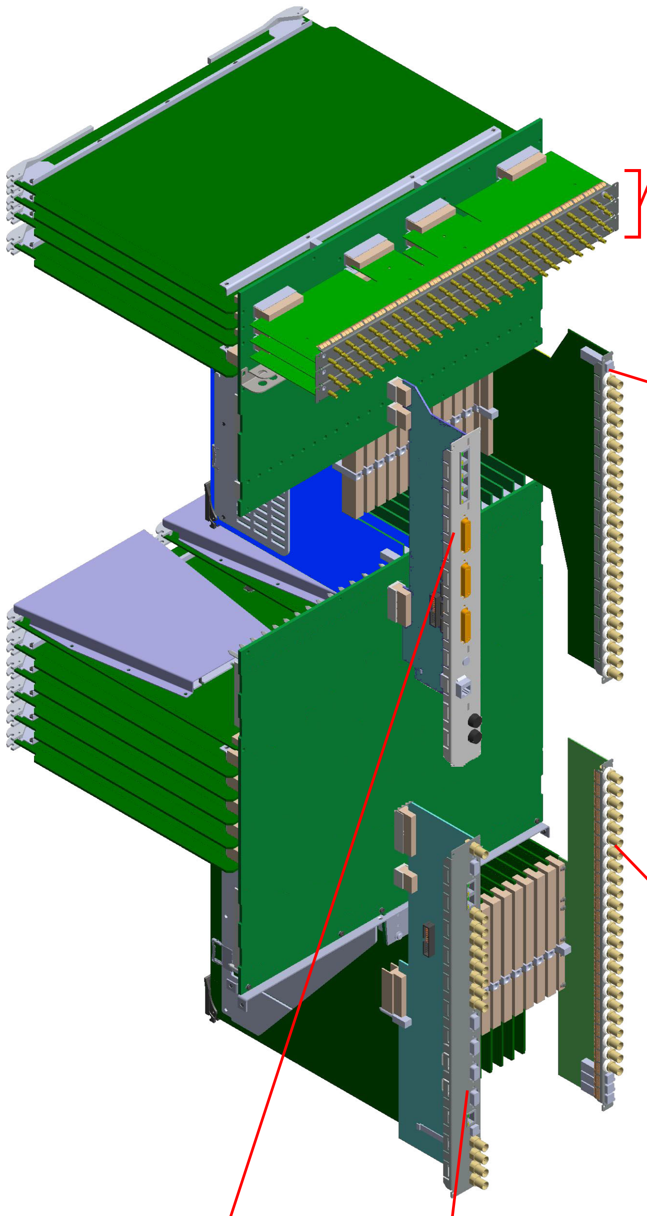


Figure 71 Sirius 840 Rear Panel Locations

- See Section 6.1 for details on which rear panels that can be used with which front module.
- See Section 6.3.7 for BNC and Fiber rear panel channel numbers and layout.

6.3.3 Sirius 850 Module Locations

The Sirius 850 architecture allows different formats to be configured, up to 576 x 576 video channels and up to 18432 x 18432 audio channels (depending on configuration) in a single 34U frame.

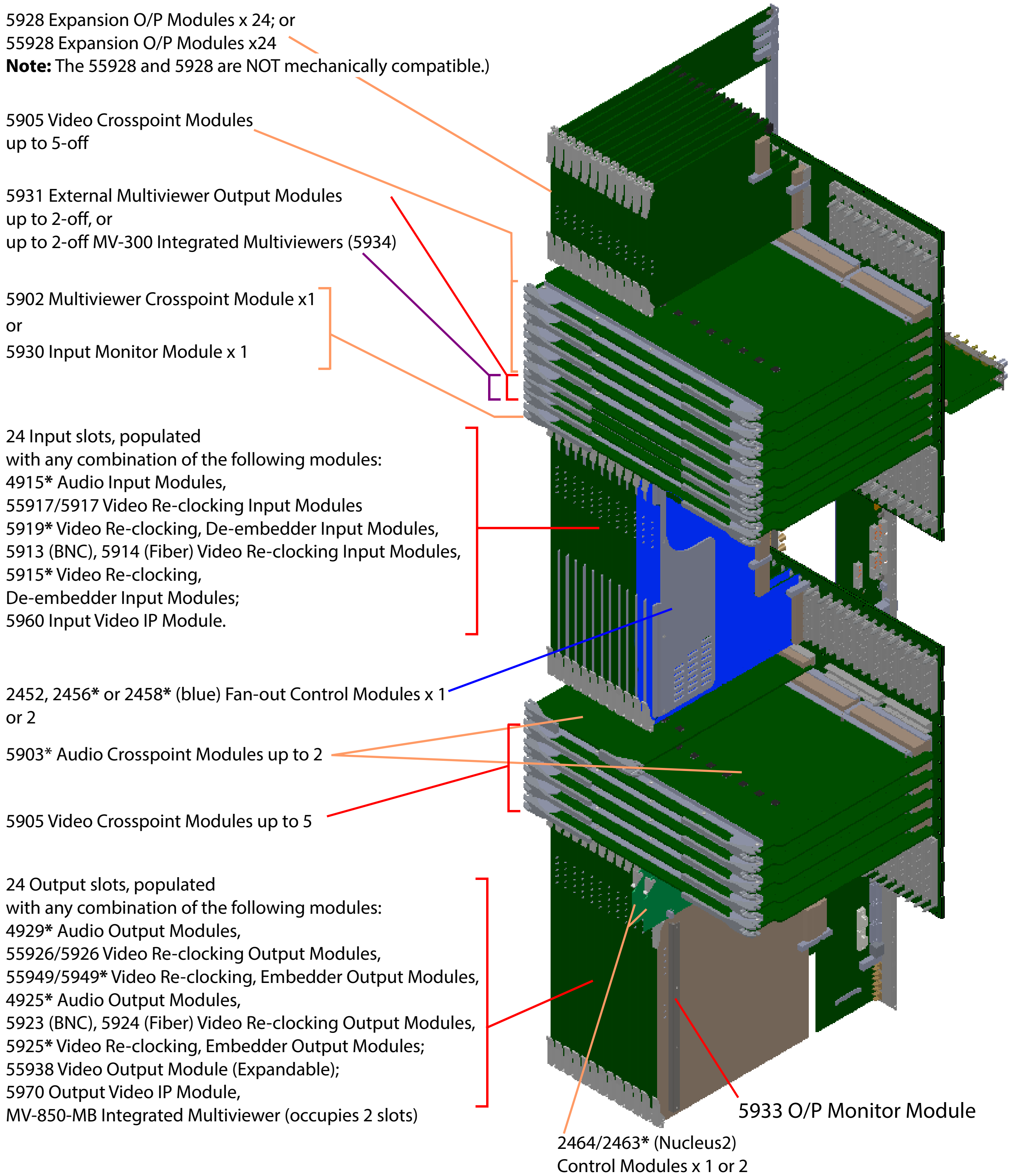


Figure 72   Sirius 850 Front Module Locations

See Section 6.1 for details on which rear panels that can be used with which front module.

Important: * Early Sirius 850 routers must be modified by Grass Valley before they can be used for audio routing and processing (4915, 5919, 4929, 5949, 4925, 5915, 5925 or 5903 modules in use). See Section 1.14 to check if the router needs modifying.

6.3.4 Sirius 850 Rear Panel Locations

Frames that are not fully populated with input, output or expansion rear panels have blanking plates fitted in their place.

Cables connected to the router must be fitted with adequate vertical and horizontal strain relief to avoid twisting of the rear panels causing damage to the router connectors and loss of electrical/signal connection to the router.

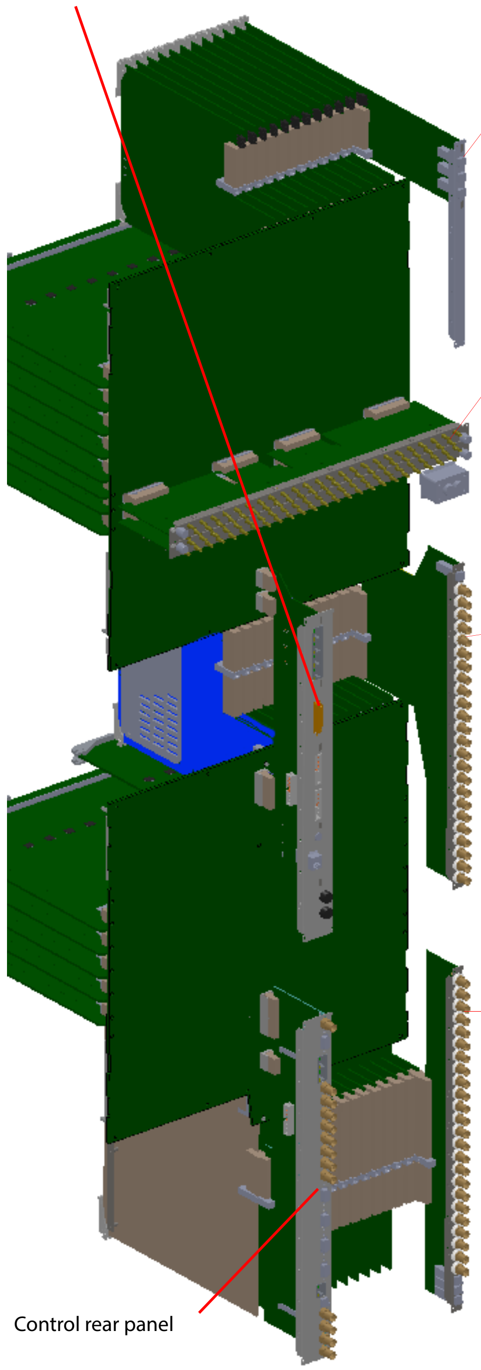


Figure 73 Sirius 850 Rear Panel Locations

- See Section 6.1 for details on which rear panels that can be used with which front module.
- See Section 6.3.7 for BNC and Fiber rear panel channel numbers and layout.
- See Section 6.3.8 for expansion rear panel channel numbers and layout.

6.3.5 Sirius 840/850: Input Module Locations

Important: Before adding modules to a Sirius 840/850 router check that the power supplies fitted can supply sufficient power to the router. The router power requirements are described in Appendix B.1.2 (Sirius 840) and Appendix B.1.3 (Sirius 850).

Figure 74 shows the Input Module locations as they are situated in the Sirius 840/850 frame.

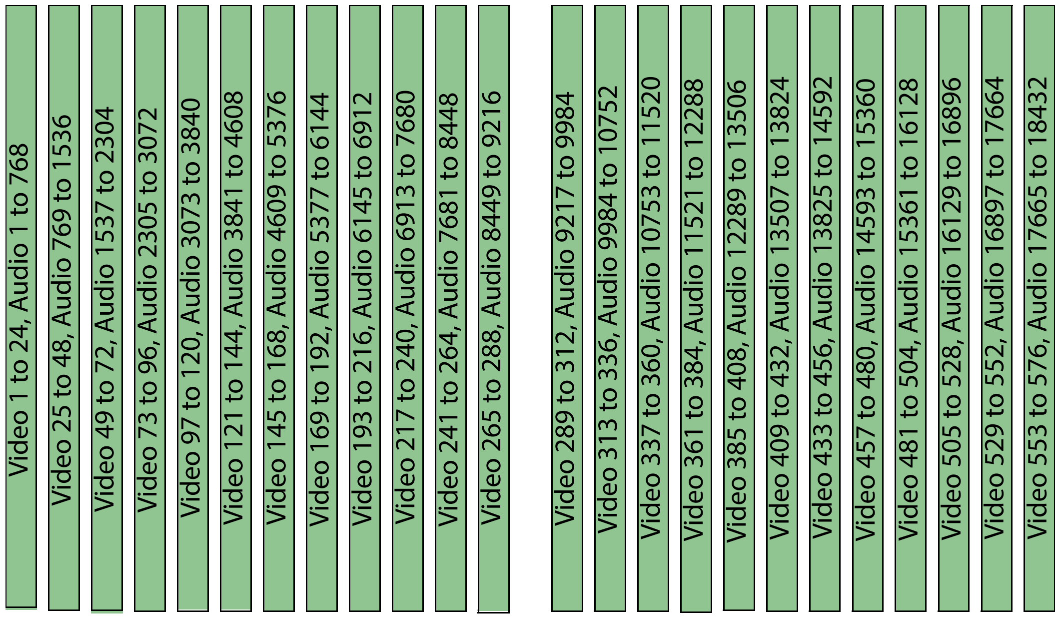


Figure 74 Sirius 840/850 Input Module Location (Front View)

6.3.6 Sirius 840/850: Output Module Locations

Important: Before adding modules to a Sirius 840/850 router check that the power supplies fitted can supply sufficient power to the router. The router power requirements are described in Appendix B.1.2 (Sirius 840) and Appendix B.1.3 (Sirius 850).

Figure 74 shows the Output Module locations as they are situated in the Sirius 840/850 frame.

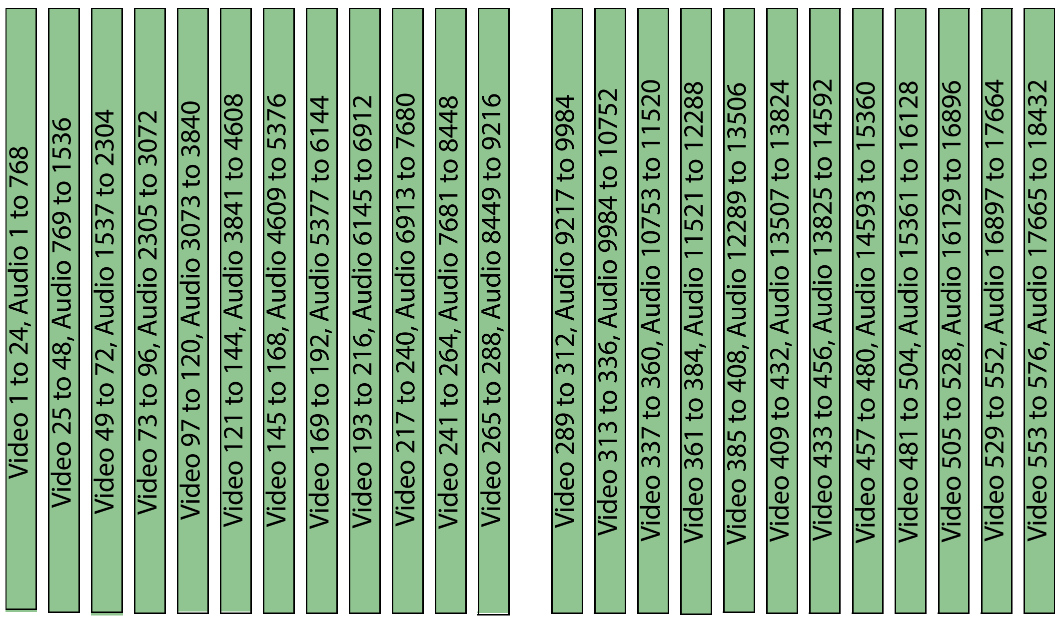


Figure 75 Sirius 840/850 Output Module Locations (Front View)

6.3.7 Sirius 840/850: Rear Input/Output Connector Configuration

Frames that are not fully populated with input or output rear panels have blanking plates fitted in their place.

Note:

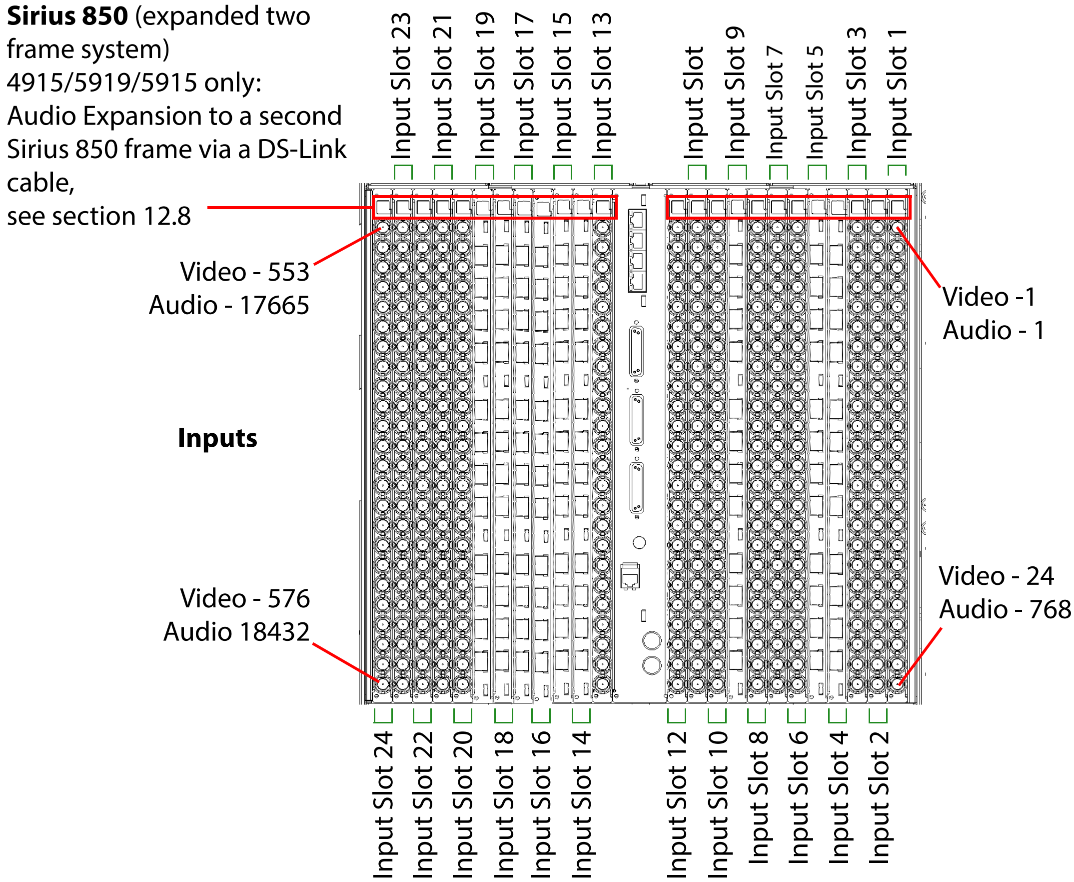
- The columns count down from top to bottom then back to top again and from right to left. The video and embedded audio channel numbers for input and output rear panel slots 1 and 24 are shown in Figure 76 and Figure 77 respectively. The channel numbers for all of the rear panel connectors are listed on page 112 in Table 25
- If MADI rear panels are fitted each input or output contains up to 64 mono audio channels.

Fiber

- Each fiber input and output rear panel has 12 SFP cages with two inputs or outputs per fiber SFP module.
- The main/redundant MADI streams alternate between the fiber SFP modules meaning that if one SFP module fails either the main or redundant MADI stream will still be available. See sections 7.10 and 7.21.1 (inputs) or sections 9.1.1 and 9.11 (outputs) for details.

6.3.7.1 Inputs

Figure 76 shows a mix of fiber and BNC input rear panel connectors on the rear of a Sirius 840/850 router.

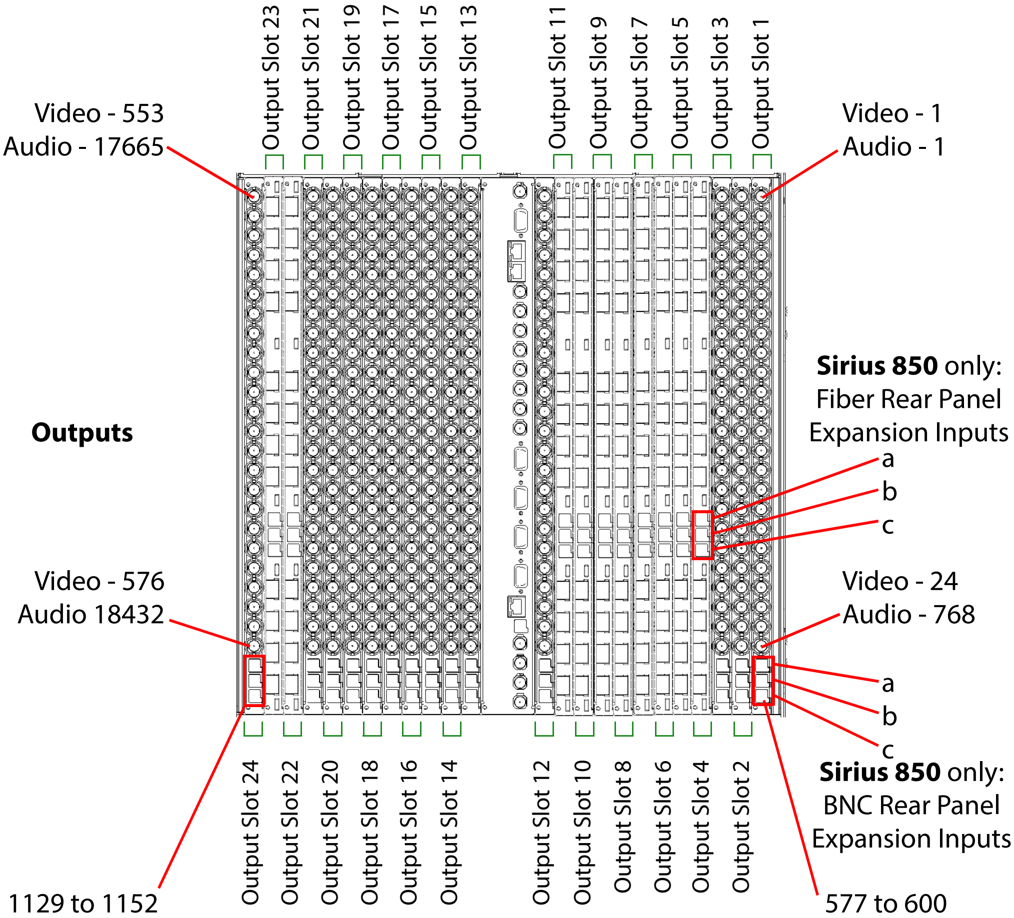


The channel numbers for all of the rear panel connectors are listed in Table 25.

Figure 76 Example: Mixed BNC/Fiber Input Rear Panel Connectors

6.3.7.2 Outputs

Figure 77 shows a mix of fiber and BNC output rear panel connectors on the rear of a Sirius 840/850 router.



The channel numbers for all of the rear panel connectors are listed in Table 25.

Figure 77 Example Sirius 840/850: Mixed BNC/Fiber Output Rear Panel Connectors

6.3.7.3 Input, Output and Expansion Connections by Slot

Table 25 Sirius 840/850: Connector Channels by Rear Panel Slot

Input/Output Rear Panel Slot Number	Input/Output Channels		
	Video Channels	Embedded Audio Channels	Sirius 850 only, Video Expansion Inputs (a, b, c)
Rear Panel Slot 1	1 to 24	1 to 768	577 to 600
Rear Panel Slot 2	25 to 48	769 to 1536	601 to 624
Rear Panel Slot 3	49 to 72	1537 to 2304	625 to 648
Rear Panel Slot 4	73 to 96	2305 to 3072	649 to 672
Rear Panel Slot 5	97 to 120	3073 to 3840	673 to 696
Rear Panel Slot 6	121 to 144	3841 to 4608	697 to 720
Rear Panel Slot 7	145 to 168	4609 to 5376	721 to 744
Rear Panel Slot 8	169 to 192	5377 to 6144	745 to 768
Rear Panel Slot 9	193 to 216	6145 to 6912	769 to 792
Rear Panel Slot 10	217 to 240	6913 to 7680	793 to 816
Rear Panel Slot 11	241 to 264	7681 to 8448	817 to 840
Rear Panel Slot 12	265 to 288	8449 to 9216	841 to 864
Rear Panel Slot 13	289 to 312	9217 to 9984	865 to 888
Rear Panel Slot 14	313 to 336	9985 to 10752	889 to 912
Rear Panel Slot 15	337 to 360	10753 to 11520	913 to 936
Rear Panel Slot 16	361 to 384	11521 to 12288	937 to 960
Rear Panel Slot 17	385 to 408	12289 to 13056	961 to 984
Rear Panel Slot 18	409 to 432	13057 to 13824	985 to 1008
Rear Panel Slot 19	433 to 456	13825 to 14592	1009 to 1032
Rear Panel Slot 20	457 to 480	14593 to 15360	1033 to 1056
Rear Panel Slot 21	481 to 504	15361 to 16128	1057 to 1080
Rear Panel Slot 22	505 to 528	16129 to 16896	1081 to 1104
Rear Panel Slot 23	529 to 552	16897 to 17664	1105 to 1128
Rear Panel Slot 24	553 to 576	17665 to 18432	1129 to 1152

6.3.8 Sirius 850: Rear Expansion Output Connectors

The 'Expansion' section at the top of the Sirius 850 frame can be fitted with either:

- 11365/1365/1290 expansion rear panels; or
- 11366/1366/1293 expansion rear panels.

The 11365/1365/1290 rears distribute expansion outputs to a second Sirius 850 frame.
The 11366/1366/1293 rears provide expansion outputs directly from a single Sirius 850 frame.
It is recommended that the 1365/1290 and 1366/1293 are not mixed in a router frame.

Note:

- It is not recommended to mix the 1365/1290 and 1366/1293 Output Rear Panels in a frame.
- 1365 and 1290 rear panels can be mixed if required.
- 1366 and 1293 rear panels can be mixed if required.
- It is not possible to monitor the 1366/1293 expansion outputs.
- The 1366/1293 expansion output rear panels are not fitted with Catsii LEDs.
- A second Sirius 850 frame cannot be used if one or more 1366/1293 Output Rear Panel is fitted in a frame.

6.3.8.1 1290, 1365 and 11365 Expansion Output Rear Panel Configuration

The output from the 55928/5928 Expansion Output Module is via the 1290 or 11365/1365 Expansion Output Rear Panels.

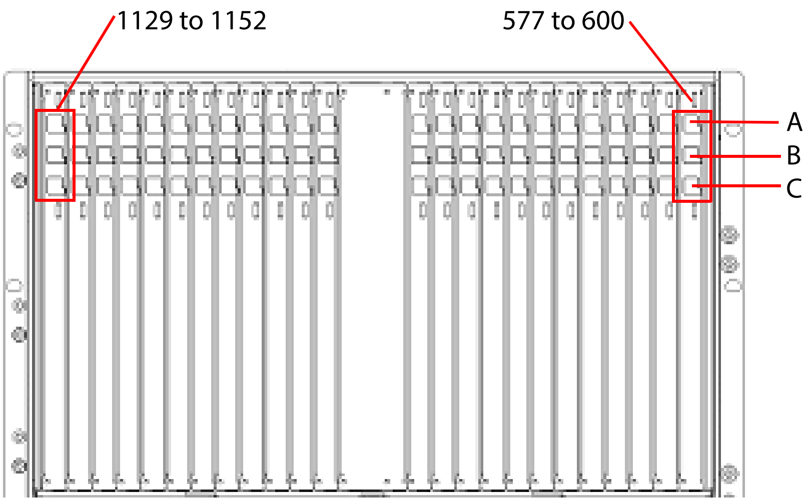


Figure 78 Sirius 850 Expansion 1290 Output Rear Panel Configuration

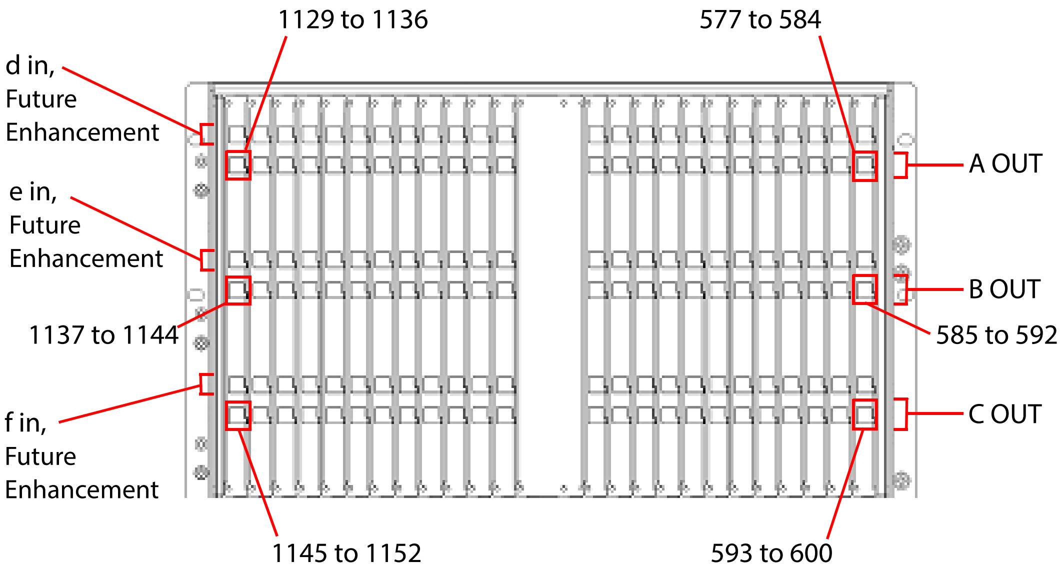


Figure 79 Sirius 850 Expansion 11365/1365 Output Rear Panel Configuration

The panel has three (DS-Link) output connectors (see note below) and connects to the equivalent placed input connectors (a, b & c) that are at the bottom of the Output Rear Panel of the second Sirius 850 frame.

Note:

- **1290 Rear Panel** - the DS-Link expansion output connectors are marked A, B & C
- **11365/1365 Rear Panel** - the DS-Link expansion output connectors are marked A OUT, B OUT & C OUT

The three expansion cables must be purchased separately.
The cable order code for one cable is:

- 1 x 6 meter (19 Feet) expansion cable, Grass Valley order code: FGAEY WDS6THIN

The DS-Link input connectors on the 11365 or 1365 rear panel (d in, e in & f in) are used to expand a Sirius 850 system above 1152[2] (future enhancement).

See section 10.2.2, *Signal Flow Between Frames* on page 255, and see section 10.11, *Audio Input Expansion in a Two Frame System* on page 271, for details of the DS-Link connections between the Sirius 850 frames.

6.3.8.2 11366 or 1366 Expansion Output Rear Panel Configuration

The output from the 55928/5928 Expansion Output Module is via the 11366/1366 24 Channel Expansion Output Rear Panel.

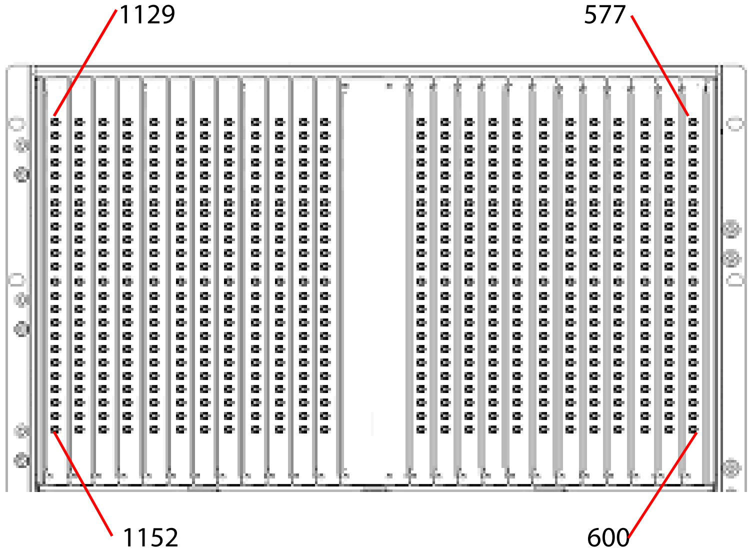


Figure 80 Sirius 850 Expansion 11366/1366 Output Rear Panel Configuration

The 11366 or 1366 Expansion Output Rear panel has 24 x HD BNC connectors.

6.4 Inserting and Removing Vertical Modules

The rear panel fastening screws are supplied fitted to the rear panels and the rear panel blanking plates.

- Replacement screw details: Pozidriv Pan head M3 x 6 mm Zinc plated screw.

Important: Do not use screws longer than specified. Using longer screws may damage the router frame.

Important:

- Before adding modules to a Sirius 800 router check that the power supplies fitted can supply sufficient power to the router. See Appendix B for router power requirements.
- Rear panels must be fitted and fastened securely to the router frame before inserting the front modules.
- The rear panel fastening screws should not require any pressure when screwing them into the router frame. They should screw in without any resistance until the screw head secures the rear panel to the frame. If a rear panel fastening screw binds up then it should be removed and the screw alignment should be checked before the screw is refitted.
- Do not over-tighten the rear panel fastening screws.

Electrostatic Damage

Static precautions must be observed when inserting and removing all system modules

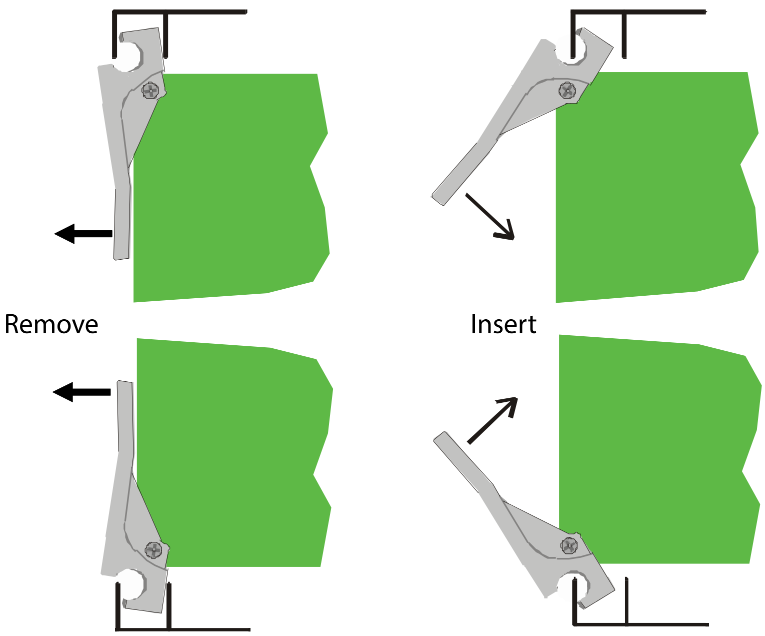


Figure 81 Inserting and Removing Vertical Modules

The vertical module levers locate into the metalwork of the Sirius 800 frame allowing easy insertion and removal.

1. To access the modules the associated front fan assembly must be opened first.

Note:

- The fan assembly should be placed back into the closed position as soon as possible after opening, as this ensures correct ventilation of the frame. Failure to do this will result in failure.
- In practice the maximum time that a fan assembly can be left open will depend on a number of factors such as; ambient temperature, frame loading, crosspoint routings, etc. To ensure correct operation under all conditions the fan assemblies should be left open for no more than 4 minutes at a time.
- **Sirius 840/850**: the crosspoint fan assembly must also be opened to access the input modules.

2. To remove the module from its socket, pull on the two levers, and slide the module out of the frame.
3. To insert the module, lift the levers and locate in the frame.
4. Push the levers to fully lock the module.
5. Close the front fan frame assembly making sure not to trap any wires.

6.5 Inserting and Removing Horizontal Modules

Electrostatic Damage

Static precautions must be observed when inserting and removing all system modules

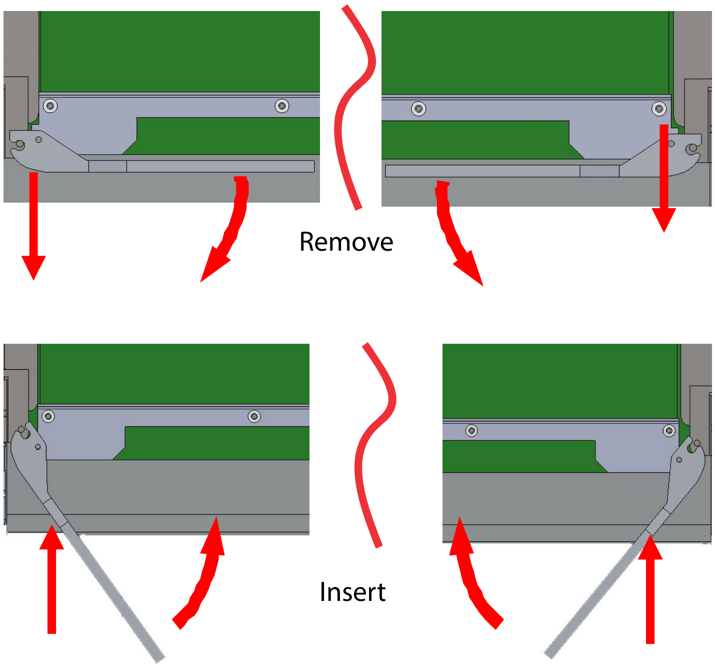


Figure 82 Inserting and Removing Horizontal Modules

The horizontal module levers locate into the metalwork of the Sirius 800 frame allowing easy insertion and removal.

1. To access the modules the associated module front fan assembly must be opened first.

Note:

- The fan assembly should be placed back into the closed position as soon as possible after opening, as this ensures correct ventilation of the frame. Failure to do this will result in failure.
- In practice the maximum time that a fan assembly can be left open will depend on a number of factors such as; ambient temperature, frame loading, crosspoint routings, etc. To ensure correct operation under all conditions the fan assemblies should be left open for no more than 4 minutes at a time.

2. To remove the module from its socket, pull on the two levers, and slide the module out of the frame.
3. To insert the module, lift the levers and locate in the frame.
4. Push the levers to fully lock the module.
5. Close the front fan frame assembly making sure not to trap any wires.

7 Input Rear Panels and Input Modules

This section describes the following:

Input Rear Panels and Input Modules

7.1 Sirius 830: 1234 Video BNC Input Rear Panel

Note:
- The 1234 rear panel is compatible with and is a direct replacement for the 1235, supplied with older Sirius 800 router systems.

The 1234 video BNC input rear panels have 24 BNC inputs.

The 1234 rear panel is used in the Sirius 830 with either the 5919/5915 input module (24 channel video with de-embedder, re-clocking and AHP) or the 5917 input modules (24 channel video with re-clocking).

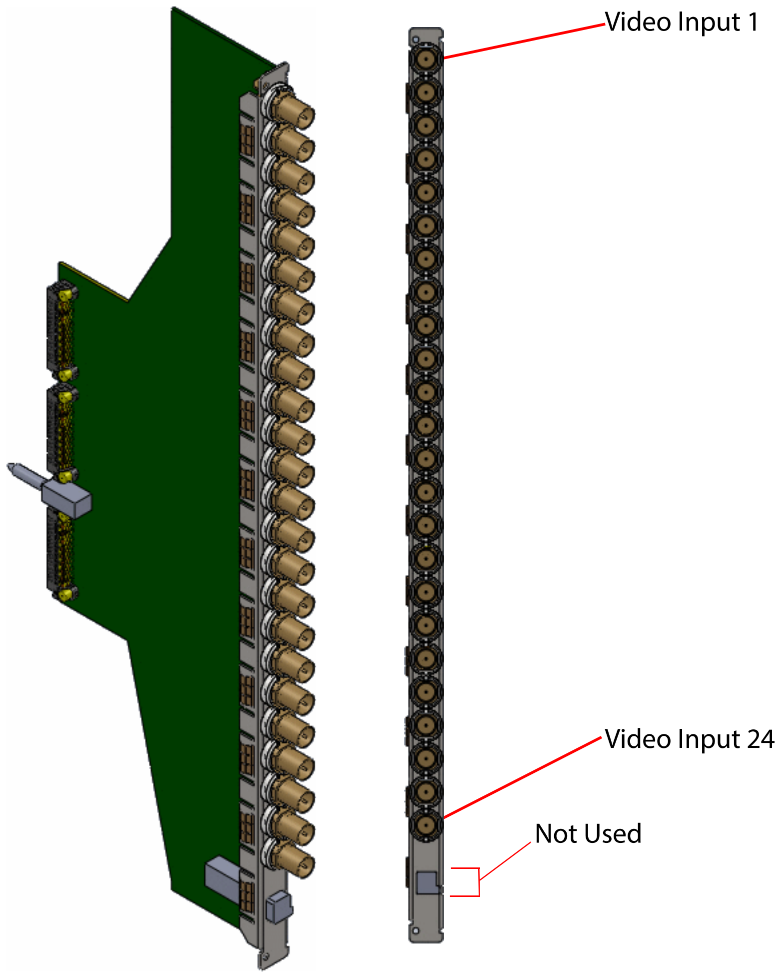


Figure 83 1234 Input BNC Rear Panel (Sirius 830 only)

All the BNC connectors on the 1234 rear panels have Grass Valley's unique Catsii feature that illuminates each connector. See section 4 for details of the Catsii functionality.

7.2 Sirius 830: 1372 Video HD BNC DS-Link Input Rear Panel

The 1372 video HD BNC DS-Link input rear panels have 24 HD BNC inputs and 3 DS-Link copy outputs.

The 1372 rear panel is used in the Sirius 830 with either the 5919/5915 input module (24 channel video with de-embedder, re-clocking and AHP) or the 55917/5917 input modules (24 channel video with re-clocking).

The DS-Link connectors output copies of the HD BNC video input signals which can be used to loop-through signals to external Grass Valley IQ modular products.

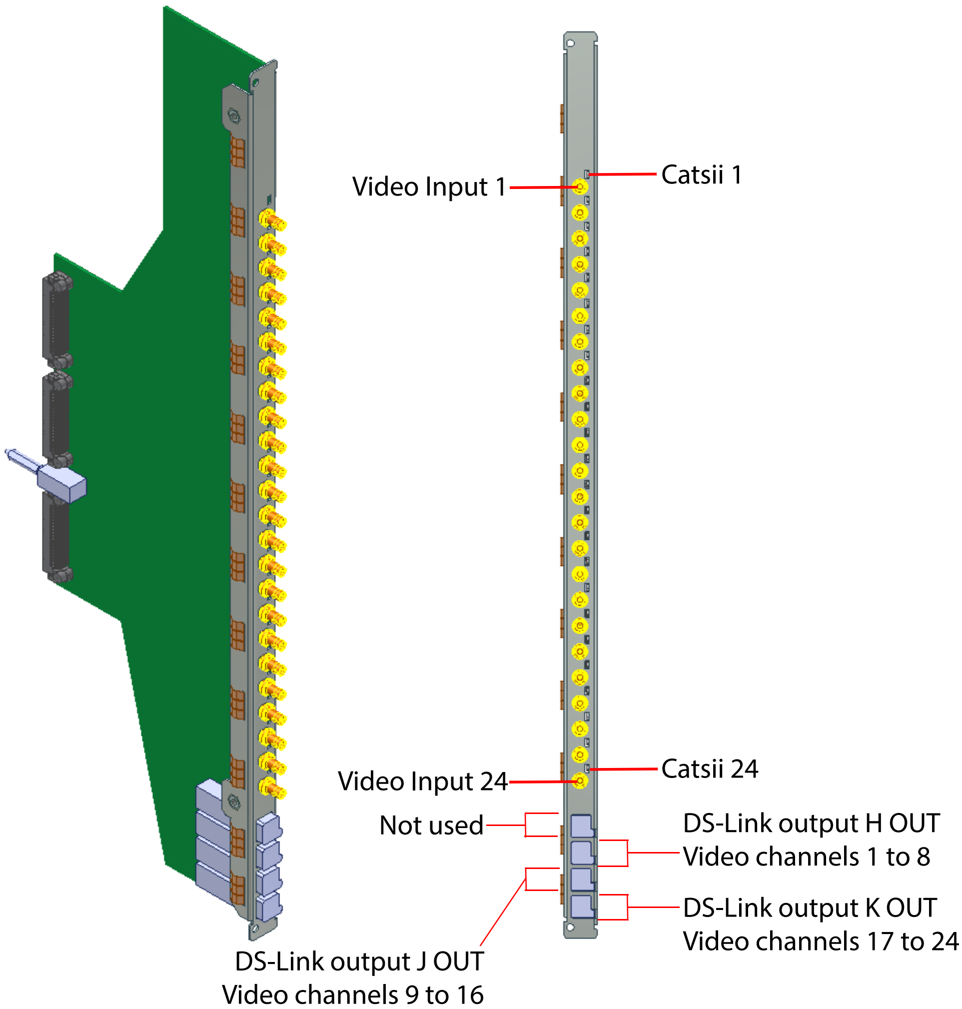


Figure 84 1372 Video Input HD BNC DS-Link Rear Panel (Sirius 830 only)

All the HD BNC connectors on the 1372 rear panels have Grass Valley's unique Catsii feature that illuminates above each connector.
See Section 4 *Catsii Functionality* on page 82 for Catsii details.

- **DS-Link to DS-Link Cable - 6 metre**:
  Order Code FGAEY WDS6THIN
  Cable kit consists of 1 x 6 metre (19 Feet) DS-Link to DS-Link cable.

7.3 Sirius 830: 1236 Video Fiber Input Rear Panel

The 1236 video fiber input rear panel has 12 fiber SFP cages with two inputs per fiber SFP module.

The 1236 rear panel is used in the Sirius 830 with either the 5919/5915 input module (24 channel video with de-embedder, re-clocking and AHP) or the 55917/5917 input modules (24 channel video with re-clocking).

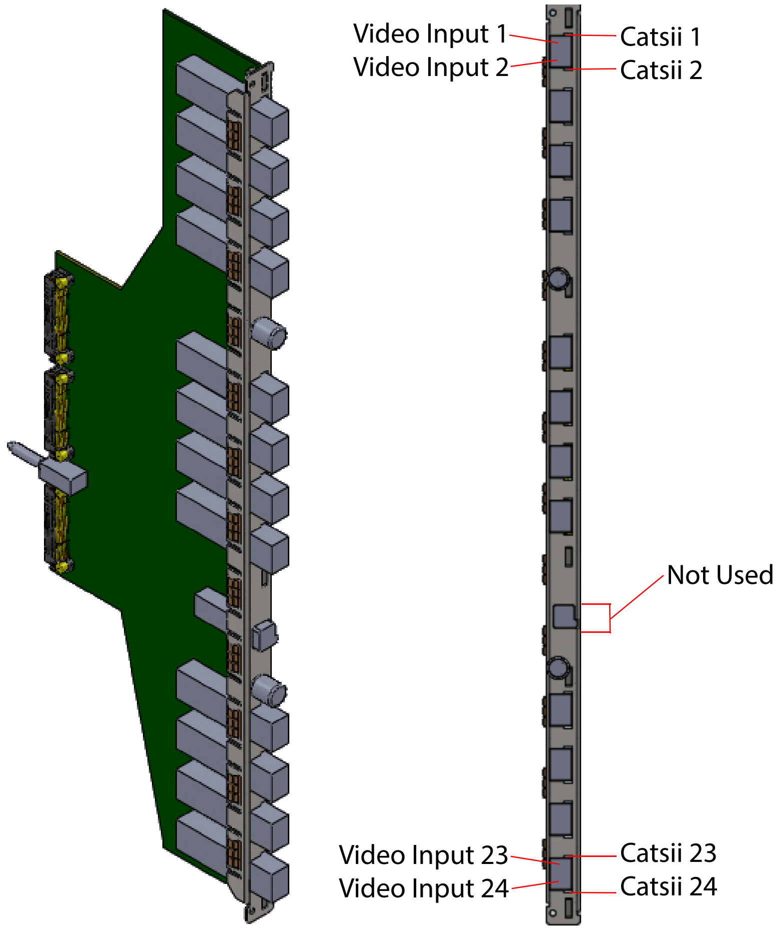


Figure 85 1236 Fiber Input Rear Panel (Sirius 830 only)

All the Fiber connectors on the 1236 rear panel have Grass Valley's unique Catsii feature that illuminates each connector. See section 4 for details of the Catsii functionality.

When ordering the router, the rear panels can be specified with or without fiber SFP receiver modules. When the rear panels are ordered as spares, they are supplied without Fiber SFP receiver modules; the SFP receiver modules must be ordered separately and the Grass Valley order code is:

- **Fiber SFP Receiver Module**
  Order Code SRR-3
  Fiber SFP 2 channel 1260-1620nm receiver. 3G, HD, SD, MADI Capable.
  Max 12 per rear panel

CAUTION:
Order and use the SFP modules specified. Using other SFP modules may damage the router.

7.4 Sirius 830: 1373 Video Fiber DS-Link Input Rear Panel

The 1373 video fiber DS-Link input rear panel has 12 fiber SFP cages with two inputs per fiber SFP module and 3 DS-Link copy outputs.

The 1373 rear panel is used in the Sirius 830 with the 5919/5915 video input module (24 channel video with de-embedder, re-clocking and AHP) and the 5917 video input module (24 channel with re-clocking).

The DS-Link connectors output copies of the fiber video input signals which can be used to loop-through signals to external Grass Valley IQ modular products.

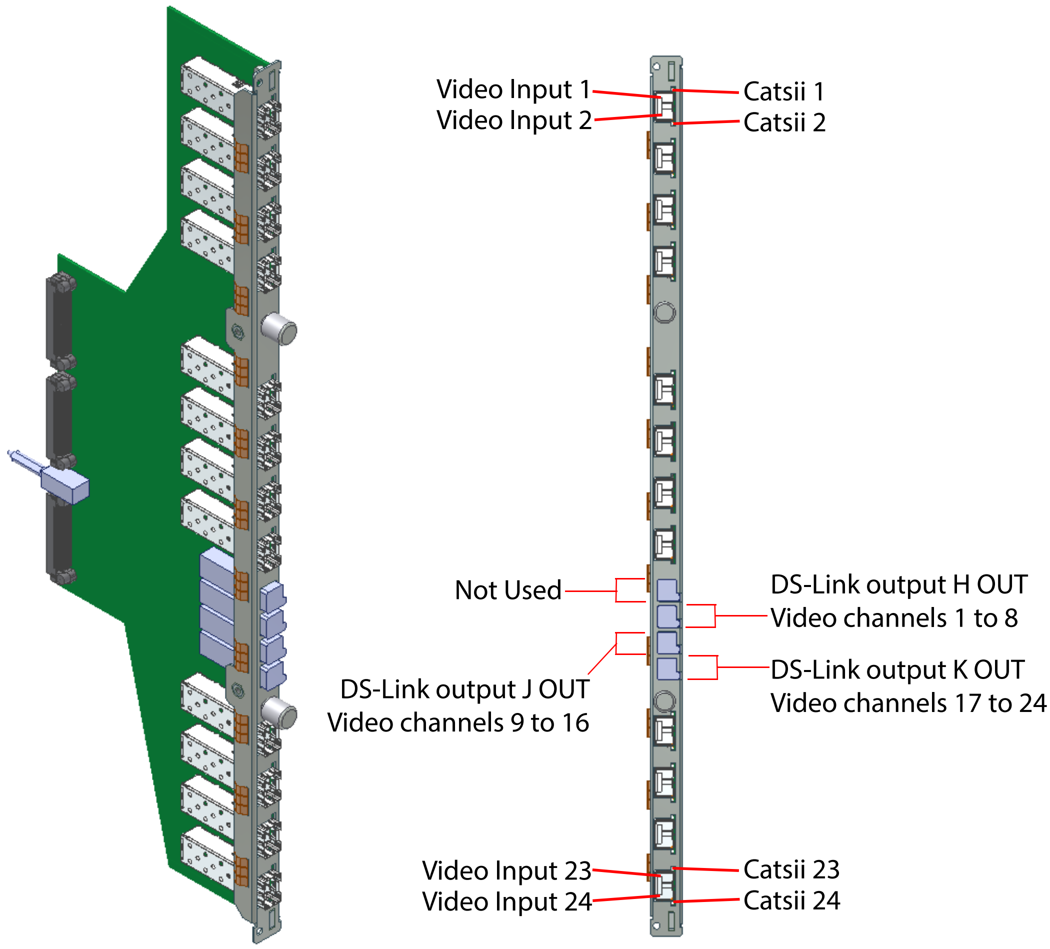


Figure 86 1373 Video Fiber DS-Link Input Rear Panel (Sirius 830 only)

All the Fiber connectors on the 1373 rear panel have Grass Valley's unique Catsii feature that illuminates each connector. See Section 4 *Catsii Functionality* on page 82 for Catsii details.

- **DS-Link to DS-Link Cable - 6 metre**:
  Order Code FGAEY WDS6THIN
  Cable kit consists of 1 x 6 metre (19 Feet) DS-Link to DS-Link cable.

When ordering the router, the rear panels can be specified with or without fiber SFP receiver modules. When the rear panels are ordered as spares they are supplied without Fiber SFP receiver modules and these must be ordered separately. The Grass Valley order code is shown below.

- **Fiber SFP Receiver Module**: Order Code SRR-3
  Fiber SFP 2 channel 1260-1620nm receiver. 3G, HD, SD, MADI Capable.
  Max 12 per rear panel

7.5 Sirius 830: 1303 MADI BNC Input Rear Panel

The 1303 MADI BNC input rear panel has 24 BNC connectors.

The 1303 rear panel is used in the Sirius 830 with the 4915 audio input module (12 channel MADI).

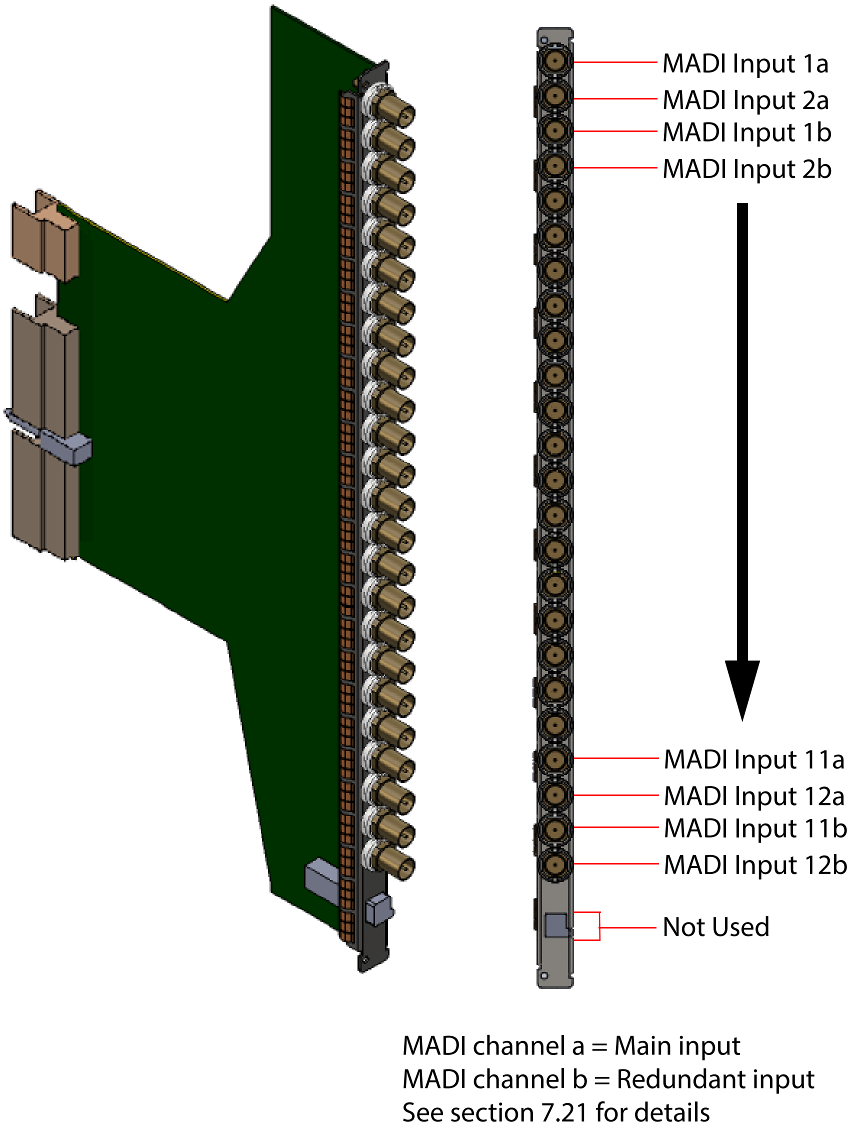


Figure 87 1303 Input BNC Rear Panel (Sirius 830 only)

All the BNC connectors on the 1303 rear panel have Grass Valley's unique Catsii feature that illuminates each connector. See section 4 for details of the Catsii functionality.

7.6 Sirius 830: 1304 MADI Fiber Input Rear Panel

The 1304 MADI fiber input rear panel has 12 fiber SFP cages with two inputs per fiber SFP module.

The 1304 rear panel is used in the Sirius 830 with the 4915 audio input module (12 channel MADI).

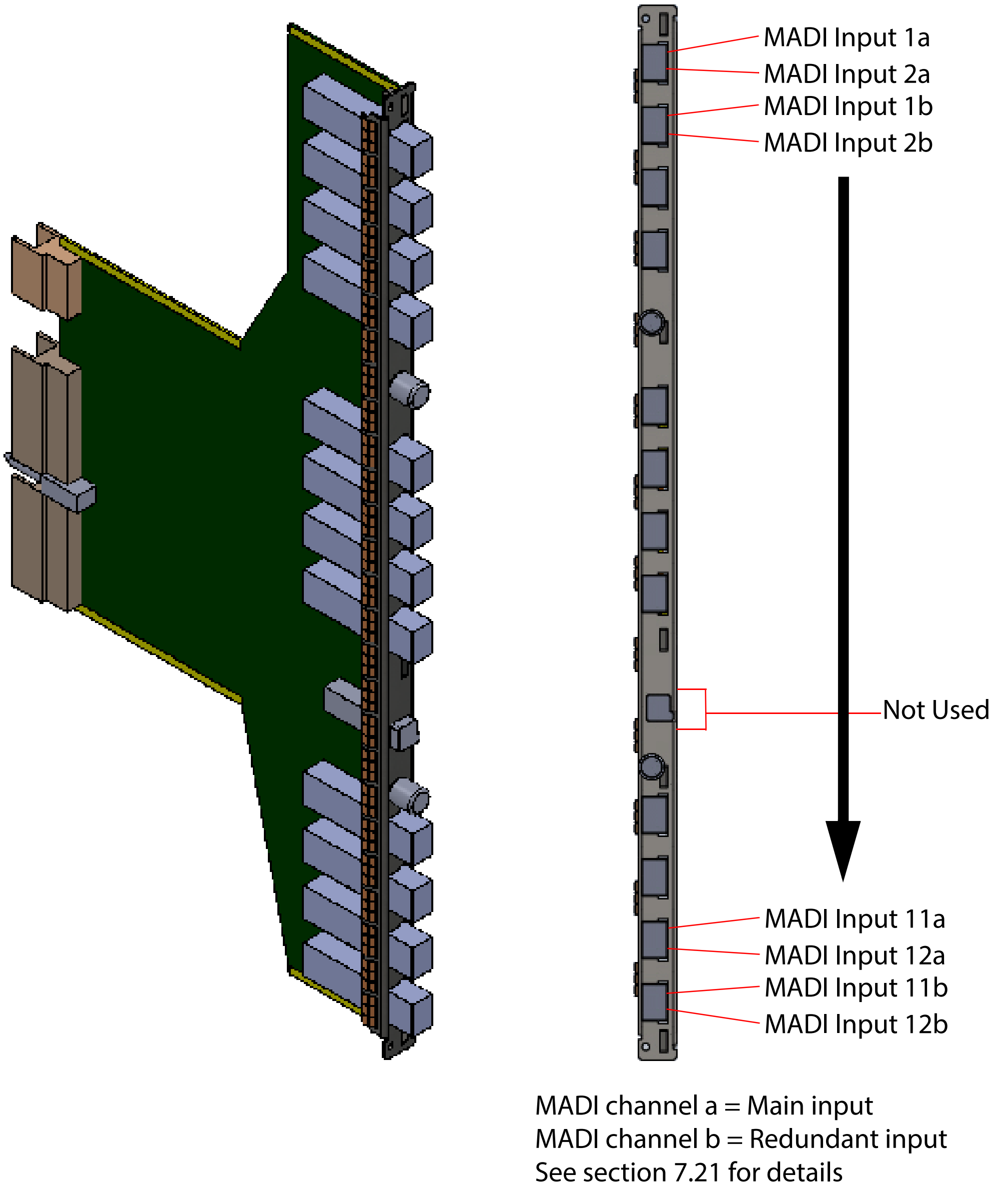


Figure 88 1304 Fiber Input Rear Panel (Sirius 830 only)

All the Fiber connectors on the 1304 rear panel have Grass Valley's unique Catsii feature that illuminates each connector. See section 4 for details of the Catsii functionality.

When ordering the router the rear panels can be specified with or without fiber SFP receiver modules. When the rear panels are ordered as spares they are supplied without Fiber SFP receiver modules and these must be ordered separately. The Grass Valley order code is shown below.

- **Fiber SFP Receiver Module**
  Order Code SRR-3
  Fiber SFP 2 channel 1260-1620nm receiver. 3G, HD, SD, MADI Capable.
  Max 12 per rear panel

7.7 Sirius 830: 1824 (40Gb/s) Video IP Input Rear

The 1824 Sirius 800 40Gb/s Video IP Input rear panel provides “Video over IP” input interface capability to the Sirius router frame (24 video input channels). It has four video IP input ports (high-performance Ethernet network ports) and two control network ports.

The 1824 rear panel works in tandem with a corresponding Video IP Input front module (*5960 Sirius 800 Video IP Input Module* on page 178). Rear interface input signals are passed internally, in the router frame, to the corresponding front module for processing.

The 1824 Video IP Input Rear Panel rear connections are:

- Four 40G (4x 10G) QSFP cages:
  (“**LINK 1A**” and “**LINK 1B**”, “**LINK 2A**” and “**LINK 2B**”.)

  These form two 12-way channels of video IP input (24 video IP inputs in total).
- Two 1G SFP cages, each fitted with one 1Gb/s Ethernet SFP module:
  (Control interfaces “**CTRL A**” and “**CTRL B**”.)

  These form two 1Gb/s Ethernet control ports.
- One Densi-Shield style connector for future audio expansion (“**PPIO**”).

Each 12-way video IP input channel can be configured either for:

- **Redundancy -** (SMPTE 2022-7 Seamless Protection Switching.)

  For example, with “LINK 1A” and “Link 1B” connected to a “Main” and a “Backup” media network respectively.
- **Maximised Network Bandwidth**

  Both “A” and “B” links used together to double the available IP network bandwidth for the video IP streams.

Note: The 1824 is *not* shipped with QSFP transceiver modules fitted as standard,
A 40Gb/s Ethernet QSFP transceiver module must be fitted to each QSFP cage.

The 1824 is shipped with SFP transceiver modules already fitted to its control Ethernet interfaces (CTRL A, CTRL B). This is summarized in Table 26.

Table 26 1824 Ethernet Port SFP/QSFP Transceiver Modules - Fitted/Not Fitted

Rear Connection	Transceiver Module	Quantity	Shipping Status
Video IP	40G QSFP	4	NOT fitted
Control	1Gb/s SFP	2	Fitted

When the rear panels are ordered as spares, they are supplied without QSFP modules, which must be ordered separately.

The Grass Valley order codes for fiber QSFP modules are shown below.

Order Code	**Description**
FGAN FCQ-40GE-LR4	40GBASE-LR4 long range QSFP for SMF
FGAN FCQ-40GE-SR	40GBASE-SR short range QSFP for MMF

Unused SFP/QSFP cages are fitted with a blank cover.
Unused fiber outputs should be covered with a dust cover.

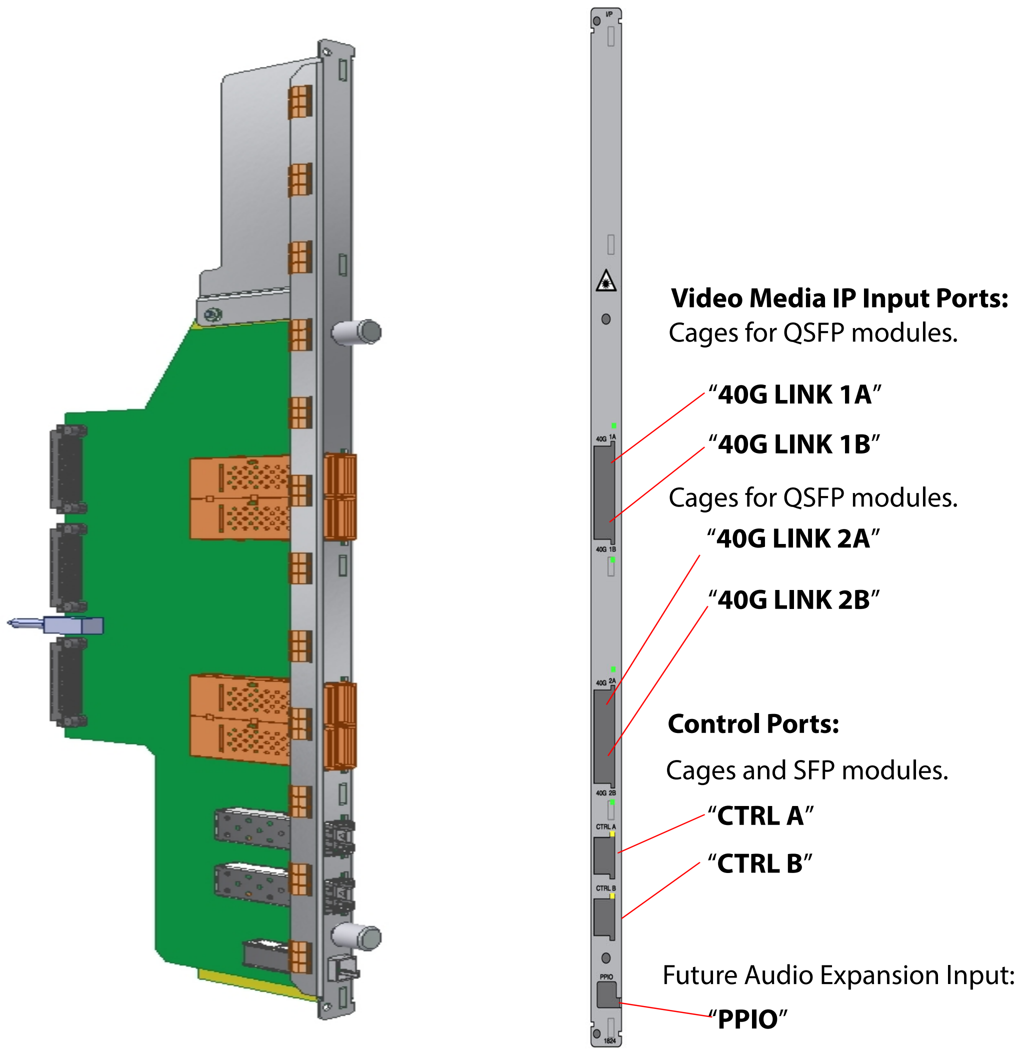


Figure 89 1824 Video IP Input (40Gb/s) Rear Panel (Sirius 830 only)

7.7.1 Rear Panel LEDs

7.7.1.1 LINK A1, LINK A2, LINK B1, LINK B2

There are two LEDs per QSFP cage, showing:

- 'Activity' (closest to the cage); and
- 'Status' (furthest from the cage).

Table 27 QSFP Link LEDs

LED	Color	Description
Activity	Off	No activity on the link.
	Cyan	Link established and in use.
Status	**Green**	OK
	Blue	Error, see **Note 1**.
	Yellow	Warning, see **Note 1**.
	Red	Comms Fail, see **Note 1**.
Note 1:	For more information about these status conditions, refer to Grass Valley customer support.	

7.7.1.2 CTRL A, CTRL B

Each ‘Control’ SFP cage has a Yellow LED (situated above the cage on the module rear) to indicate network activity.

7.7.2 Configuration

The 1824 Video IP Input rear panel and its corresponding Video IP Input front module are configured together. Please refer to *5960 Sirius 800 Video IP Input Module* on page 178 for further configuration information.

7.8 Sirius 830: 1840 12G-SDI HD-BNC Input Rear

The 1840 12G-SDI HD-BNC video input rear fits into a S830 router frame.

The rear panel has six 12G (UHD) inputs. Each 12G-SDI input signal is converted into four 3G-SDI sub-signals (four 2SI SDI sub-signals) before being passed, internally, to the corresponding input front module. Thus, internally within the router frame, 24 3G-SDI signals are passed to the input module.

The rear panel can also operate in a 6G mode (i.e. four 1.5G-SDI 2SI sub-signals are derived from each input).

Note: A 12G input is broken into four 2SI 3G-SDI sub-signals internally. The payload ID of each sub-signal is assigned a 3G ID.

A 6G input is broken into four 2SI 1.5G-SDI sub-signals internally. The payload ID of each sub-signal is assigned a 1.5G ID

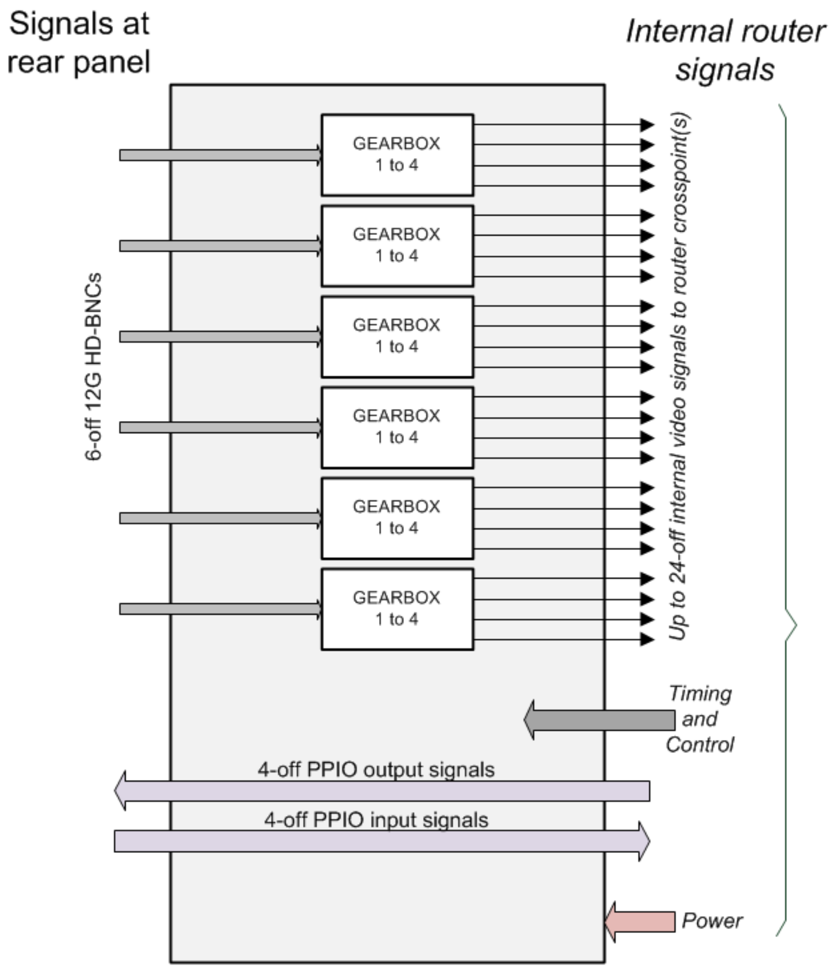


Figure 90 1840 Video 12G Input Rear Functional Block Diagram

The rear panel can also operate in 'pass-though' mode where one SDI signal is derived from each input (3G-SDI, HD-SDI, SD-SDI) and is passed on to the corresponding video input front module without any modification. The rear panel automatically configures itself according to the input signal video standard. Default operation is 12G.

Input rears automatically configure without any external software control.

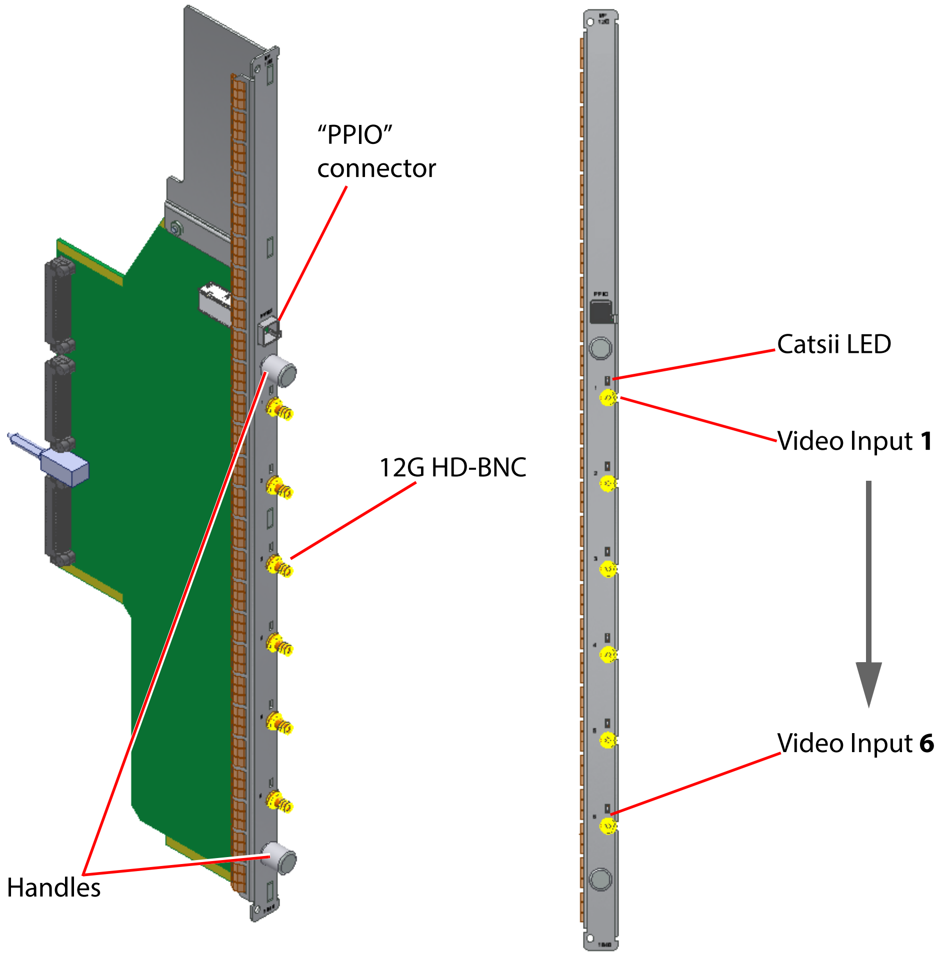


Figure 91 1840 12G-SDI HD-BNC Video Input Rear Panel (Sirius 830 only)

All the HD-BNC connectors have Grass Valley's unique ‘Catsii 2’ feature that illuminates each connector. See Section 4 *Catsii Functionality* on page 82 for details of the Catsii functionality.

The 1840 rear panels can be fitted to any Sirius 830 video input rear slot.

See Section 1.6 *Software Compatibility Matrix* on page 17 and Section 1.7 *12G SDI Rear Module Compatibility* on page 18 for information on compatibility.

7.9 Sirius 840/850: 1285 Video/MADI BNC Input Rear

The 1285 video/MADI BNC input rear panel has 24 BNC inputs.

The 1285 rear panel is used in the Sirius 840/850 with either the 4915 audio input module (12 Ch MADI) or with the 5913 video input module (24 channel video with re-clocking, no longer supplied with new systems, see Appendix C *5913/4 Sirius 840/850 Standard Video Input Module* on page 355).

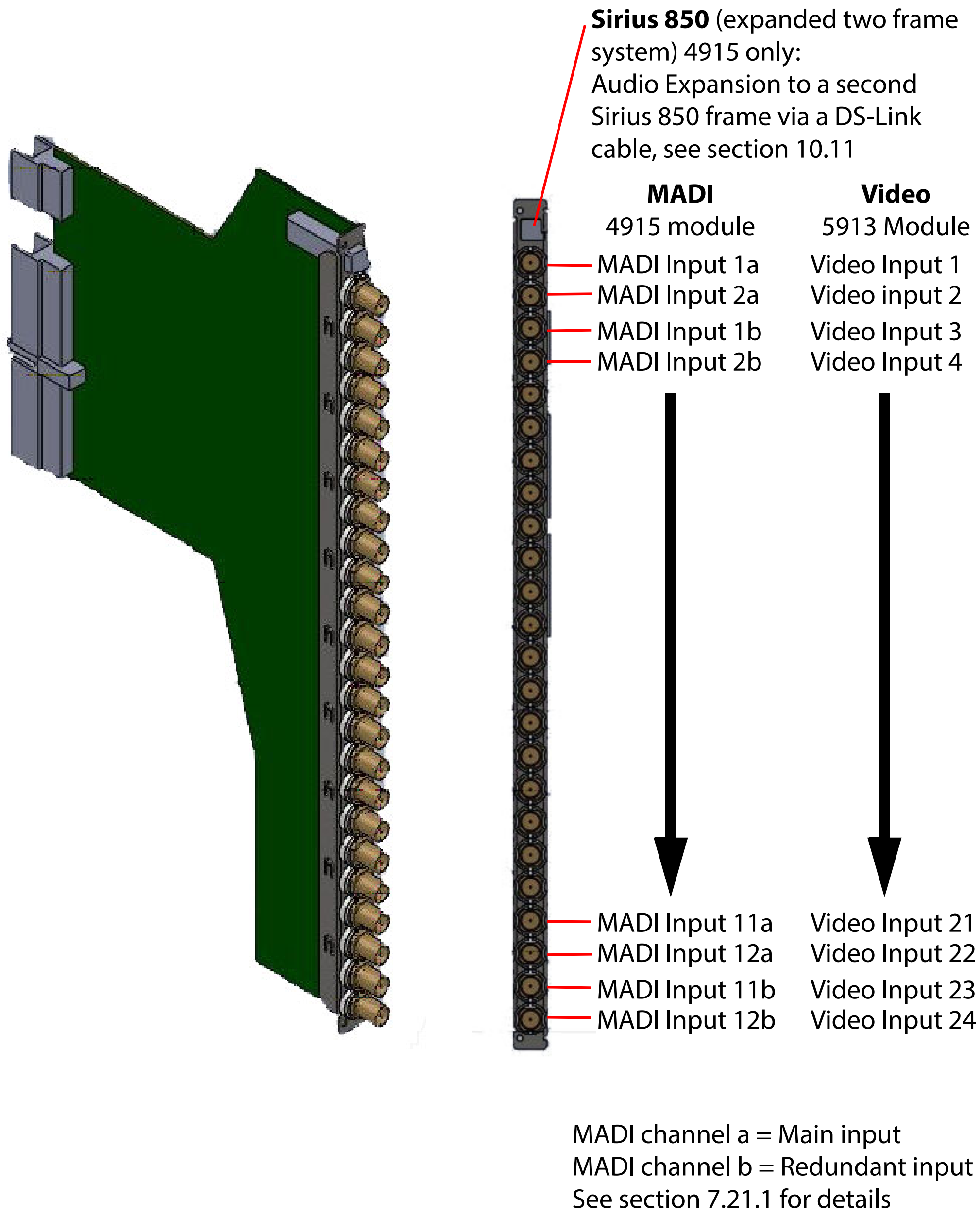


Figure 92 1285 Input BNC Rear Panel (Sirius 840/850 only)

All the BNC connectors on the 1285 rear panel have Grass Valley's unique Catsii feature that illuminates each connector. See section 4 for details of the Catsii functionality.

7.10 Sirius 840/850: 1286 Video/MADI Fiber Input Rear

The 1286 video/MADI fiber input rear panel has 12 fiber SFP cages with two inputs per fiber SFP module.

The 1286 rear panel is used in the Sirius 840/850 with either the 4915 audio input module (12 Channel MADI) or the 5914 video input module (24 channel video with re-clocking, no longer supplied with new systems, see Appendix C *5913/4 Sirius 840/850 Standard Video Input Module* on page 355).

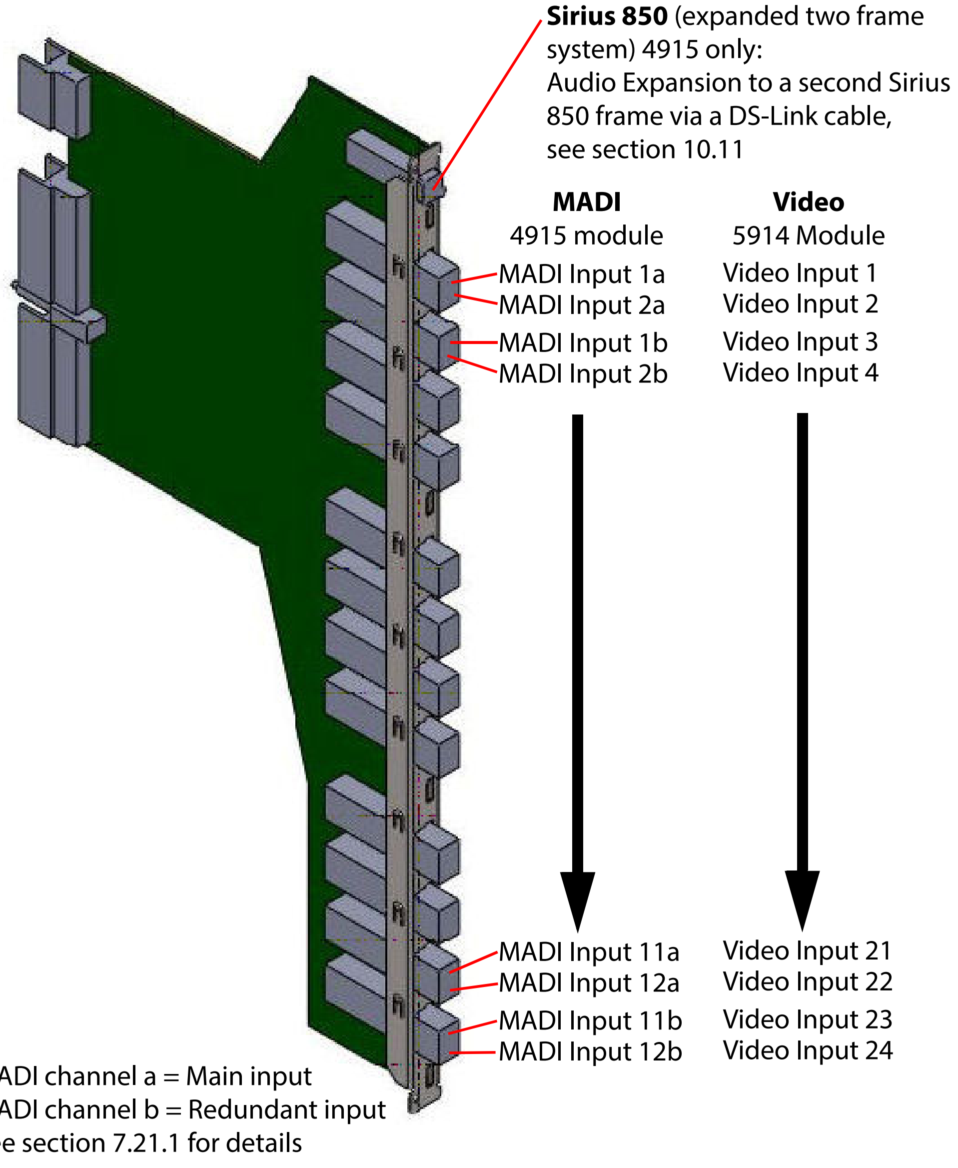


Figure 93 1286 Fiber Input Rear Panel (Sirius 840/850 only)

All the Fiber connectors on the 1286 rear panel have Grass Valley's unique Catsii feature that illuminates each connector. See section 4 for details of the Catsii functionality.

When ordering, router the rear panels can be specified with or without fiber SFP receiver modules. When rear panels are ordered as spares they are supplied without Fiber SFP receiver modules and these must be ordered separately. The Grass Valley order code is shown below.

- **Fiber SFP Receiver Module**
  Order Code SRR-3
  Fiber SFP 2 channel 1260-1620nm receiver. 3G, HD, SD, MADI Capable.
  Max 12 per rear panel

7.11 Sirius 840/850: 1349 Video BNC Input Rear

Note:
- The 1349 rear panel is compatible with and is a direct replacement for the 1289, supplied with older Sirius 800 router systems.

The 1349 video BNC input rear panels have 24 BNC inputs.

The 1349 rear panels are used in the Sirius 840/850 with the 5919/5915 video input module (24 channel video with de-embedder, re-clocking and AHP) and the 55917/5917 video input module (24 channel video with re-clocking).

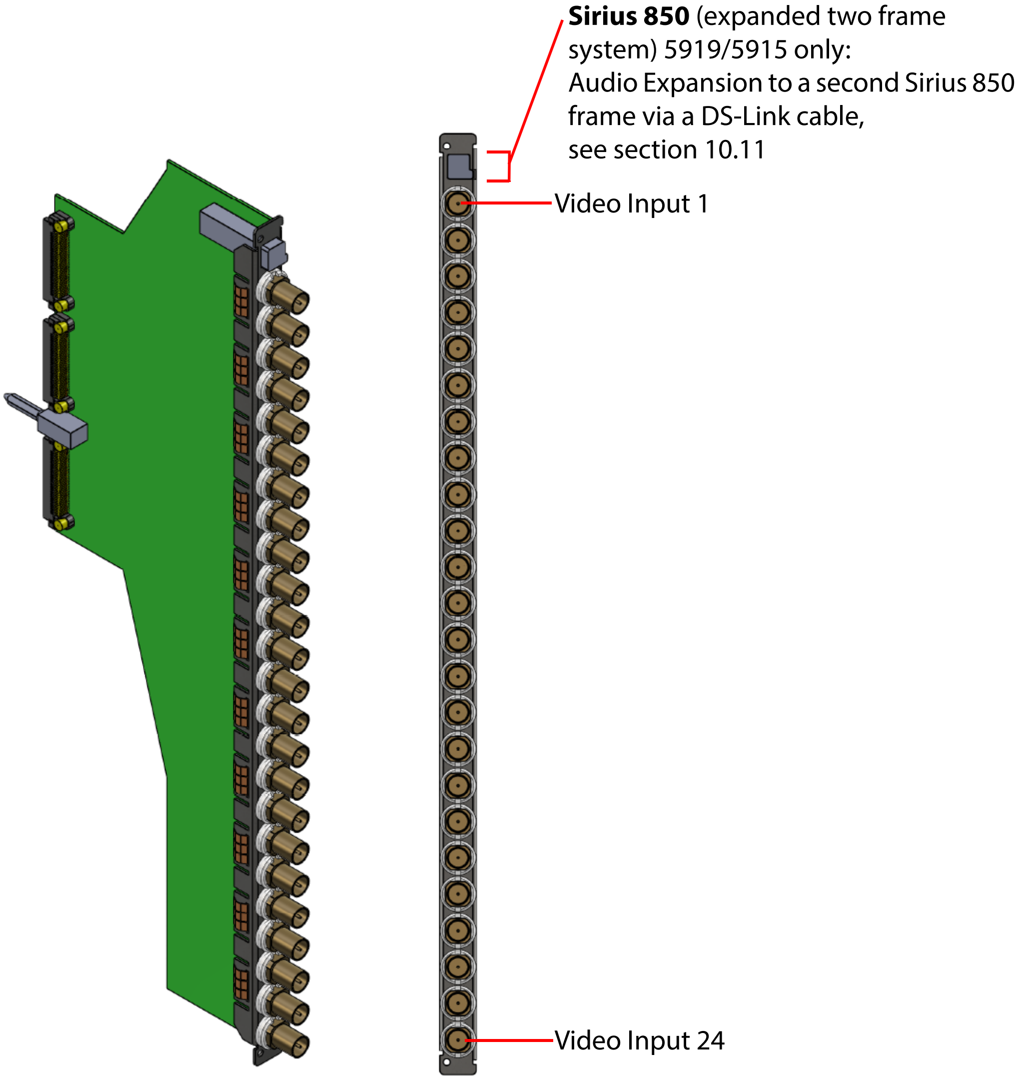


Figure 94 1349 Input BNC Rear Panel (Sirius 840/850 only)

All the BNC connectors on the 1349 rear panels have Grass Valley's unique Catsii feature that illuminates each connector. See section 4 for details of the Catsii functionality.

7.12 Sirius 840/850: 1360 Video HD BNC DS-Link Input Rear

The 1360 video HD BNC DS-Link input rear panels have 24 HD BNC inputs and 3 DS-Link copy outputs.

The 1360 rear panel is used in the Sirius 840/850 with either the 5919/5915 input module (24 channel video with de-embedder, re-clocking and AHP) or the 55917/5917 input modules (24 channel video with re-clocking).

The DS-Link connectors output copies of the HD BNC video input signals which can be used to loop-through signals to external Grass Valley IQ modular products or to expand a Sirius 850 system above 1152[2] (future enhancement).

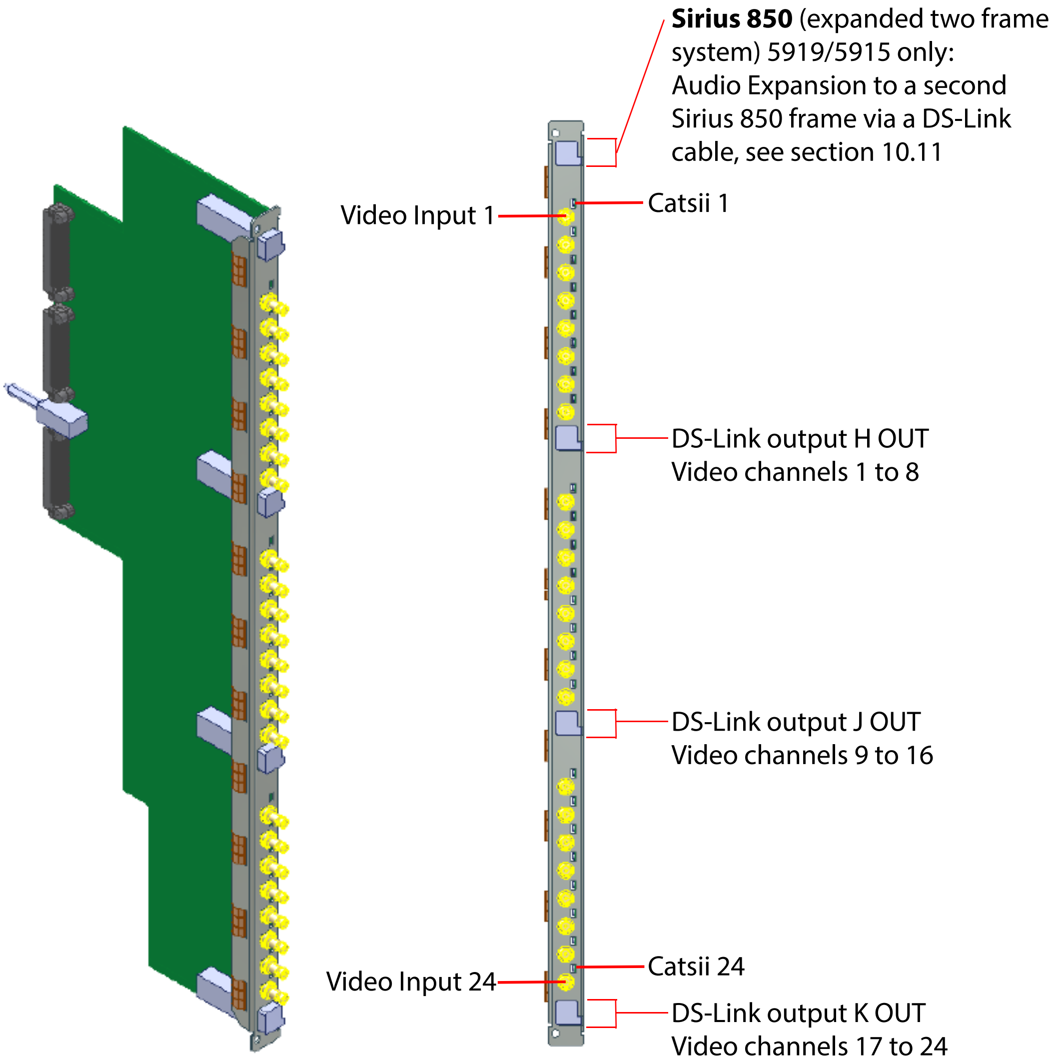


Figure 95 1360 Video Input HD BNC DS-Link Rear Panel (Sirius 840/850 only)

All the HD BNC connectors on the 1360 rear panels have Grass Valley's unique Catsii feature that illuminates above each connector. See Section 4 *Catsii Functionality* on page 82 for Catsii details.

- **DS-Link to DS-Link Cable - 6 metre**:
  Order Code FGAEY WDS6THIN
  Cable kit consists of 1 x 6 metre (19 Feet) DS-Link to DS-Link cable.

7.13 Sirius 840/850: 1305 Video Fiber Input Rear

The 1305 video fiber input rear panel has 12 fiber SFP cages with two inputs per fiber SFP module.

The 1305 rear panel is used in the Sirius 840/850 with the 5919/5915 video input module (24 channel video with de-embedder, re-clocking and AHP) and the 55917/5917 video input module
(24 channel with re-clocking).

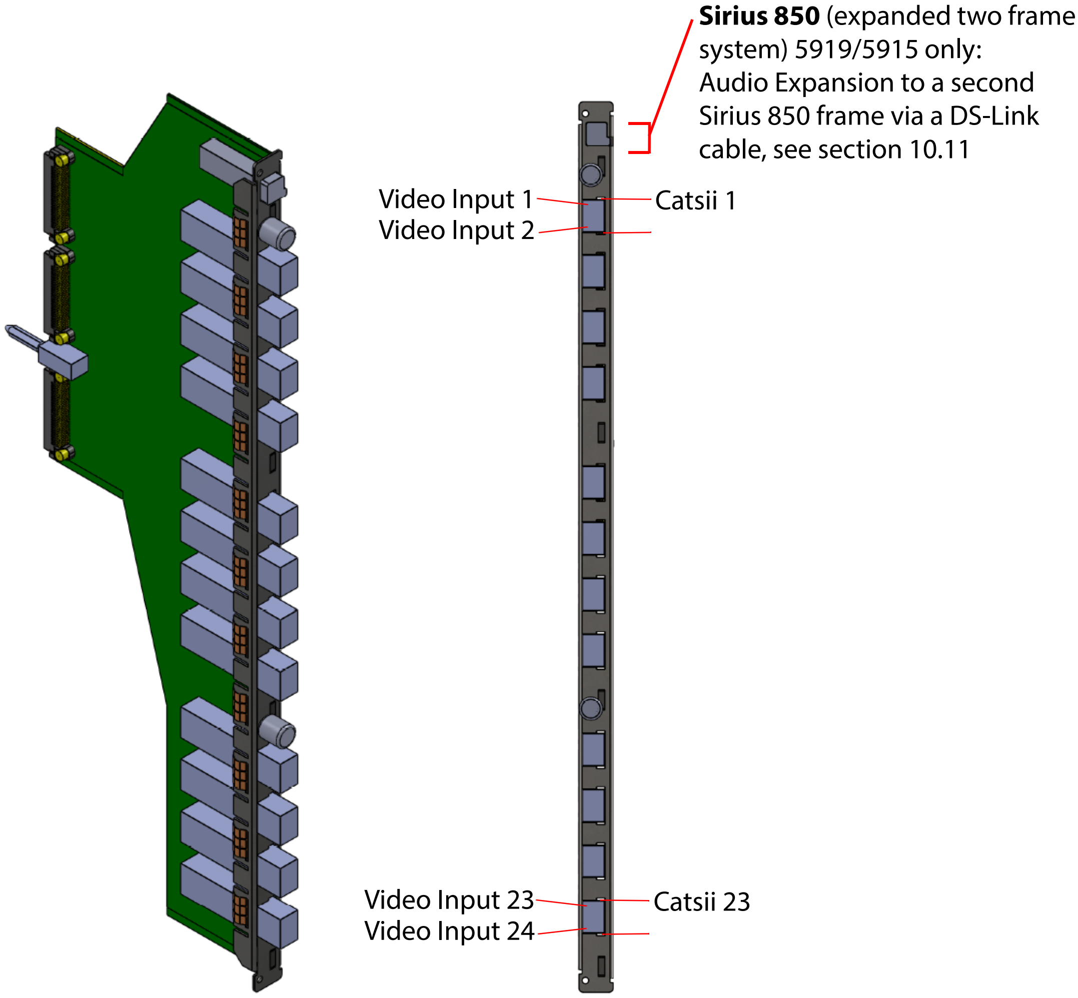


Figure 96 1305 Fiber Input Rear Panel (Sirius 840/850 only)

All the Fiber connectors on the 1305 rear panel have Grass Valley's unique Catsii feature that illuminates each connector. See section 4 for details of the Catsii functionality.

When ordering the router the rear panels can be specified with or without fiber SFP receiver modules. When the rear panels are ordered as spares they are supplied without Fiber SFP receiver modules and these must be ordered separately. The Grass Valley order code is shown below.

- **Fiber SFP Receiver Module**: Order Code SRR-3
  Fiber SFP 2 channel 1260-1620nm receiver. 3G, HD, SD, MADI Capable.
  Max 12 per rear panel

7.14 Sirius 840/850: 1361 Video Fiber DS-Link Input Rear

The 1361 video fiber DS-Link input rear panel has 12 fiber SFP cages with two inputs per fiber SFP module and 3 DS-Link copy outputs.

The 1361 rear panel is used in the Sirius 840/850 with the 5919/5915 video input module (24 channel video with de-embedder, re-clocking and AHP) and the 55917/5917 video input module (24 channel with re-clocking).

The DS-Link connectors output copies of the fiber video input signals which can be used to loop-through signals to external Grass Valley IQ modular products or to expand a Sirius 850 system above 1152^2 (future enhancement).

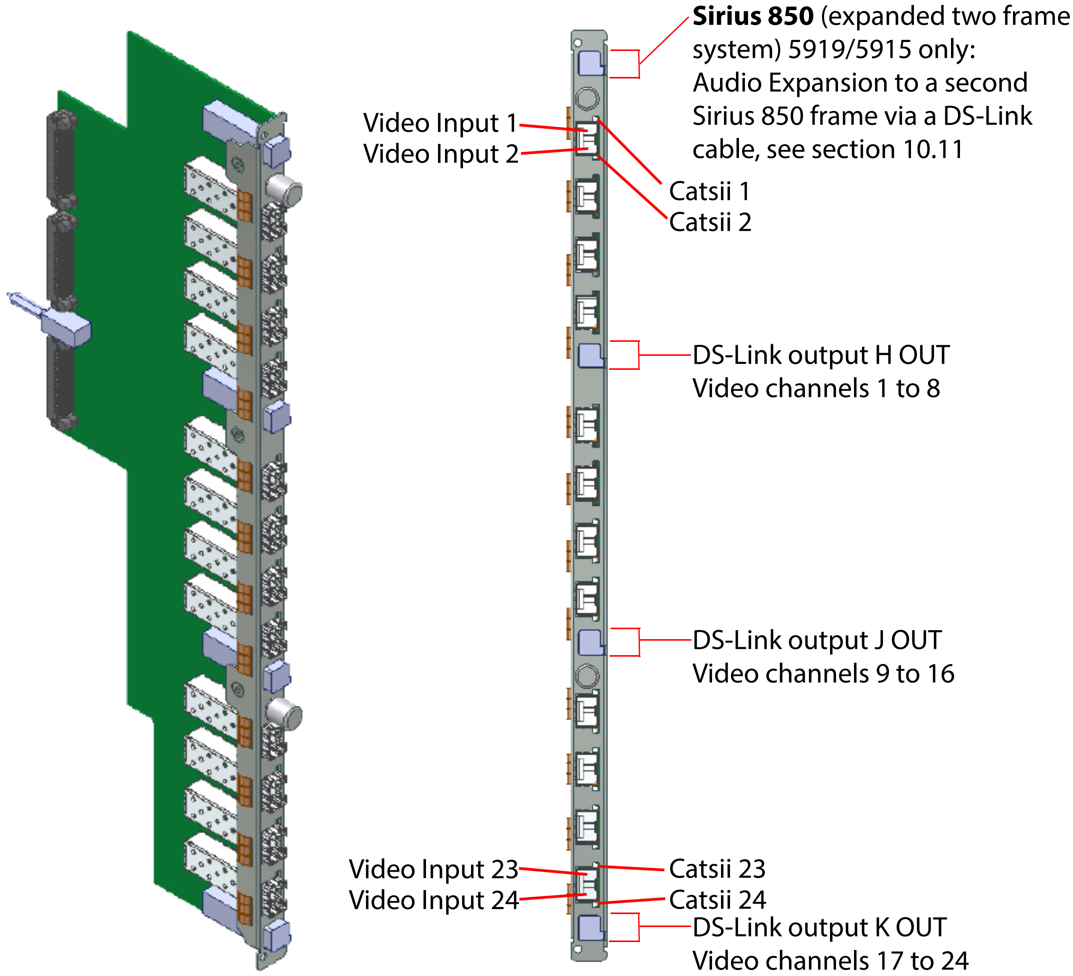


Figure 97 1361 Video Fiber DS-Link Input Rear Panel (Sirius 840/850 only)

All the Fiber connectors on the 1361 rear panel have Grass Valley's unique Catsii feature that illuminates each connector. See Section 4 *Catsii Functionality* on page 82 for Catsii details.

- **DS-Link to DS-Link Cable - 6 metre**:
  Order Code FGAEY WDS6THIN
  Cable kit consists of 1 x 6 metre (19 Feet) DS-Link to DS-Link cable.

When ordering the router the rear panels can be specified with or without fiber SFP receiver modules. When the rear panels are ordered as spares they are supplied without Fiber SFP receiver modules and these must be ordered separately. The Grass Valley order code is shown below.

- **Fiber SFP Receiver Module**: Order Code SRR-3
  Fiber SFP 2 channel 1260-1620nm receiver. 3G, HD, SD, MADI Capable.
  Max 12 per rear panel

7.15 Sirius 840/850: 1362 DS-Link In / DS-Link Out Expansion Input

1362 Video DS-Link In / DS-Link Out Expansion Input Rear Panel:

The 1362 video DS-Link in / DS-Link out expansion input rear panel has 3 DS-Link expansion inputs and 3 DS-Link expansion outputs.

The 1362 rear panel is used in the Sirius 840/850 with the 5919/5915 video input module (24 channel video with de-embedder, re-clocking and AHP) and the 55917/5917 video input module
(24 channel with re-clocking).

The DS-Link outputs are copies of the DS-Link video input signals which can be used to loop-through signals to external Grass Valley IQ modular products or to expand a Sirius 850 system above 1152^2 (future enhancement).

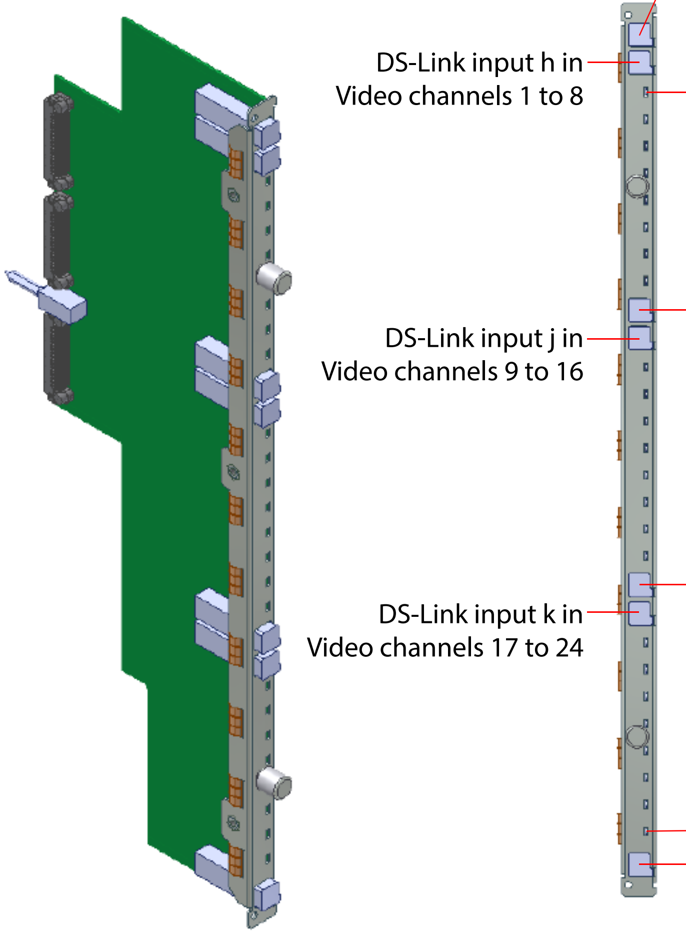


Figure 98 1361 Video Fiber DS-Link Input Rear Panel (Sirius 840/850 only)

All the signal inputs on the input rear panel have Grass Valley's unique Catsii feature. See Section 4 *Catsii Functionality* on page 82 for Catsii details.

- **DS-Link to DS-Link Cable - 6 metre**:
  Order Code FGAEY WDS6THIN
  Cable kit consists of 1 x 6 metre (19 Feet) DS-Link to DS-Link cable.

7.16 Sirius 840/850: 1825 (40Gb/s) Video IP Input Rear

The 1825 Sirius 800 40Gb/s Video IP Input rear panel provides "Video over IP" input interface capability to the Sirius router frame (24 video input channels). It has four video IP input ports (high-performance Ethernet network ports) and two control network ports.

The 1825 rear panel works in tandem with a corresponding Video IP Input front module (*5960 Sirius 800 Video IP Input Module* on page 178) and rear interface signals are passed on internally to the corresponding front module for processing.

The 1825 Video IP Input Rear Panel rear connections are:

- Four 40G (4x 10G) QSFP cages:
  ("**LINK 1A**" and "**LINK 1B**", "**LINK 2A**" and "**LINK 2B**".)

  These form two 12-way channels of video IP input (24 video IP inputs in total).
- Two 1G SFP cages, each fitted with one 1Gb/s Ethernet SFP module:
  (Control interfaces "**CTRL A**" and "**CTRL B**".)

  These form two 1Gb/s Ethernet control ports.
- One Densi-Shield style connector for future audio expansion ("**PPIO**").

Each 12-way video IP input channel can be configured either for:

- **Redundancy -** (SMPTE 2022-7 Seamless Protection Switching.)

  For example, with "LINK 1A" and "Link 1B" connected to a "Main" and a "Backup" media network respectively.
- **Maximised Network Bandwidth**

  Both "A" and "B" links used together to double the available IP network bandwidth for the video IP streams.

Note: The 1825 is not shipped with QSFP transceiver modules fitted as standard,
A 40Gb/s Ethernet QSFP transceiver module must be fitted to each QSFP cage.

The 1825 *is* shipped with SFP transceiver modules already fitted to its control Ethernet interfaces (CTRL A, CTRL B). This is summarized in Table 28.

Table 28 1825 Ethernet Port Transceiver Modules - Fitted/Not Fitted

Rear Connection	Transceiver Module	Quantity	Shipping Status
Video IP	40G QSFP	4	NOT fitted
Control	1Gb/s SFP	2	Fitted

When the rear panels are ordered as spares, they are supplied without QSFP modules, which must be ordered separately.

The Grass Valley order codes are shown below.

The Grass Valley order codes for fiber QSFP modules are shown below.

Order Code	Description
FGAN FCQ-40GE-LR4	40GBASE-LR4 long range QSFP for SMF
FGAN FCQ-40GE-SR	40GBASE-SR short range QSFP for MMF

Unused SFP/QSFP cages are fitted with a blank cover.
Unused fiber outputs should be covered with a dust cover.

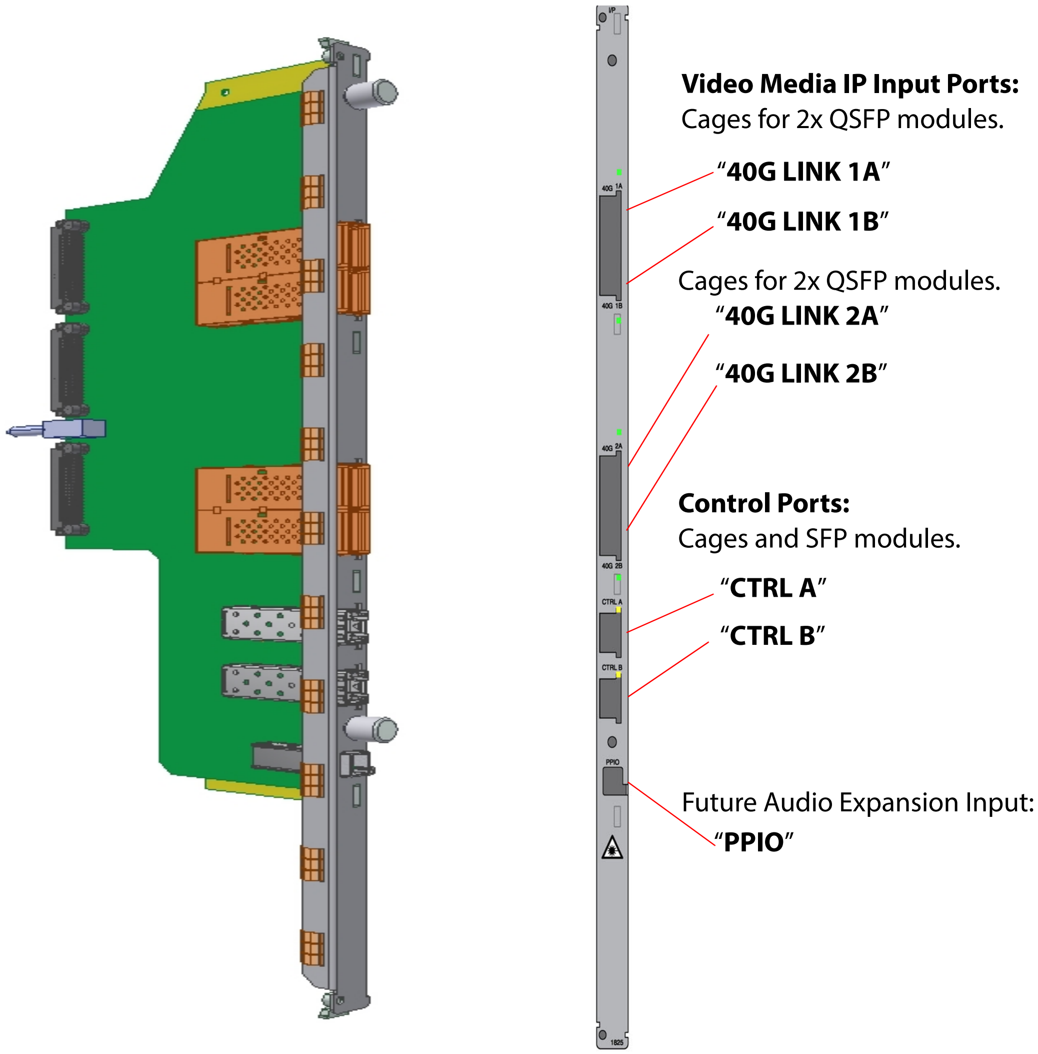


Figure 99 1825 Video IP Input (40Gb/s) Rear Panel (Sirius 840/850 only)

7.16.1 Rear Panel LEDs

7.16.1.1 LINK A1, LINK A2, LINK B1, LINK B2

There are two LEDs per QSFP cage, showing:

- 'Activity' (closest to the cage); and
- 'Status' (furthest from the cage).

Table 29 QSFP Link LEDs

LED	Color	Description
Activity	Off	No activity on the link.
	Cyan	Link established and in use.
Status	**Green**	OK
	Blue	Error, see **Note 1**.
	Yellow	Warning, see **Note 1**.
	Red	Comms Fail, see **Note 1**.
Note 1:	For more information about these status conditions, refer to Grass Valley customer support.	

7.16.1.2 CTRL A, CTRL B

Each ‘Control’ SFP cage has a Yellow LED (situated above the cage on the module rear) to indicate network activity.

7.16.2 Configuration

The 1825 Video IP Input rear panel and its corresponding Video IP Input front module are configured together. Please refer to *5960 Sirius 800 Video IP Input Module* on page 178 for further configuration information.

7.17 Sirius 840/850 1841 12G-SDI HD-BNC Input Rear

The 1841 12G-SDI HD-BNC video input rear fits into a S840 or S850 router frame.

The rear panel has six 12G (UHD) inputs. Each 12G-SDI input signal is converted into four 3G-SDI sub-signals (four 2SI SDI sub-images) before being passed, internally, to the corresponding input front module. Thus, internally within the router frame, 24 3G-SDI signals are passed to the input module.

The rear panel can also operate in a 6G mode (i.e. four 1.5G-SDI 2SI sub-signals are formed from each input).

Note: A 12G input is broken into four 2SI 3G-SDI sub-signals internally. The payload ID of each sub-signal is assigned a 3G ID.

A 6G input is broken into four 2SI 1.5G-SDI sub-signals internally. The payload ID of each sub-signal is assigned a 1.5G ID

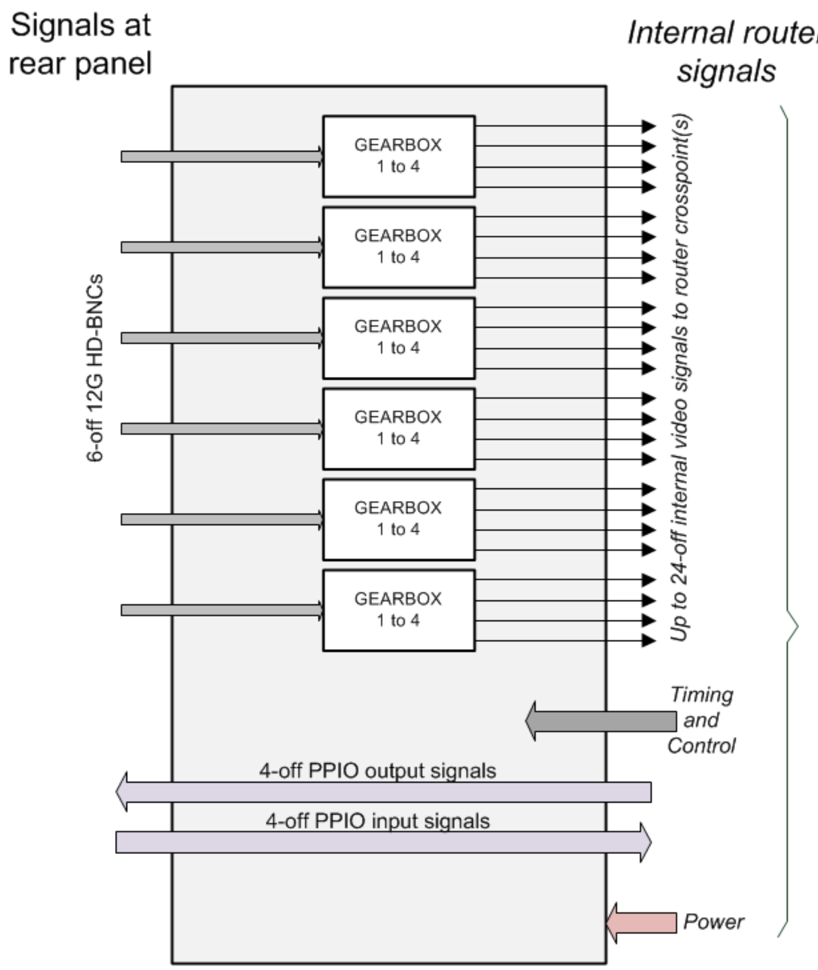


Figure 100 1841 Video 12G Input Rear Functional Block Diagram

The rear panel can also operate in 'pass-though' mode where one SDI signal is derived from each input (3G-SDI, HD-SDI, SD-SDI) and is passed on to the corresponding video input front module without any modification. The rear panel automatically configures itself according to the input signal video standard. Default operation is 12G.

Input rears automatically configure without any external software control.

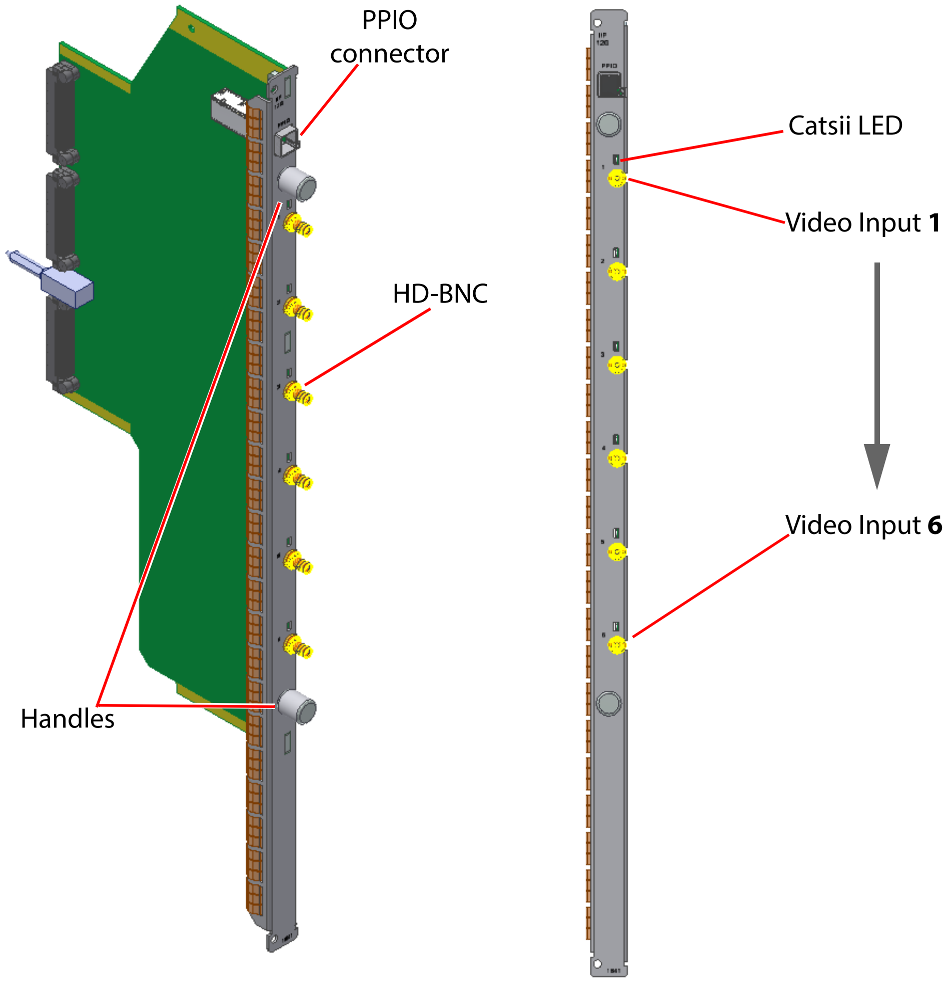


Figure 101 1841 12G-SDI HD-BNC Video Input Rear Panel (Sirius 840 and 850 only)

All the HD-BNC connectors have Grass Valley's unique 'Catsii 2' feature that illuminates each connector. See Section 4 *Catsii Functionality* on page 82 for details of the Catsii functionality.

The 1841 rear panels can be fitted to any Sirius 840/850 video input rear slot.

See Section 1.6 *Software Compatibility Matrix* on page 17 and Section 1.7 *12G SDI Rear Module Compatibility* on page 18 for information on compatibility.

7.18 Balanced AES Input Rear Panels with MADI Inputs

7.18.1 Sirius 830: 1354 Balanced AES Input Rear with MADI Inputs

The 1354 balanced AES input rear panel has 5 x 62 way female high density sockets for balanced AES audio inputs and HD BNC connectors for up to 3 MADI inputs.

Note: If unbalanced AES inputs are required see section 7.19 for details.

The 1354 rear panel is used in the Sirius 830 with the 4915 120 channel AES/MADI input module. For the wiring details for the 62 way D-Type sockets see section 7.18.3 and for details of the MADI inputs see section 7.20.

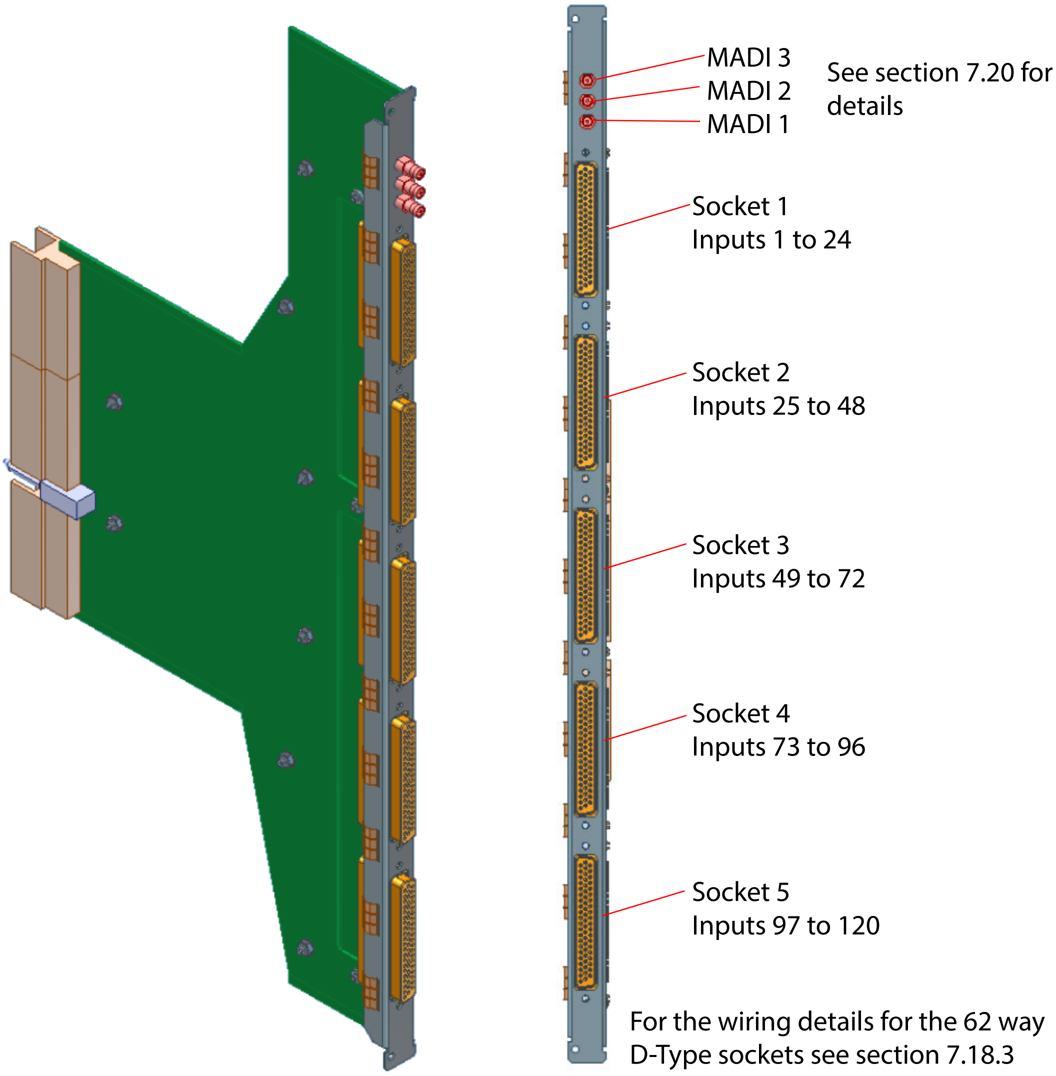


Figure 102 1354 Balanced AES Input Rear Panel (Sirius 830 only)

7.18.2 Sirius 840/850: 1352 Balanced AES Input Rear with MADI Inputs

The 1352 balanced AES input rear panel has 5 x 62 way female high density sockets for balanced AES audio inputs and HD BNC connectors for up to 3 MADI inputs.

Note: If unbalanced AES inputs are required see section 7.19.2 for details.

The 1352 rear panel is used in the Sirius 840/850 with the 4915 120 channel AES/MADI input module. For the wiring details for the 62 way D-Type sockets see section 7.18.3 and for details of the MADI inputs see section 7.20.

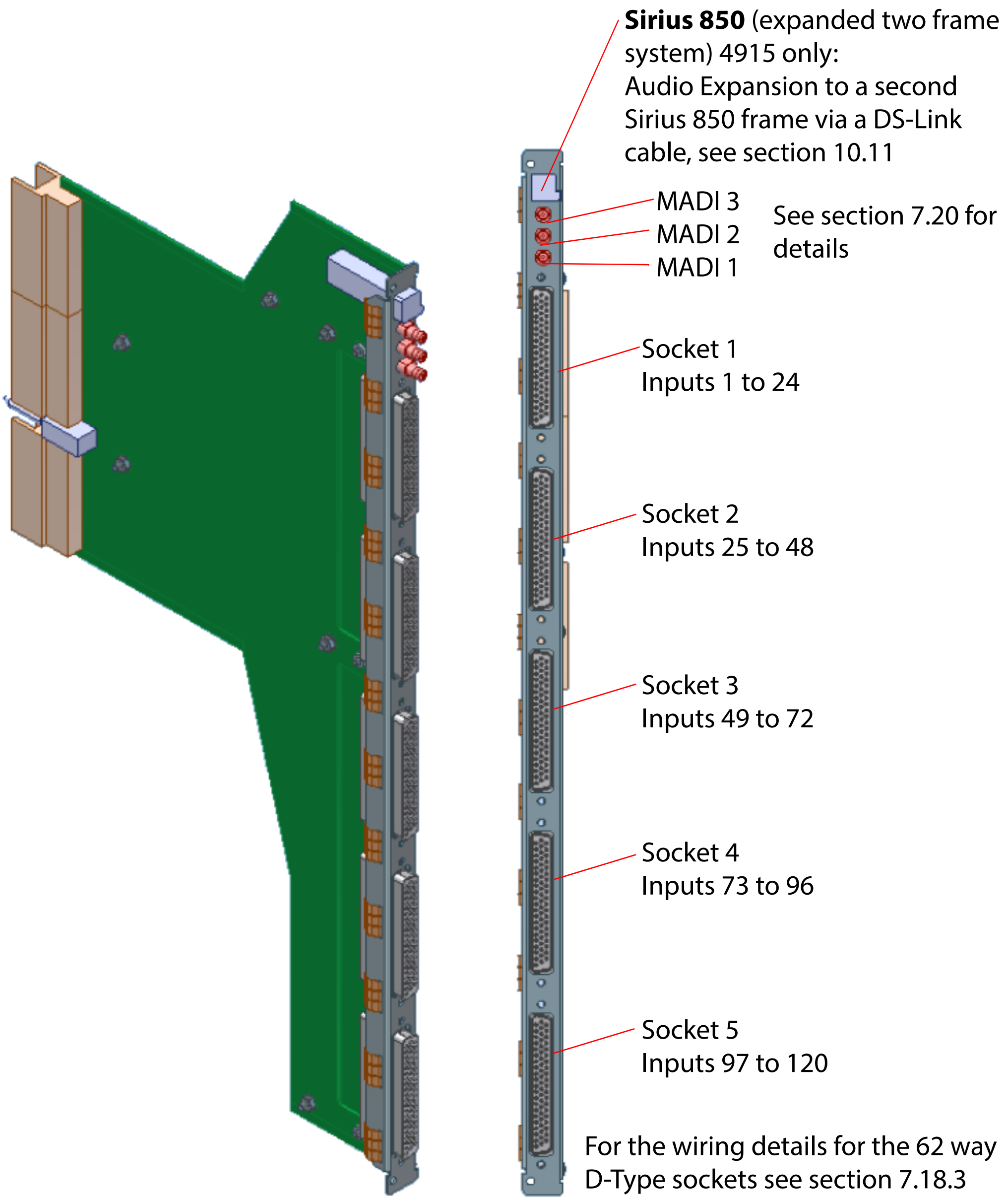


Figure 103 1352 Balanced AES Input Rear Panel (Sirius 840/850 only)

7.18.3 62 Way High Density Balanced AES Socket Pin Outs

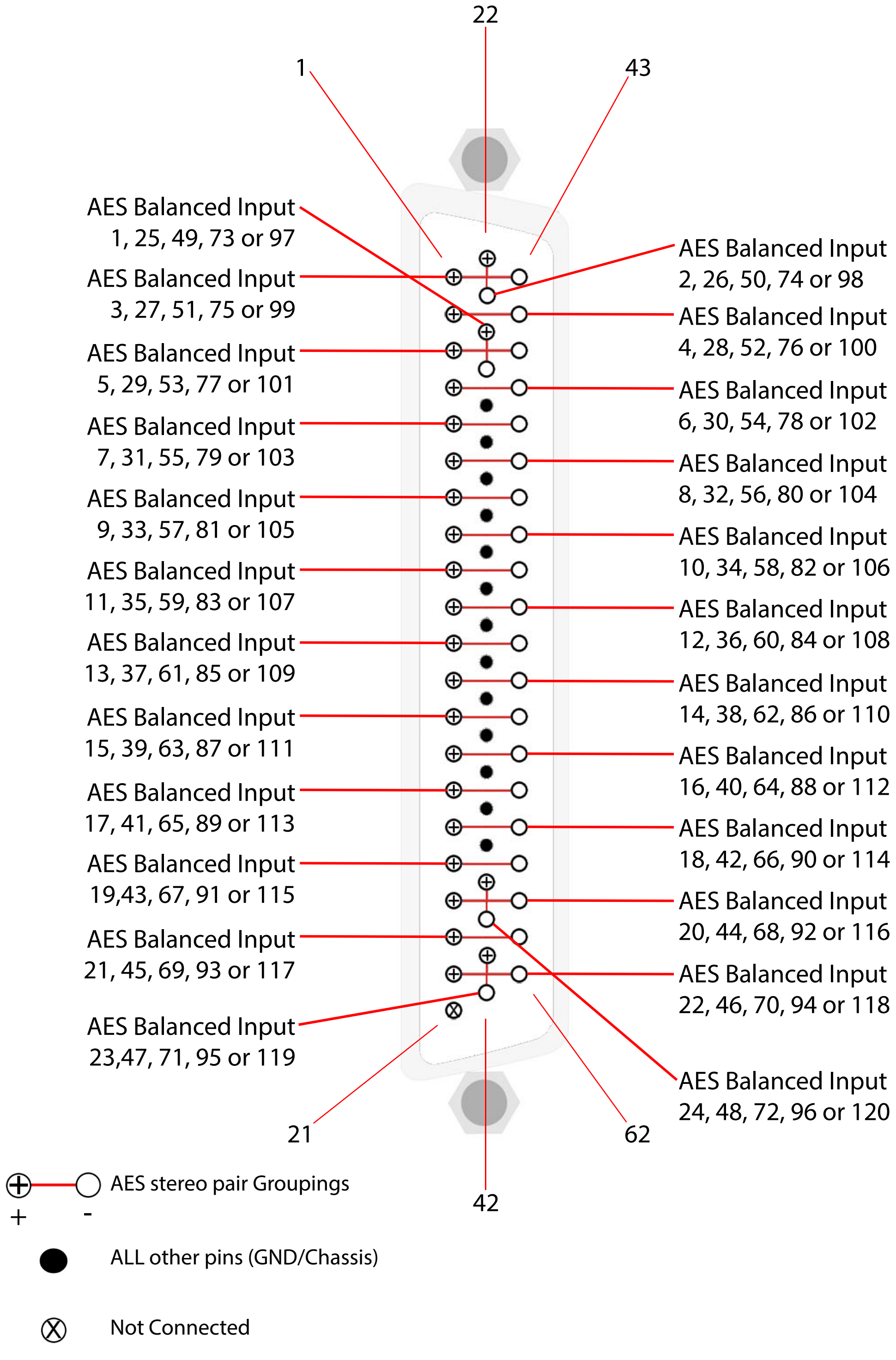


Figure 104 Balanced AES Rear Panel 62 Way High Density Socket (Viewed from the Rear of the Router)

Table 30 Balanced AES Rear Panel 62 Way High Density AES Socket Pin Outs

Pin Number	Socket 1 AES Balanced Input	Socket 2 AES Balanced Input	Socket 3 AES Balanced Input	Socket 4 AES Balanced Input	Socket 5 AES Balanced Input
24	1+	25+	49+	73+	97+
25	1-	25-	49-	73-	97-
22	2+	26+	50+	74+	98+
23	2-	26-	50-	74-	98-
1	3+	27+	51+	75+	99+
43	3-	27-	51-	75-	99-
2	4+	28+	52+	76+	100+
44	4-	28-	52-	76-	100-
3	5+	29+	53+	77+	101+
45	5-	29-	53-	77-	101-
4	6+	30+	54+	78+	102+
46	6-	30-	54-	78-	102-
5	7+	31+	55+	79+	103+
47	7-	31-	55-	79-	103-
6	8+	32+	56+	80+	104+
48	8-	32-	56-	80-	104-
7	9+	33+	57+	81+	105+
49	9-	33-	57-	81-	105-
8	10+	34+	58+	82+	106+
50	10-	34-	58-	82-	106-
9	11+	35+	59+	83+	107+
51	11-	35-	59-	83-	107-
10	12+	36+	60+	84+	108+
52	12-	36-	60-	84-	108-
11	13+	37+	61+	85+	109+
53	13-	37-	61-	85-	109-
12	14+	38+	62+	86+	110+
54	14-	38-	62-	86-	110-
13	15+	39+	63+	87+	111+
55	15-	39-	63-	87-	111-
14	16+	40+	64+	88+	112+
56	16-	40-	64-	88-	112-
15	17+	41+	65+	89+	113+
57	17-	41-	65-	89-	113-
16	18+	42+	66+	90+	114+
58	18-	42-	66-	90-	114-

Table 30 Balanced AES Rear Panel 62 Way High Density AES Socket Pin Outs (Continued)

Pin Number	Socket 1 AES Balanced Input	Socket 2 AES Balanced Input	Socket 3 AES Balanced Input	Socket 4 AES Balanced Input	Socket 5 AES Balanced Input
17	19+	43+	67+	91+	115+
59	19-	43-	67-	91-	115-
18	20+	44+	68+	92+	116+
60	20-	44-	68-	92-	116-
19	21+	45+	69+	93+	117+
61	21-	45-	69-	93-	117-
20	22+	46+	70+	94+	118+
62	22-	46-	70-	94-	118-
41	23+	47+	71+	95+	119+
42	23-	47-	71-	95-	119-
39	24+	48+	72+	96+	120+
40	24-	48-	72-	96-	120-
21	N/C	N/C	N/C	N/C	N/C
26 to 38	Signal GND	Signal GND	Signal GND	Signal GND	Signal GND

7.19 Unbalanced AES Input Rear Panels with MADI Inputs

7.19.1 Sirius 830: 1357 Unbalanced AES Input Rear with MADI Inputs

The 1357 unbalanced AES input rear panel has 5 x 62 way female high density sockets for unbalanced AES audio inputs and HD BNC connectors for up to 3 MADI inputs.

Note: If balanced AES inputs are required see section 7.18.1 for details.

The 1357 rear panel is used in the Sirius 830 with the 4915 120 channel AES/MADI input module. For the wiring details for the 62 way D-Type sockets see section 7.19.3 and for details of the MADI inputs see section 7.20.

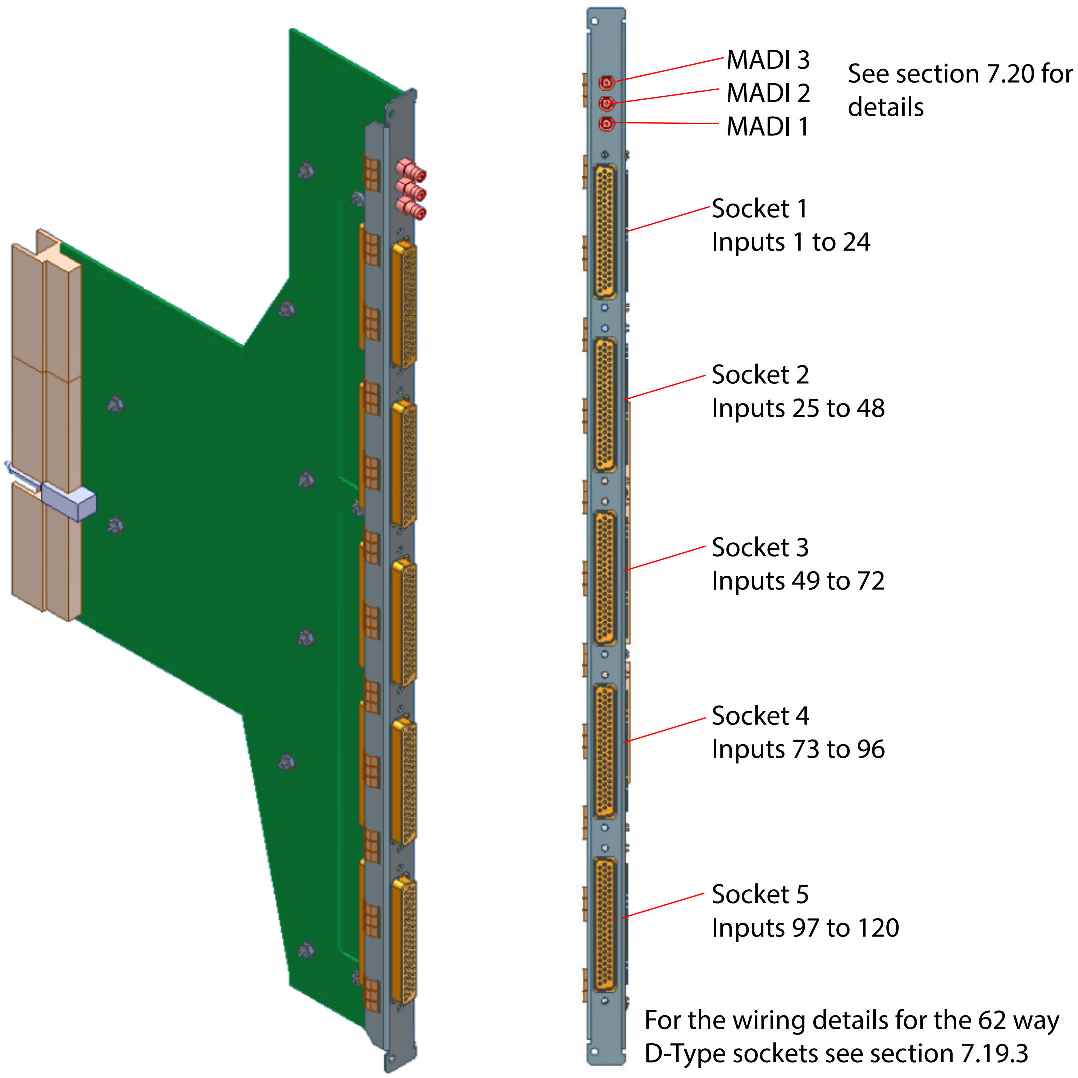


Figure 105 1357 Unbalanced AES Input Rear Panel (Sirius 830 only)

7.19.2 Sirius 840/850: 1355 Unbalanced AES Input Rear with MADI Inputs

The 1355 unbalanced AES input rear panel has 5 x 62 way female high density sockets for unbalanced AES audio inputs and HD BNC connectors for up to 3 MADI inputs.

Note: If balanced AES inputs are required see section 7.18.2 for details.

The 1355 rear panel is used in the Sirius 840/850 with the 4915 120 channel AES/MADI input module. For the wiring details for the 62 way D-Type sockets see section 7.19.3 and for details of the MADI inputs see section 7.20.

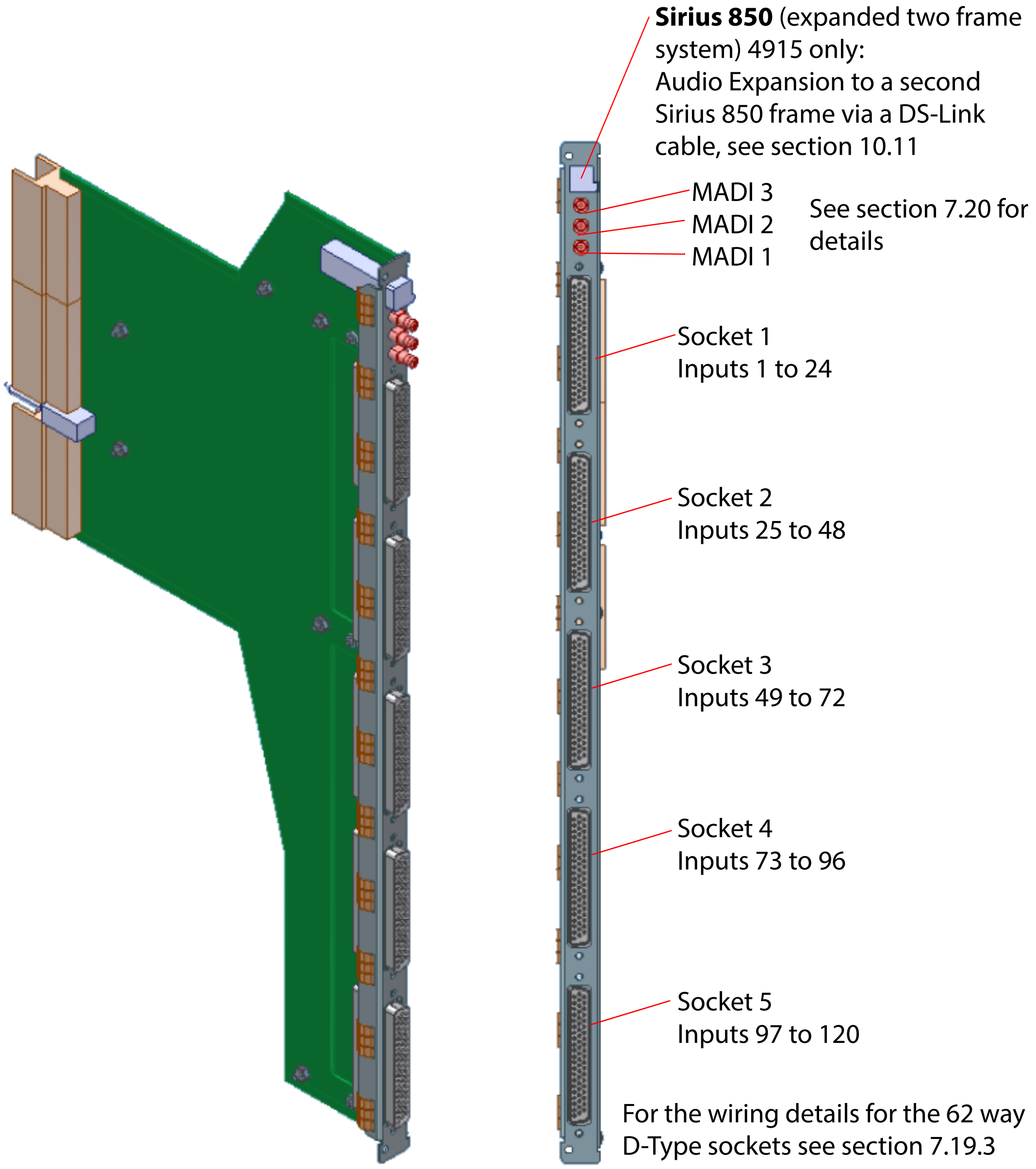


Figure 106 1355 Unbalanced AES Input Rear Panel (Sirius 840/850 only)

7.19.3 62 Way High Density Unbalanced AES Socket Pin Outs

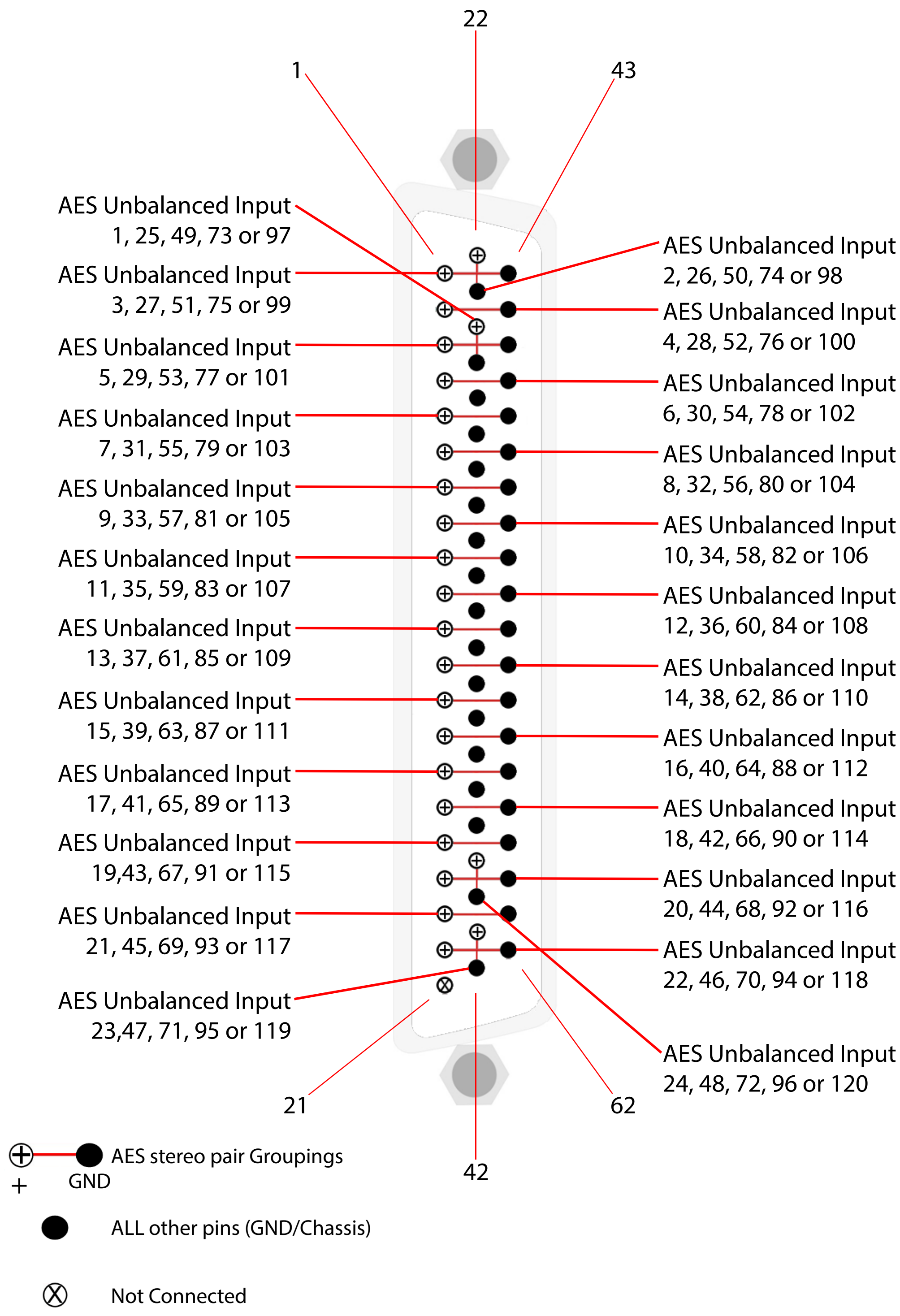


Figure 107 Unbalanced AES Rear Panel 62 Way High Density Socket (Viewed from the Rear of the Router)

Table 31 Unbalanced AES Rear Panel 62 Way High Density AES Socket Pin Outs

Pin Number	Socket 1 AES Unbalanced Input	Socket 2 AES Unbalanced Input	Socket 3 AES Unbalanced Input	Socket 4 AES Unbalanced Input	Socket 5 AES Unbalanced Input
24	1+	25+	49+	73+	97+
25	GND	GND	GND	GND	GND
22	2+	26+	50+	74+	98+
23	GND	GND	GND	GND	GND
1	3+	27+	51+	75+	99+
43	GND	GND	GND	GND	GND
2	4+	28+	52+	76+	100+
44	GND	GND	GND	GND	GND
3	5+	29+	53+	77+	101+
45	GND	GND	GND	GND	GND
4	6+	30+	54+	78+	102+
46	GND	GND	GND	GND	GND
5	7+	31+	55+	79+	103+
47	GND	GND	GND	GND	GND
6	8+	32+	56+	80+	104+
48	GND	GND	GND	GND	GND
7	9+	33+	57+	81+	105+
49	GND	GND	GND	GND	GND
8	10+	34+	58+	82+	106+
50	GND	GND	GND	GND	GND
9	11+	35+	59+	83+	107+
51	GND	GND	GND	GND	GND
10	12+	36+	60+	84+	108+
52	GND	GND	GND	GND	GND
11	13+	37+	61+	85+	109+
53	GND	GND	GND	GND	GND
12	14+	38+	62+	86+	110+
54	GND	GND	GND	GND	GND
13	15+	39+	63+	87+	111+
55	GND	GND	GND	GND	GND
14	16+	40+	64+	88+	112+
56	GND	GND	GND	GND	GND
15	17+	41+	65+	89+	113+
57	GND	GND	GND	GND	GND
16	18+	42+	66+	90+	114+
58	GND	GND	GND	GND	GND

Table 31 Unbalanced AES Rear Panel 62 Way High Density AES Socket Pin Outs (Continued)

Pin Number	Socket 1 AES Unbalanced Input	Socket 2 AES Unbalanced Input	Socket 3 AES Unbalanced Input	Socket 4 AES Unbalanced Input	Socket 5 AES Unbalanced Input
17	19+	43+	67+	91+	115+
59	GND	GND	GND	GND	GND
18	20+	44+	68+	92+	116+
60	GND	GND	GND	GND	GND
19	21+	45+	69+	93+	117+
61	GND	GND	GND	GND	GND
20	22+	46+	70+	94+	118+
62	GND	GND	GND	GND	GND
41	23+	47+	71+	95+	119+
42	GND	GND	GND	GND	GND
39	24+	48+	72+	96+	120+
40	GND	GND	GND	GND	GND
21	N/C	N/C	N/C	N/C	N/C
26 to 38	Signal GND	Signal GND	Signal GND	Signal GND	Signal GND

7.19.4 FGAEY 2502910A: Unbalanced 62 Way AES to BNC Breakout Cable

The optional breakout cable converts a single unbalanced 62 way high density AES connector to 24 unbalanced AES female BNC connectors.

The breakout cable is optional and not supplied with the AES rear panels. Five cables are required for all of the AES connectors on each AES rear panel.

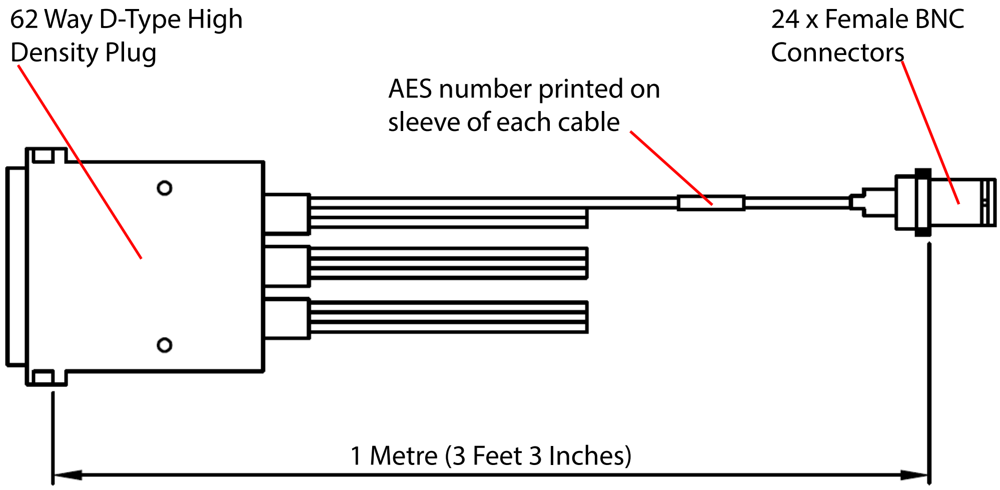


Figure 108 RMYS 2502910A Unbalanced AES Breakout Cable, 62 Way D-Type to 24 BNC Female

7.20 HD BNC MADI Input Connectors

The HD BNC connector details are the same for the balanced and unbalanced AES rear panels (see section 7.18 or 7.19 for rear panel details).

The first and last MADI Channels in the following table assume that the HD BNC breakout cables are connected to an AES rear panel located in input slot 1 of the router.

Table 32 Starting and Ending MADI Channels for Slot 1

HD BNC Plug Marking	First MADI Channel (Slot 1)	Last MADI Channel (Slot 1)
MADI 1	577	640
MADI 2	641	704
MADI 3	705	768

Use the following formula to calculate the first and last MADI channels for any other router input slot:

First MADI Channel = ((Slot Number x 768) - 768) + X
Where X = the First MADI channel for the required MADI connector

Last MADI Channel = First MADI Channel + 63

Please see the following examples to see how this works in practice.

7.20.1 Example 1:

Slot 5, MADI 1 Connector

First MADI Channel: ((5 x 768) - 768) + 577 =(3840 - 768) + 577 =3072 + 577 = 3649
First MADI Channel = 3649

Last MADI Channel: 3649 + 63 = 3712
Last MADI Channel = 3712

7.20.2 Example 2:

Slot 9, MADI 2 Connector

First MADI Channel: ((9 x 768) - 768) + 641 = (6912 - 768) + 641 =6144 + 641 = 6785
First MADI Channel = 6785

Last MADI Channel: 6785 + 63 = 6848
Last MADI Channel = 6848

7.20.3 Example 3:

Slot 12, MADI 3 Connector

First MADI Channel: ((12 x 768) - 768) + 705 = (9216 - 768) + 705 = 8448 + 705 = 9153
First MADI Channel = 9153

Last MADI Channel: 9153 + 63 = 9216
Last MADI Channel = 9216

7.21 4915 Sirius 800 AES/MADI Input Module

Important: Early Sirius 800 routers must be modified by Grass Valley before they can be used with the 4915. See section 1.14 to check if the router needs modifying.

The 4915 AES/MADI input module can accept either 120 AES inputs (balanced or unbalanced) with up to 3 MADI input channels or 12 channels of MADI inputs depending on the rear panel fitted. The 4915 Input Module is compatible with the rear panels listed in Table 33.

Table 33 4915 Rear Panel Compatibility

Rear Panel (Up to 120 AES inputs and up to 3 MADI input channels)	See Section
Sirius 830:	
1354 Balanced AES + HD BNC MADI rear panel	See section 7.18.1
1357 Unbalanced AES + HD BNC MADI rear panel	See section 7.19.1
1299 Balanced AES rear panel (no MADI) - No longer supplied	See Appendix C.1.3
Sirius 840/850:	
1352 Balanced AES + HD BNC MADI rear panel	See section 7.18.2
1355 Unbalanced AES + HD BNC MADI rear panel	See section 7.19.2
1297 Balanced AES rear panel (no MADI) - No longer supplied	See Appendix C.1.4
Up to 12 MADI input channels:	
Sirius 830:	
1303 MADI Input BNC rear panel	See section 7.5
1304 MADI Input Fiber rear panel	See section 7.6
Sirius 840/850:	
1285 MADI Input BNC rear panel	See section 7.9
1286 MADI Input Fiber rear panel	See section 7.10

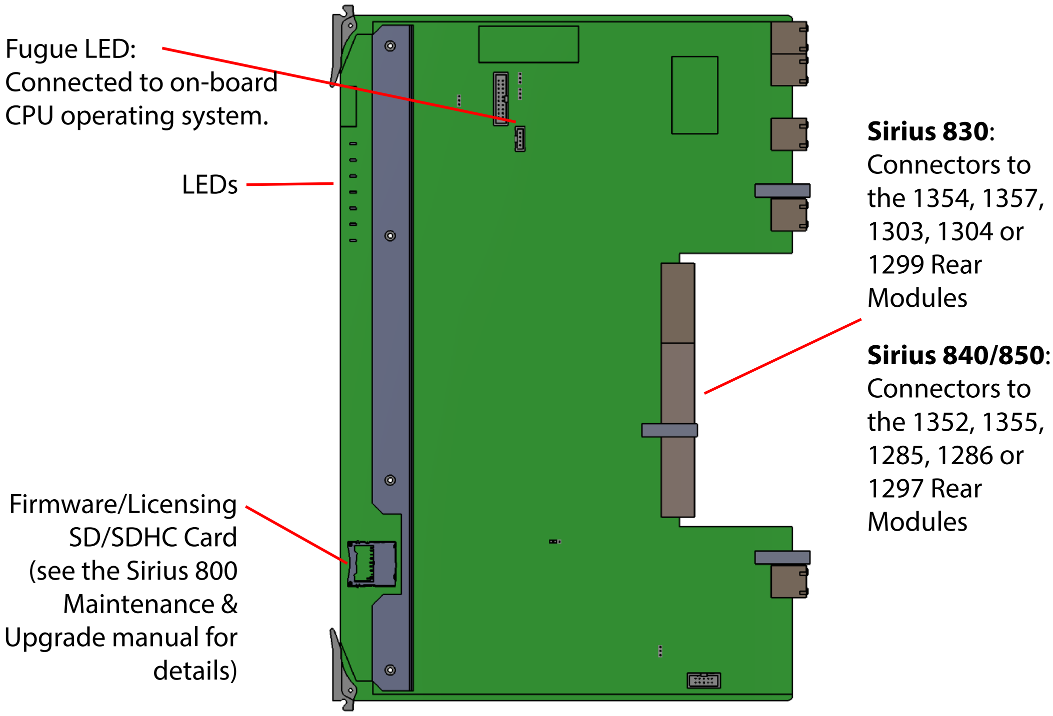


Figure 109 4915 Sirius 800 AES/MADI Input Module

Note:
- Jumpers/Headers present on the audio input module are for Grass Valley Use Only.
- In normal operation no jumper links or headers are fitted except for PL7 which has a link fitted across the two pins closest to the SD card slot.

7.21.1 MADI Main and Redundant Inputs

Each MADI rear panel has 12 main and 12 redundant MADI input connectors. If you have duplicate feeds for the MADI input channels these can be connected to the redundant MADI input connectors. The main and redundant connections are shown in the rear panel diagrams listed in Table 34

Table 34 MADI Main and Backup Connections

Rear Panel	See Figure Number
Sirius 830:	
1303 BNC rear panel	See Figure 87 on page 124.
1304 Fiber rear panel	See Figure 88 on page 125.
Sirius 840/850:	
1285 BNC rear panel	See Figure 92 on page 131.
1286 Fiber rear panel	See Figure 93 on page 132.

If a main MADI input fails the input module will automatically switch to the redundant input for that feed. Once it has switched the input module will continue to use the redundant input even if the main input is restored. If, subsequently, the redundant input fails the input module will automatically switch back to the main MADI input. If required the MADI input used can also be manually changed using Workbench or the Door screen (see section 3.3.3).

7.21.2 AES Audio Functions

- Up to 120 balanced or unbalanced AES inputs (dependent on rear panel fitted) at a nominal sample rate of 48 kHz
- Passes all input audio channels, including VU&C (Validity, User and Channel status) data to the audio crosspoint
- Passes AES audio asynchronously transparently from any input.
- Dolby E is flagged as non audio and passed transparently to the audio crosspoint
- Up to 3 MADI inputs are also available on HD BNC connectors (with correct rear panels, see section 7.20 for details)
    - Up to 64 channels of audio per MADI input
    - Each MADI input can be asynchronous

7.21.3 MADI Audio Functions

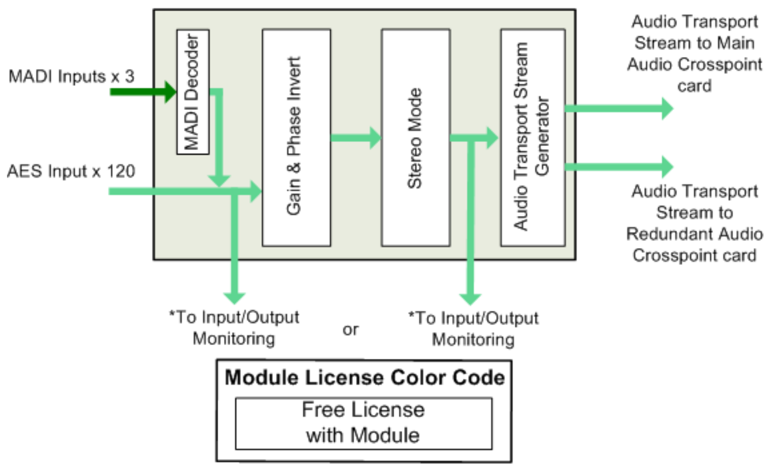
- Up to 12 MADI inputs
- 56 or 64 channels of audio per MADI input at a nominal sample rate of 48 kHz
- Maximum of 768 (12 x 64) audio channels per 4915 audio input module
- 12 redundant MADI inputs which automatically switch if a main MADI input fails
- Each MADI input can be asynchronous to others
- Passes all input audio channels, including VU&C (Validity, User and Channel status) data to the audio crosspoint
- Dolby E is flagged as non audio and passed transparently to the audio crosspoint

7.21.4 Audio Processing on the Input Module

The 4915 audio input module can manipulate the audio channels received from the input rear panels before outputting them to the audio crosspoint card. This makes it possible to customize the audio input channels to a house standard within the router.

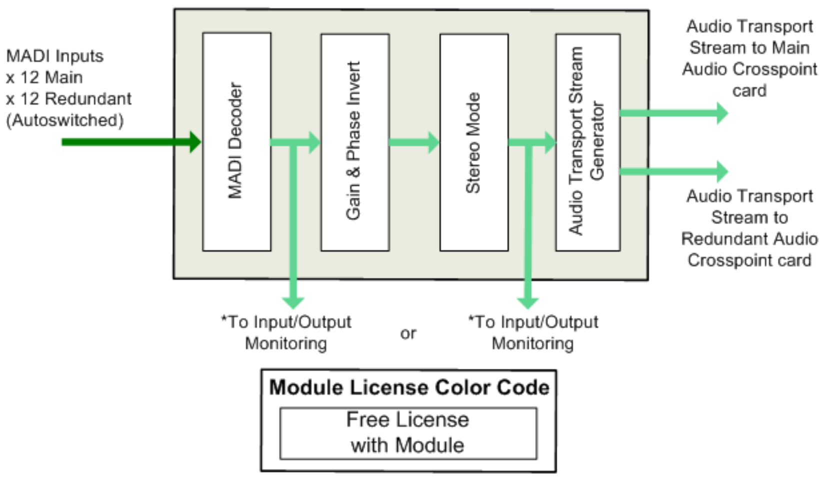
Note: The audio processing functions are gain control, phase invert and stereo mode (left/right swap, left both, right both or mono mix). The audio processing is supplied free of charge for each audio module.

Audio processing is controlled from Workbench.
Figure 110 and Figure 111 show the order that the processing is applied to the audio signals.



*Input/Output Monitoring selected from either the input or the output of the module (pre- or post-processing). See section 3.6.2 for details on how to configure this using the router Door screen.

Figure 110 Audio Channel Processing Block Diagram (AES Rear Panel)



*Input/Output Monitoring selected from either the input or the output of the module (pre- or post-processing). See section 3.6.2 for details on how to configure this using the router Door screen.

Figure 111 Audio Channel Processing Block Diagram (MADI Rear Panel)

7.21.4.1 Gain Control and Phase Invert

Gain

Gain is applied to an audio input channel as Silence (mute) or in steps of 0.1dB in a range of -72 dB to +30 dB.

Phase Invert

Phase invert will invert the audio waveform.

7.21.4.2 Stereo Mode

Stereo Mode is used to manipulate stereo pairs. Options include: Left/Right Swap, Left Both, Right Both and Mono Mix.

Left/Right Swap

Left/Right swap is used to swap the two audio channels of an AES pair over.

Left Both & Right Both

Left Both and Right Both are used to duplicate the selected channel of a stereo pair and pass the two identical output channels on in place of the original pair.

Mono Mix

Mono mix is used to mix a stereo pair together to create a single mono signal. This single mono signal is then passed to the router for each of the mixed channels.

The Mono Mix is: $\frac{A + B}{2}$

7.21.5 4915 Connections to the Audio Crosspoints

The 4915 Audio input module creates two identical multiplexed audio transport streams each of which contains all of the audio channels on the input module (up to 768 mono channels). One transport stream is sent to the main audio crosspoint module and a duplicate transport stream is sent to the redundant audio crosspoint module.

7.21.6 4915 Input Module LED Information

Table 35 shows the LED color code on the 4915 Input Module, and Figure 112 shows the front edge of the input module.

Table 35 4915 Input Module LED Information

LED Color	Label	Detail	Status
Blue/Green	Fugue Status	CPU status of on-board CPU	**Flashing sequence Green, Green, Blue** - normal operation the CPU is programmed and running **Brief Red Flash at startup** - normal **Flashing Red** - CPU Error. Remove module and refit to force a reboot.

Table 35   4915 Input Module LED Information (Continued)

LED Color	Label	Detail	Status
Red	LED R	FPGA status	**Flashing rapidly between Red & Green** (2 Hz each LED) - starting up **Green On Solid & Red Off** - normal state working correctly **Green Off & Red On Solid** - FPGA programming fault found. Remove module and refit to force a reboot. **Red & Green Flashing very rapidly in sync** (4 Hz each LED) - A change has been made to the module settings database in RAM but it has not yet been written to flash memory. This is not a fault and the flash memory will be updated after 10 seconds of no audio setting changes being made. Do not remove power from the module while this indication is present as the flash may become corrupted. Other indications are displayed when performing a firmware upgrade, see the Sirius 800 Maintenance & Upgrade manual for details.
Green	LED G		
Green	Power OK	Power to the module	**On Solid** - working correctly
Yellow	Local Command OK	Receiving messages from the local Nucleus control module (the Nucleus controller in this frame)	**Flashing** - receiving information and working correctly
Red	Local Error	Error with messages from the local Nucleus control module (the Nucleus controller in this frame)	**Off** - normal state **Flashing** - the command message from the router controller is corrupt or hasn't been received. This communications error could be caused by a hardware failure or incorrect insertion. Check that the module is inserted correctly. If the "Local Error" LED is flashing at the same time as the "Local Command OK" LED is flashing it suggests a mismatch in the configuration of the Nucleus controller. Check the controller configuration.
Yellow	Remote Command OK	Receiving messages from remote Nucleus control module (the Nucleus controller in the frame linked to this frame)	**Sirius 830/840/850 (no expansion)**: **Off** - Expansion not used. **Sirius 850 (expanded to second frame)**: **Flashing** - receiving information and working correctly

Table 35 4915 Input Module LED Information (Continued)

LED Color	Label	Detail	Status
Red	Remote Error	Error with messages from remote Nucleus control module (the Nucleus controller in the frame linked to this frame)	**Sirius 830/840/850 (no expansion)**: **Off** - Expansion not used. **Sirius 850 (expanded to second frame)**: **Off** - normal state, **Flashing** - the command message from the remote router controller is corrupt or hasn't been received. This communications error could be caused by a hardware failure or incorrect insertion. Check that the module is inserted correctly and the four RJ45 connections between the frames are fitted correctly (see section 10.2). If the "Remote Error" LED is flashing at the same time as the "Remote Command OK" LED is flashing it suggests a mismatch in the configuration of the Nucleus controller. Check the controller configuration.

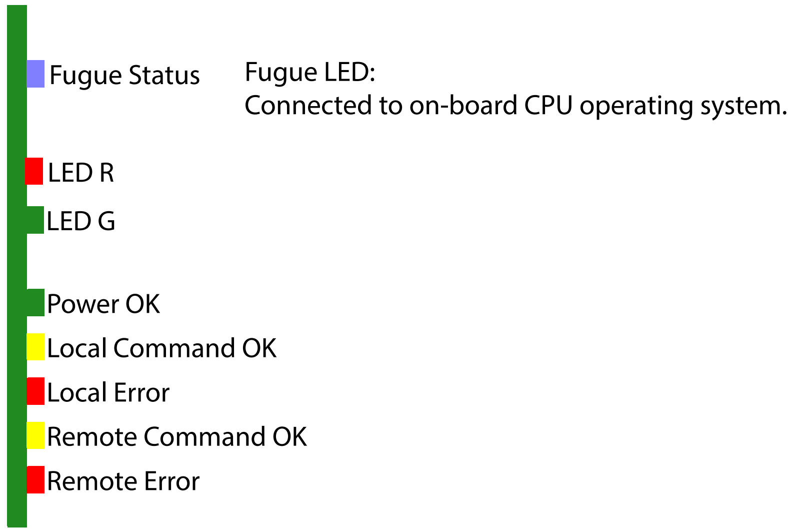


Figure 112 4915 Input Module LEDs

7.22 55917/5917 Sirius 800 Standard Video BNC/Fiber Input Module

The 55917 and 5917 standard video BNC/fiber input module has 24 input channels and can handle SD, ASI and HD signals up to 3Gb/s. (The 55917 is a form, fit and functional replacement for the 5917.)

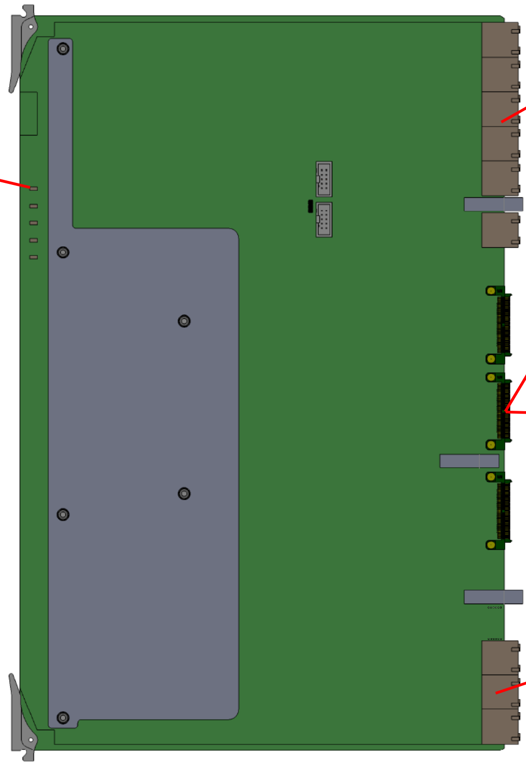


Figure 113 55917/5917 24 Channel Video Input Module with 24 Channel Re-clocking

Note:

- Jumpers and Headers are present on the video input module and these are for Grass Valley Use Only.
- In normal operation no jumper links or headers are fitted.

The 55917/5917 Input Module is compatible with the rear panels listed in Table 36

Table 36 55917/5917 Rear Panel Compatibility

Rear Panel	**See Section**
Sirius 830: 1234/1235 BNC rear panel	See section 7.1
Sirius 830: 1372 HD BNC rear panel	See section 7.2
Sirius 830: 1236 Fiber rear panel	See section 7.3
Sirius 830: 1373 Fiber rear panel	See section 7.4
Sirius 840/850: 1349/1289 BNC rear panel	See section 7.11
Sirius 840/850: 1360 HD BNC rear panel	See section 7.12
Sirius 840/850: 1305 Fiber rear panel	See section 7.13
Sirius 840/850: 1361 Fiber rear panel	See section 7.14
Sirius 840/850: 1362 DS-Link rear panel	See section 7.15

7.22.1 55917/5917 Input Module LED Information

Table 37 shows the LED color code on the 55917/5917 Input Module, and Figure 114 shows the front edge of the input module.

Table 37 55917/5917 Input Module LED Information

LED Color	Label	Detail	Normal Working Status
Green	Power OK	Power to the module	**On Solid** - working correctly
Yellow	Local Command OK	Receiving messages from local Nucleus control module (the Nucleus controller in this frame)	**Flashing** - receiving information and working correctly
Red	Local Error	Error with messages from local Nucleus control module (the Nucleus controller in this frame)	**Off** - normal state **Flashing** - the command message from the router controller is corrupt or hasn't been received. This communications error could be caused by a hardware failure or incorrect insertion. Check that the module is inserted correctly. If the "Local Error" LED is flashing at the same time as the "Local Command OK" LED is flashing it suggests a mismatch in the configuration of the Nucleus controller. Check the controller configuration.
Yellow	Remote Command OK	Receiving messages from remote Nucleus control module (the Nucleus controller in the frame linked to this frame)	**Sirius 830/840/850 (no expansion)**: **Off** - Expansion not used. **Sirius 850 (expanded to second frame)**: **Flashing** - receiving information and working correctly
Red	Remote Error	Error with messages from remote Nucleus control module (the Nucleus controller in the frame linked to this frame)	**Sirius 830/840/850 (no expansion)**: **Off** - Expansion not used. **Sirius 850 (expanded to second frame)**: **Off** - normal state, **Flashing** - the command message from the remote router controller is corrupt or hasn't been received. This communications error could be caused by a hardware failure or incorrect insertion. Check that the module is inserted correctly and the four RJ45 connections between the frames are fitted correctly (see section 10.2). If the "Remote Error" LED is flashing at the same time as the "Remote Command OK" LED is flashing it suggests a mismatch in the configuration of the Nucleus controller. Check the controller configuration.

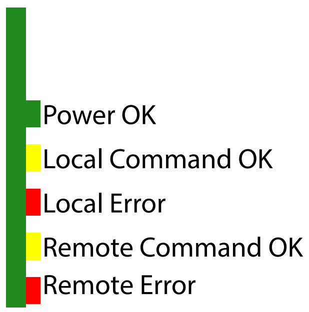


Figure 114 55917/5917 Input Module LEDs

7.23 5919 Sirius 800 Video AHP Input Module with Delay & Sync

5919 Sirius 800 Video AHP Input Module with Delay and Sync Capability:

Important: Early Sirius 800 routers must be modified by Grass Valley before they can be used with the 5919. See section 1.14 to check if the router needs modifying.

The 5919 module heat sink can get very hot during normal operation. When removing the 5919 module from a router do not touch the heat sink until it has had time to cool down.

The 5919 video AHP input module with delay and sync capability has 24 input channels and can handle SD and HD signals up to 3Gb/s. The module also accepts DVB-ASI input signals, but there is *no processing* in this case.

The audio de-embedder extracts up to 16 mono audio channels per video input channel (16 for SD and HD) giving up to 768 audio channels per 5919 input module.

The 5919 AHP video input module contains a powerful processing engine that can manipulate the individual audio channels passing through it (see section 7.23.1). The input module also contains frame/line synchronizers allowing video signals to be synchronized with router references (see section 7.23.1.1). Audio and video processing are licensed features which must be purchased for each module they are needed on, See section 1.9.1 for licensing details.

The 5919 AHP video input module is capable of input embedding. Input embedding allows any incoming audio channel (embedded, AES or MADI) to be routed via the audio crosspoint and embedded on to any incoming video signal on the 5919 module (see section 7.23.2). Input embedding is a licensed feature which must be purchased for each 5919 module, See section 1.9.1 for licensing details.

The 5919 passes all of de-embedded audio channels (incl. VU&C data) to the audio crosspoints.

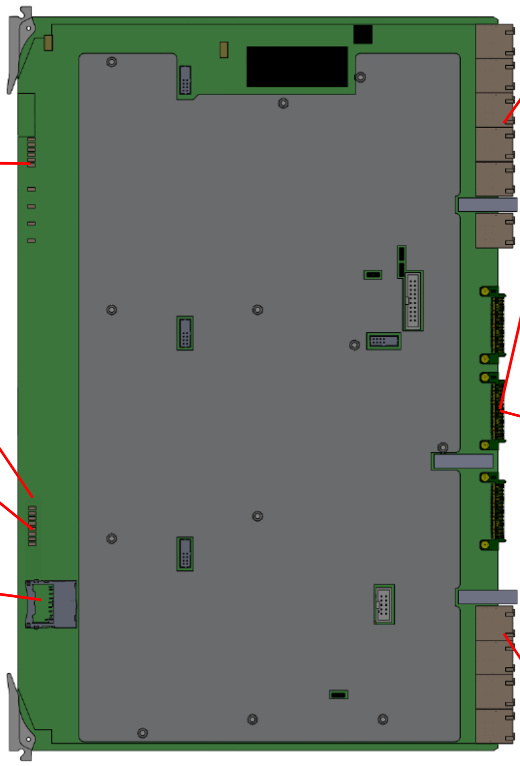


Figure 115 5919 Sirius 800 Video AHP Input Module with Delay and Sync Capability

Note:

- Jumpers/Headers on the video input module are for Grass Valley Use Only.
- In normal operation no jumper links or headers are fitted.

The 5919 input module is compatible with the rear panels listed in Table 38

Table 38 5919 Rear Panel Compatibility

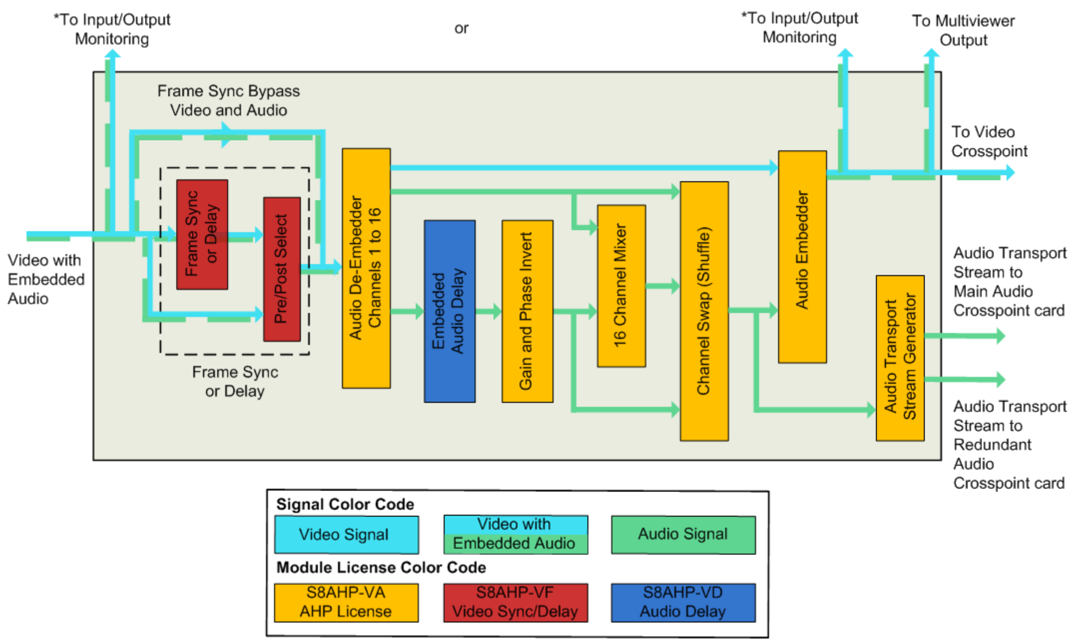
Rear Panel	See Section
Sirius 830: 1234/1235 BNC rear panel	See section 7.1
Sirius 830: 1372 HD BNC rear panel	See section 7.2
Sirius 830: 1236 Fiber rear panel	See section 7.3
Sirius 830: 1373 Fiber rear panel	See section 7.4
Sirius 840/850: 1349/1289 BNC rear panel	See section 7.11
Sirius 840/850: 1360 HD BNC rear panel	See section 7.12
Sirius 840/850: 1305 Fiber rear panel	See section 7.13
Sirius 840/850: 1361 Fiber rear panel	See section 7.14
Sirius 840/850: 1362 DS-Link rear panel	See section 7.15

7.23.1 Advanced Hybrid Processing on the 5919 Input Module

The 5919 video input module can manipulate video and audio channels received from the input rear panels before outputting them to video and audio crosspoint cards. This makes it possible to customize video and audio input channels to a house standard within the router.

Note: Video and Audio processing are licensed options and must be purchased for each module they are used on (See section 1.6 for details).

Processing is configured in Workbench. Figure 116 shows the order that the video and audio processing is applied to the signal.



*Input/Output Monitoring selected from either the input or the output of the module (pre- or post-processing). See section 3.6.2 for details on how to configure this using the router Door screen.

Figure 116 5919 Processing Block Diagram

If any embedded audio channels are asynchronous to the video signal the input module will use drop/repeat to synchronize the audio channels with the video signal.

7.23.1.1 Frame/Line Sync and Video Delay

The video processing block can be used for frame/line sync or video delay on a channel by channel basis but they cannot both be used on the same channel.

> **Note:** Video Frame Synchronization is achieved by dropping or repeating video frames when the Frame Buffer is empty or full.
>
> Selecting audio post synchronization means that when a video frame is dropped or repeated a frame of audio will also be dropped or repeated.
>
> Selecting audio pre synchronization means that when a video frame is dropped or repeated the audio will not be dropped or repeated so will no longer be associated with the original video frame resulting in lip sync mismatch.
>
> Therefore Grass Valley recommends that the synchronizers are used to re-time video in synchronous systems only.

Figure 117 Example Workbench Frame Sync/Delay Summary Screen

The video channel is selected using the dialup panel. The Frame Sync/Delay screen displays the currently detected video standard for the selected channel.

The configuration buttons at the top of the screen are used to configure the general behavior of the video channel.

The **Summary** tab displays all of the possible video standards and whether they are configured for frame sync or delay. The signal standard is auto-detected and the channel uses the settings defined in the appropriate Frame sync or Delay tab for that standard.

Table 39 Frame Sync/Delay Summary Screen

Function	Function Description
Channel Configuration (Applies to all video standards)	
Detected Standard:	Displays the detected video standard for the selected video channel.
Summary button	Click on the Summary button to return to the summary screen
Frame Sync Enabled	Check the box to enable frame/line sync on the selected video channel.
Audio Selection	Select the embedded audio from before or after the frame sync block by clicking on the required option.
Sync Function	Select to sync to frame or to line by clicking on the required option.
Summary tab (**Standard** & **Mode**) for each video input standard	
Frame Sync Indicator	Green when frame sync is enabled for the video standard. Red when frame sync is not enabled for the video standard
Delay Indicator	Green when video delay is enabled for the video standard. Red when video delay is not enabled for the video standard

Frame/Line Sync

A video output signal can set to frame or line sync to a video reference signal (physical or derived) as long as the video output signal and reference frame rates match. An offset can be applied to the input signal relative to the frame or line sync to allow for delays later in the system.

The offset for frame sync is set in frames, lines and pixels or in milliseconds. The offset for line sync is set in pixels or in milliseconds. The offset settings can be preset for each standard of video signal that might be expected to be input to the channel. Video offset is set in steps of 0.00001 ms up to a maximum of 14 frames for progressive video standards or 14 fields for interlaced video standards.

The embedded audio can be sourced from before or after the frame sync block using the Pre/Post Selector as required.

Each video standard has a tab for frame sync configuration and a tab for delay configuration. The signal standard is auto detected and the channel uses the settings defined in the appropriate Frame sync or Delay tab for that standard.

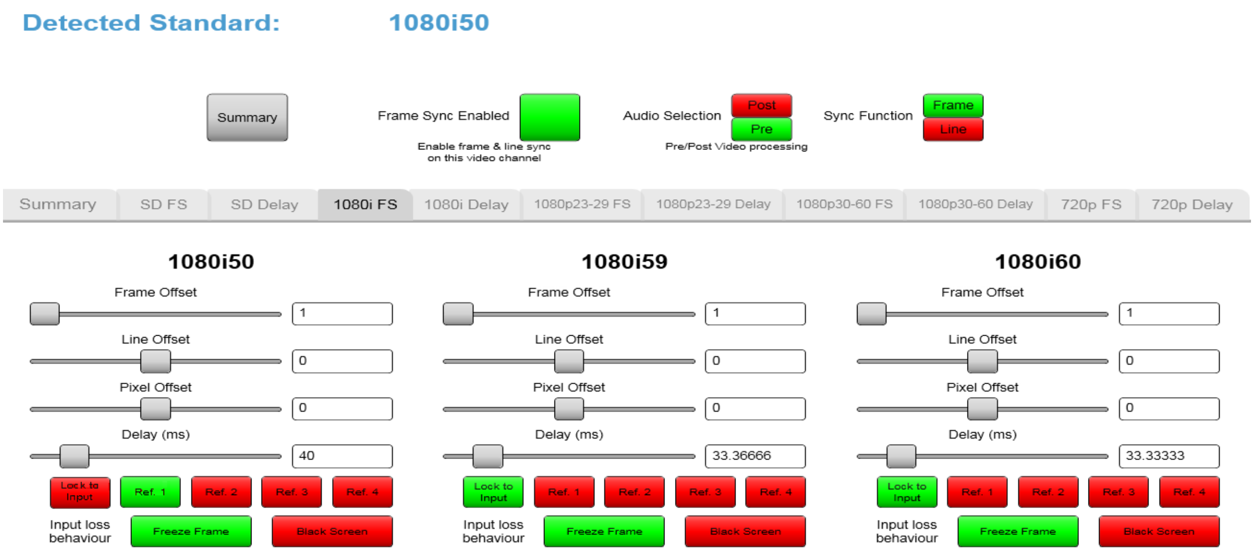


Figure 118 Example Workbench 1080i Frame Sync Settings Tab

The example in Figure 118 shows:

1080i50 - set to **Ref 1** so a 1080i50 signal will use frame sync settings in the **1080i FS** tab.

1080i59 - set to **Lock to Input** so a 1080i59 signal will use delay settings in the **1080i Delay** tab.

1080i60 - set to **Lock to Input** so a 1080i60 signal will use delay settings in the **1080i Delay** tab.

Table 40 Frame Sync Configuration

Function	Function Description
XXXX FS tab (where XXXX is the video standard, eg **1080i FS**) Video standard configuration tabs for Frame/Line Sync	
Frame Offset*	Select the number of frames of offset from the reference. Only available if **Sync Function** is selected as **Frame**. If **Line** is selected then the frame slider is not visible.
Line Offset*	Select the number of lines of offset from the reference. Only available if **Sync Function** is selected as **Frame**. If **Line** is selected then the frame slider is not visible.
Pixel Offset*	Select the number of pixels of offset from the reference.
Delay ms*	Select the offset in milliseconds from the reference.
*When setting any one of the above values the other settings will automatically changes to reflect the setting being made.	
Reference	**Lock to Input**- Select **Lock to Input** to enable video delay for the video standard. **Reference 1** to **4** - Select which video reference the signal will be synchronized to.
Input Loss behavior	**Freeze Frame** - in the event of input signal loss the last good frame is output. **Black Screen** - in the event of input signal loss a black screen is output.

Video Delay

Delay is applied to a video output channel in frames, lines, pixels or in milliseconds. Video delay is set in steps of 0.00001 ms up to a maximum of 14 frames for progressive video standards or 14 fields for interlaced video standards.

Note: To enable video delay for a particular video standard **Lock to Input** must be selected in either the delay tab or the frame sync tab of the same standard.

Each video standard has a tab for frame sync configuration and a tab for delay configuration. The signal standard is auto detected and the channel uses the settings defined in the appropriate Frame sync or Delay tab for that standard.

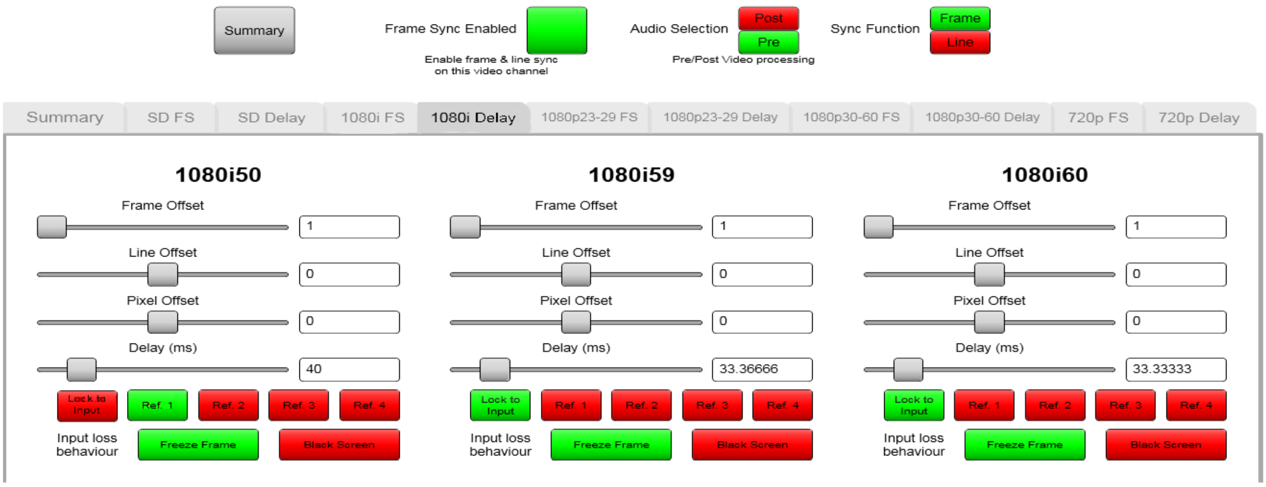


Figure 119 Example Workbench 1080i Delay Settings Screen

The example in Figure 119 shows:

1080i50 - set to **Ref 1** so a 1080i50 signal will use frame sync settings in the **1080i FS** tab.

1080i59 - set to **Lock to Input** so a 1080i59 signal will use delay settings in the **1080i Delay** tab.

1080i60 - set to **Lock to Input** so a 1080i60 signal will use delay settings in the **1080i Delay** tab.

Table 41 Video Delay Configuration

Function	Function Description
XXXX Delay tab (where XXXX is the video standard, eg **1080i Delay**) Video standard configuration tabs for Delay	
Frame Offset*	Select the number of frames of video delay. Only available if **Sync Function** is selected as **Frame**. If **Line** is selected then the frame slider is not visible.
Line Offset*	Select the number of lines of video delay. Only available if **Sync Function** is selected as **Frame**. If **Line** is selected then the frame slider is not visible.
Pixel Offset*	Select the number of pixels of video delay.
Delay ms*	Select the video delay in milliseconds.
*When setting any one of the above values the other settings will automatically change to reflect the setting being made.	
Reference	**Lock to Input**- Select **Lock to Input** to enable video delay for the video standard. **Reference 1** to **4** - Not used for Delay.
Input Loss behavior	**Freeze Frame** - in the event of input signal loss the last good frame is output. **Black Screen** - in the event of input signal loss a black screen is output.

7.23.1.2 Embedded Audio Delay

Embedded audio delay is applied to an audio input channel in steps of 0.25 ms in a range of 0 to 5.46 Seconds.

7.23.1.3 Gain Control and Phase Invert

Gain - Gain is applied to an audio input channel as Silence (mute) or in steps of 0.1dB in a range of -72 dB to +30 dB.

Phase Invert - Phase invert will invert the audio waveform.

7.23.1.4 16 Channel Mixer

There are 16 Mixers available per video input channel and each mixer can mix up to 16 channels of audio. Each 16 channel mixer is used to mix two or more audio input channels together to create a single mono signal that is output from the mixer.

The mixing process is purely additive and the gain of signals being mixed will need to be reduced to ensure the final mixed signal has the correct gain level.

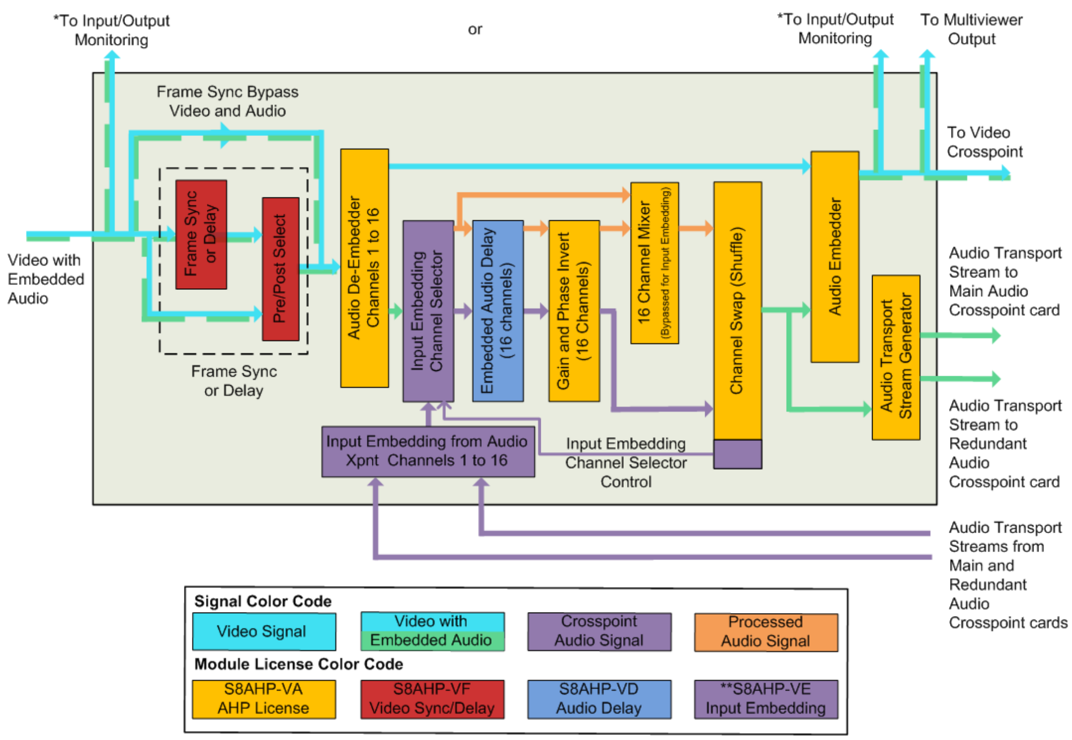
7.23.1.5 Channel Swap (Shuffle)

The channel shuffler is used to change the channel order of one or more of the audio channels.

7.23.2 Input Embedding

Input embedding enables any incoming audio channel (embedded, AES or MADI) to be routed via the audio crosspoint to an AHP video input module (5919). Input embedding works by replacing/overwriting one or more of the original source video embedded audio channels with audio channels sourced from the audio crosspoint modules.

This enables finished audio packages to be built up on the AHP video input modules which frees up inputs and outputs for other routing needs and enables non AHP video output modules to be fitted. It also eliminates looping cables and saves cost, power and space, see section 7.23.2.1 for further details.



* Input/Output Monitoring selected from either the input or the output of the module (pre- or post-processing). See section 3.6.2 for details on how to configure this using the router Door screen.

Figure 120 5919 Input Embedding Processing Block Diagram

Note:

- Input embedding requires the purchase of an S8AHP-VA (Embedded Audio Processing license) and S8AHP-VE (Input Embedding license) for each video AHP input module (5919) being used for input embedding (See section 1.6 for details).
- Input Embedding is usually added to all 5919 Sirius 800 Video AHP Input Modules in the router (as a licensed option) by an upgrade of the 5919 firmware and software. No controller upgrade is required.
- Input embedding must be enabled and configured for the Sirius 800 by Grass Valley (chargeable) before it can be used.
- Input embedding bypasses the 16 Channel Mixer block but is still available for processed audio signals (non-input embedded signals).

If the Sirius 800 is using 1 to 16 channels of audio per video:

- There are no restrictions on combinations of audio routing and embedding. The router architecture allows for 32 channels of audio per channel. Channels 1-16 will be used for outputs, channels 17-32 for input embedding.

If the Sirius 800 is using 17 to 32 channels of audio per video:

- Audio modules should not be fitted in an output slot when the equivalent input slot is used for input embedding. For example if inputs 25-48 (slot 2) are used for input embedding, outputs 25-48 (slot 2) should be standard video output module.

7.23.2.1 Why Use Input Embedding?

In a live productions and incoming line areas, there is often a need to create a "package" of video with multiple embedded audio channels.

The audio channels may be:

- Different formats (for example; stereo, AES, Dolby E, etc.)
- Audio mix of local commentary and remote ambience.
- Stereo and mono downmixes.
- Multiple languages.

Previously without Input Embedding:

The "package" would previously have been created on an output Video AHP module. A combination of signals from the embedded audio, MADI and AES audio would be routed to a video AHP output module, where the audio was embedded into the video signal. This "package" would be wrapped around the router to a video input module and from there routed to multiple video outputs.

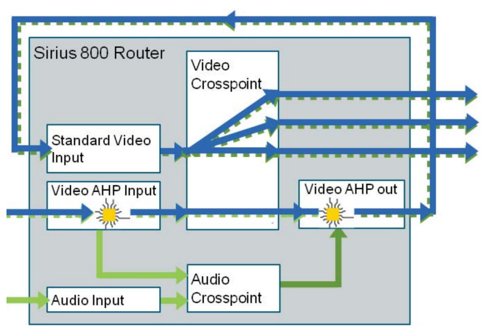


Figure 121 Creating a "Package" without Input Embedding

Input Embedding Solution:

With input embedding the same "package" is created on the video AHP input module, adding audio from any source by routing it directly to the incoming video signal.

Benefits of Input Embedding:

- No output embedder module, non AHP video output modules can be fitted
- No wrap-around cabling
- No additional video input module
- Saves cost and power
- Simplifies the system architecture

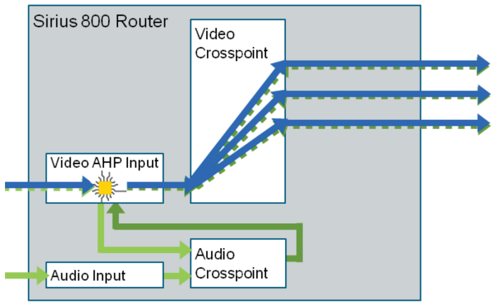


Figure 122 Creating a "Package" using Input Embedding

Input Embedding is selectable per mono channel. This allows some incoming audio channels to be preserved, and some overwritten. Incoming Embedded Audio channels that are overwritten on inputs are not available for audio routing. Incoming Audio channels can be moved to other tracks on the AHP input module.

7.23.2.2 How Input Embedding Works

Each Video input port to be used for audio embedding can be assigned up to 16 audio channels from the audio crosspoint module. The crosspoint audio channels are selected using the Input Embedding Routing screen (Figure 123).

The following simplified diagram shows how one or more of the original embedded audio channels of the video input are overwritten by the audio channels routed from the audio crosspoint.

Table 42 Simplified Input Embedding Audio Channel Operation

Incoming video, original embedded audio channels	Ch1	Ch2	Ch3	Ch4	Ch5	Ch6	Ch7	C 8	Ch9	Ch10	Ch11	Ch12	Ch13	Ch14	Ch15	Ch16
								+								
Audio channels from the Audio Crosspoint	Ch1	Ch2	Ch3	Ch4	Ch5	Ch6	Ch7	C 8	Ch9	Ch10	Ch11	Ch12	Ch13	Ch14	Ch15	Ch16
Use Audio Crosspoint channel?	Yes	Yes	Yes	Yes	No	No	Yes	Yes	No	No	No	No	No	No	No	No
								=								
The resulting Audio Package is a combination of original incoming embedded audio and audio routed from the Crosspoint	Ch1	Ch2	Ch3	Ch4	Ch5	Ch6	Ch7	C 8	Ch9	Ch10	Ch11	Ch12	Ch13	Ch14	Ch15	Ch16

Because channel positions 1 to 4 and 7 to 8 have been overwritten the original embedded audio signals on those channel positions is lost and cannot be routed to any destinations in the router.

If there are unused channel positions this can be overcome by shuffling the required original embedded channel to an unused position. Shuffling is controlled from the Video AHP Input Embedding Audio Processing screen (Figure 124).

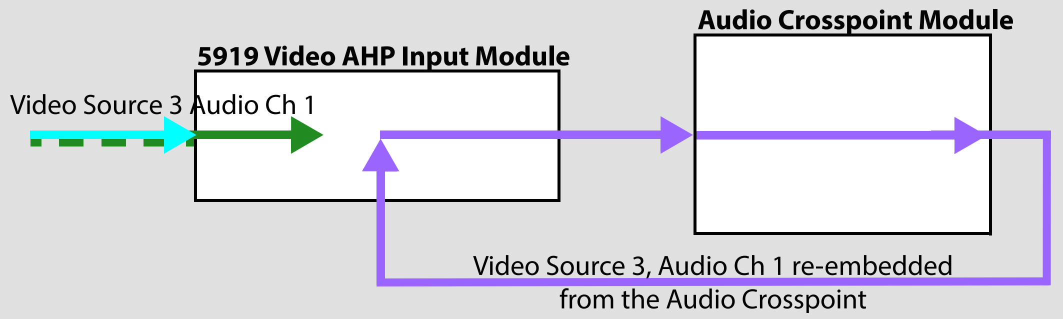
Important:

- Input embedding works by replacing/overwriting the original source video embedded audio channels with audio channels sourced from the audio crosspoint. This means these original embedded audio channel positions are lost and cannot be routed to any destinations in the router.

  There is no indication of this on the interface and the audio channel will appear to be available for routing.

- Do not input embed an audio channel from the audio crosspoint back on to itself as this will break the audio for that channel. This is because the audio signal overwrites itself resulting in a very short loop of fragmented audio which breaks that channel. See the following example:

  Example: Embedding audio channel 1 of video source 3 back on to audio channel 1 of video source 3 via the crosspoint results in a very short loop of fragmented audio which breaks the audio for channel 1.



7.23.2.3 Creating an Example Audio Package

To create the following audio package for video source 99:

Table 43 Example Audio Channel Sources

Source supplying crosspoint audio channels	Audio channels from Crosspoint to Video Source 99 Audio Channels
Video Source 2, Audio channels 5, 6, 9 and 10	1 to 4 respectively
Video Source 6, Audio channels 1 and 2	7 and 8 respectively
Video Source 99, Audio Channels 1 and 2	5 and 6 respectively
Note: as these audio channels are not from the crosspoint and are the original embedded audio channels of video source 99 they are set up from the shuffler, see section 7.23.2.4.	
-	9 to 16 (Source 99 original embedded audio)

1. Open the Workbench Input Embedding Routing screen from the Workbench Main Menu screen.

   The Input Embedding Routing screen works in a similar to the Track Routing screen and allows audio channels from multiple sources to be routed from the audio crosspoint modules for embedding into the selected AHP video input module port.

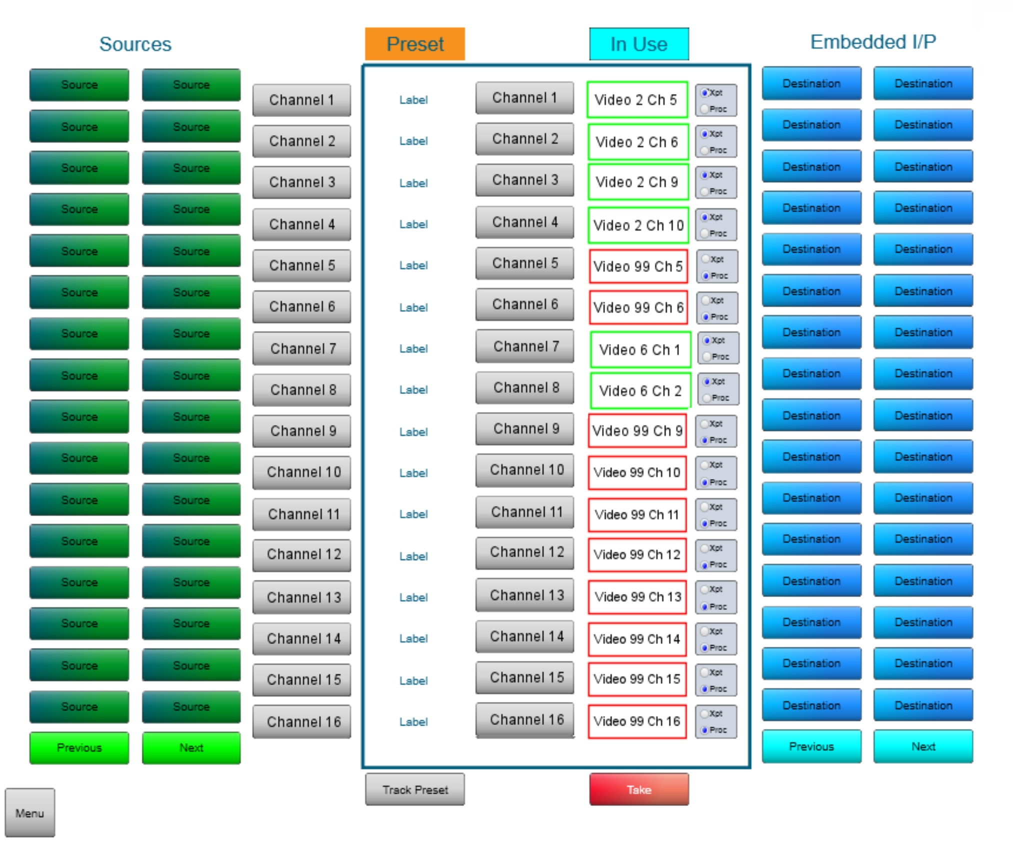


Figure 123 Creating a "Package" using the Input Embedding Routing Screen

To select the audio tracks for embedding on video source 99:

1. From the Embedded I/P column on the right of the screen click on the **Video 99** button.
2. The currently configured audio channels are displayed in the In Use column.
3. Click the **Track Preset** button once so that it goes yellow, this allows the input embedding audio tracks to be set one at a time.

Note: Clicking on the **Track Preset** changes its state in the following sequence:

- **Grey** (not selected) - Selecting a video source displays all 16 tracks in the Preset column. The Preset column is cleared when the **Take** button is clicked.
- **Yellow** (first click) - Selecting a video source leaves the Preset column empty and allows individual tracks to be selected. The Preset column is cleared when the **Take** button is clicked.
- **Yellow + Yellow frame** (second click) - Selecting a video source leaves the Preset column empty and allows individual tracks to be selected. The Preset column is not cleared when the **Take** button is clicked.
- Clicking on the **Track Preset** button a third time cycles the button state back to Grey.

4. From the Sources column on the left of the screen click on the **Video Source 2** button.
   a Click on the **Channel 1** button in the **Preset** column.
   b Click on the **Channel 5** button in the column between the Source and Preset columns to direct audio channel 5 to audio channel 1 of video source 99.
   c Click on the **Channel 2** button in the Preset column.

d Click on the **Channel 6** button in the column between the Source and Preset columns to direct audio channel 6 to audio channel 2 of video source 99.

e Repeat to direct audio channels 9 and 10 to audio channels 3 and 4 of video source 99.

5. Click on the **Video Source 6** button.

a Click on the **Channel 7** button in the Preset column.

b Click on the **Channel 1** button between the Source and Preset columns to direct audio channel 1 to audio channel 7 of video source 99.

c Repeat to direct audio channel 2 to audio channel 8 of video source 99.

6. Any channels that are not changed will keep their previously set routes.
7. Click on the **Take** button to enter the audio package settings.
8. Click on the **Xpt** radio button for channels 1 to 4 and 7 to 8 to set the default audio path. The path will change instantly as each radio button is selected.
These selections can be changed later in the Video AHP Input Audio Processing screen if required.

   A green frame around the In Use channel indicates Xpt is selected for that channel.
9. Select the Proc radio button for channels 5, 6 and 9 to 16 so they use the original embedded audio of video source 99. The path will change instantly as each radio button is selected.
These selections can be changed later in the Video AHP Input Audio Processing screen if required.

   A red frame around the In Use channel indicates Proc is selected for that channel.
10. The package has now been configured for video source 99 and can be modified from the Video AHP Input Audio Processing screen (see section 7.23.2.4).
11. Click on the menu button to return to the Main Menu screen.

7.23.2.4 Using Input Embedding and AHP

Once a video source input embedding routing has been setup (see section 7.23.2.2) the audio channels can be controlled and audio processing can be carried out using the Input Embedding control screen.

1. Click on the **Video AHP Input Embedding Audio Processing** button from the Workbench Main Menu screen.
2. The Input Embedding Control screen AHP settings work in the same way as a normal Workbench AHP screen, see the Workbench user manual for details.
3. Dial up video source 99 in the usual way.
4. The shuffle settings reflect any **Xpt** and **Proc** radio button selections made in Video Input Embedding Routing screen.
5. Each channel can be selected as one of the following options:
   - **Crosspoint** - selects the channel configured in the Input Embedding Routing screen (see section 7.23.2.2).
In this mode the 16 channel mixer is bypassed.
   - **Processed** - selects the original embedded audio channel and any processing applied to it.
   - **Mixer** - allows mixing of pre and post processing embedded audio. Crosspoint audio is not supported by the mixer.
   - **Silence** - bypasses all of the processing modules and outputs silence on the audio channel.

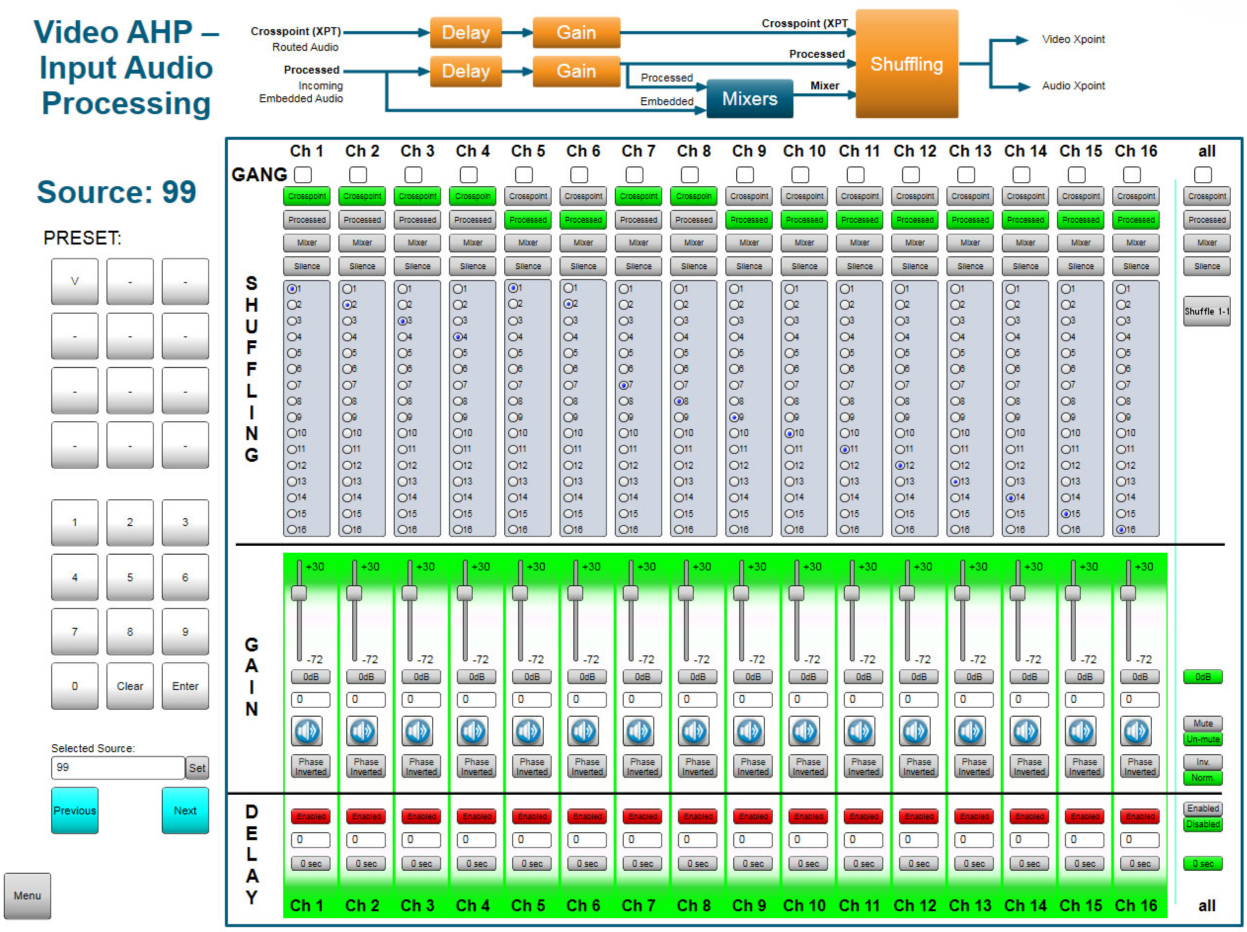


Figure 124 Video AHP Input Embedding Audio Processing Screen

6. For this example shuffling is used to route original embedded audio channels 1 and 2 of video source 99 to channels 5 and 6 of video source 99.

   Shuffler Settings:

   Channel 5 -click on the **Processed** button and then radio button **1** on the shuffler.

   Channel 6 - click on the **Processed** button and then radio button **2** on the shuffler.

7.23.3 5919 Connections to the Audio Crosspoints

The 5919 video input module creates two identical multiplexed audio transport streams, each of which contains all of the audio channels on the input module (up to 768 mono channels). One transport stream is sent to the main audio crosspoint module and a duplicate transport stream is sent to the redundant audio crosspoint module.

7.23.4 5919 Input Module LED Information

Table 44 shows the LED color code on the 5919 Input Module, and Figure 125 shows the front edge of the input module.

Table 44 5919 Input Module LED Information

LED Color	Label	Detail	Normal Working Status
Red Green	1	FPGA 1 status	**Each Pair of FPGA LEDS:** **Flashing rapidly between Red & Green** (2 Hz each LED) - starting up **Green On Solid & Red Off** - normal state working correctly **Green Off & Red On Solid** - FPGA programming fault found. Remove module and refit to force a reboot. **Red & Green Flashing very rapidly in sync** (4 Hz each LED) - A change has been made to the module settings database in RAM but it has not yet been written to flash memory. This is not a fault and the flash memory will be updated after 10 seconds of no audio setting changes being made. Do not remove power from the module while this indication is present as the flash may become corrupted. Other indications are displayed when performing a firmware upgrade, see the Sirius 800 Maintenance & Upgrade manual for details.
Red Green	2	FPGA 2 status	
Red Green	3	FPGA 3 status	
Red Green	4	FPGA 4 status	
Green	Power OK	Power to the module	**On Solid** - working correctly
Yellow	Local Command OK	Receiving messages from local Nucleus control module (the Nucleus controller in this frame)	**Flashing** - receiving information and working correctly
Red	Local Error	Error with messages from local Nucleus control module (the Nucleus controller in this frame)	**Off** - normal state **Flashing** - the command message from the router controller is corrupt or hasn't been received. This communications error could be caused by a hardware failure or incorrect insertion. Check that the module is inserted correctly. If the "Local Error" LED is flashing at the same time as the "Local Command OK" LED is flashing it suggests a mismatch in the configuration of the Nucleus controller. Check the controller configuration.

Table 44 5919 Input Module LED Information (Continued)

LED Color	Label	Detail	Normal Working Status
Yellow	Remote Command OK	Receiving messages from remote Nucleus control module (the Nucleus controller in the frame linked to this frame)	**Sirius 830/840/850 (no expansion)**: **Off** - Expansion not used. **Sirius 850 (expanded to second frame)**: **Flashing** - receiving information and working correctly
Red	Remote Error	Error with messages from remote Nucleus control module (the Nucleus controller in the frame linked to this frame)	**Sirius 830/840/850 (no expansion)**: **Off** - Expansion not used. **Sirius 850 (expanded to second frame)**: **Off** - normal state, **Flashing** - the command message from the remote router controller is corrupt or hasn't been received. This communications error could be caused by a hardware failure or incorrect insertion. Check that the module is inserted correctly and the four RJ45 connections between the frames are fitted correctly (see section 10.2). If the "Remote Error" LED is flashing at the same time as the "Remote Command OK" LED is flashing it suggests a mismatch in the configuration of the Nucleus controller. Check the controller configuration.
Blue/Green	Fugue Status	CPU status of on-board CPU	**Flashing sequence Green, Green, Blue** - normal operation the CPU is programmed and running **Brief Red Flash at startup** - normal **Flashing Red** - CPU Error. Remove module and refit to force a reboot.
Amber		Eight Diagnostic LEDs - Grass Valley Use Only	**Normal LED Pattern Sequence** 1. All LEDs On for one Second 2. All LEDs Off except the top LED 3. All LEDs Off except the second LED from the top 4. This sequence continues until all LEDs are Off except for the bottom LED 5. All LEDs Off for 10 Seconds 6. Return to Step 1 Any other pattern - abnormal operation contact Grass Valley Customer Support

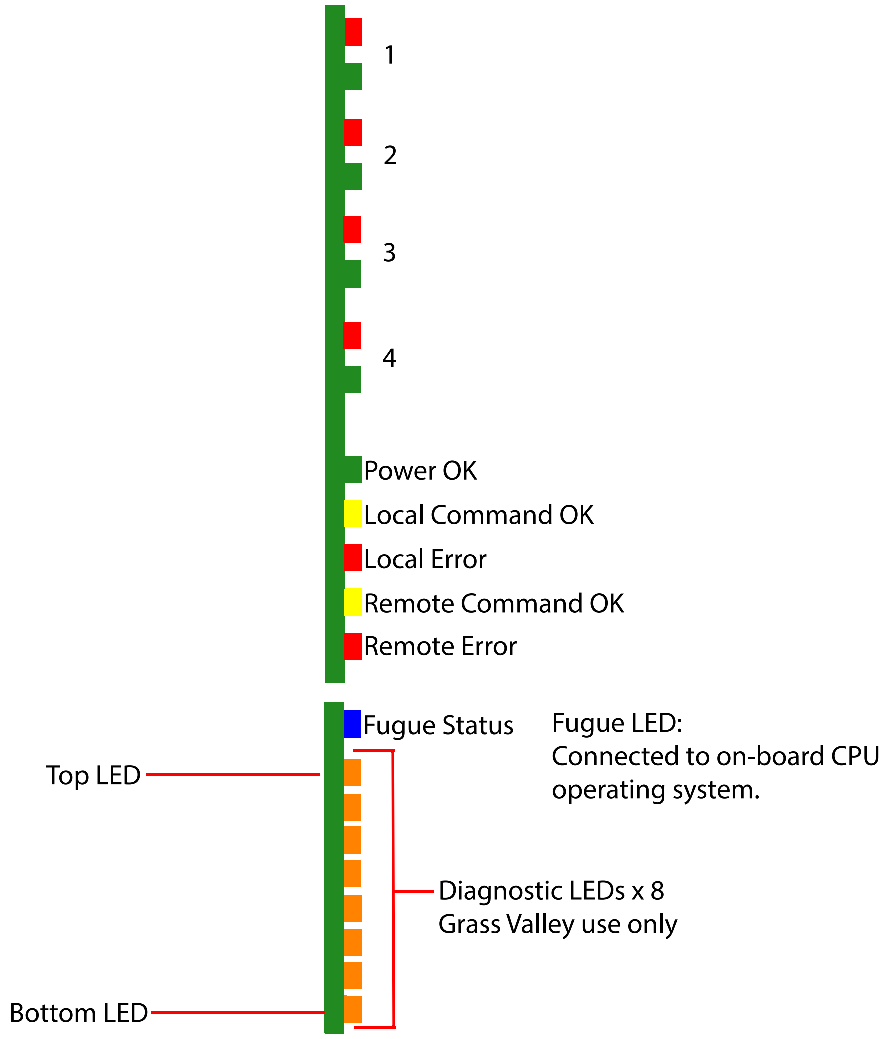


Figure 125 5919 Input Module LEDs

7.24 5960 Sirius 800 Video IP Input Module

7.24.1 Introduction

The 5960 Video IP Input Module provides video IP input capability to the Sirius 800 range. It works together with a Video IP Input rear panel (1824 or 1825) and provides 24 SDI video input sources to the router core from up to 4-off 40Gb/s Ethernet media links.

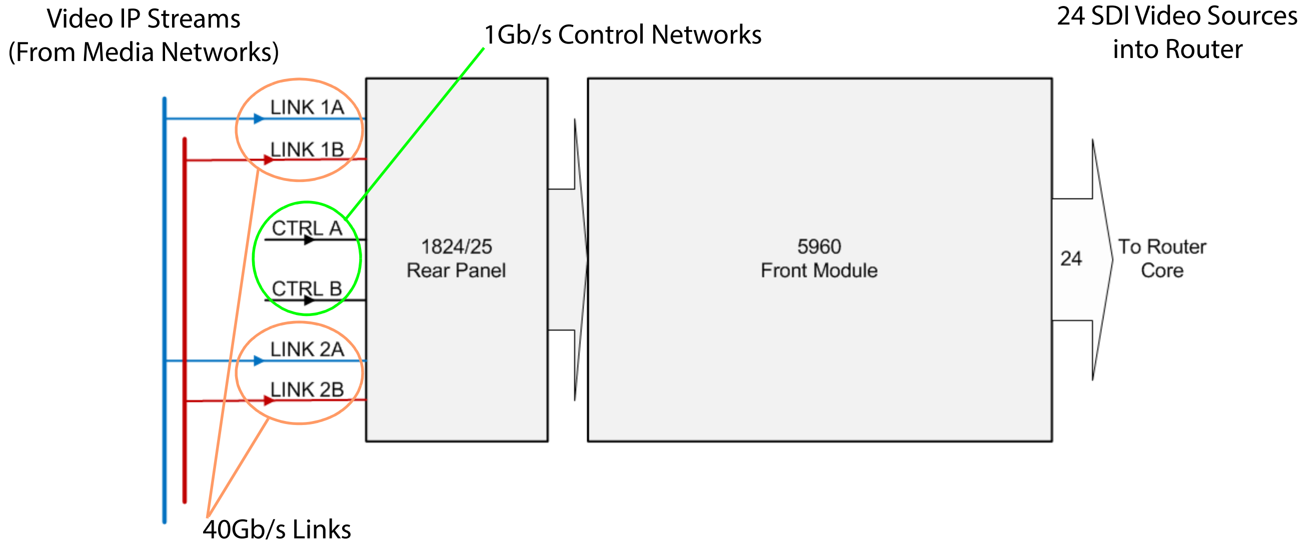


Figure 126 5960-1824/25 I/O Diagram

Video input streams can be for up to 3G SDI video and are decoded from video IP streams fed to it from a corresponding rear panel. Each derived video input has associated frame buffering.

The 5960 and its corresponding Video IP Input rear panel mainly comprise two independent multi-channel circuit blocks of IP-to-SDI conversion. See Figure 127.

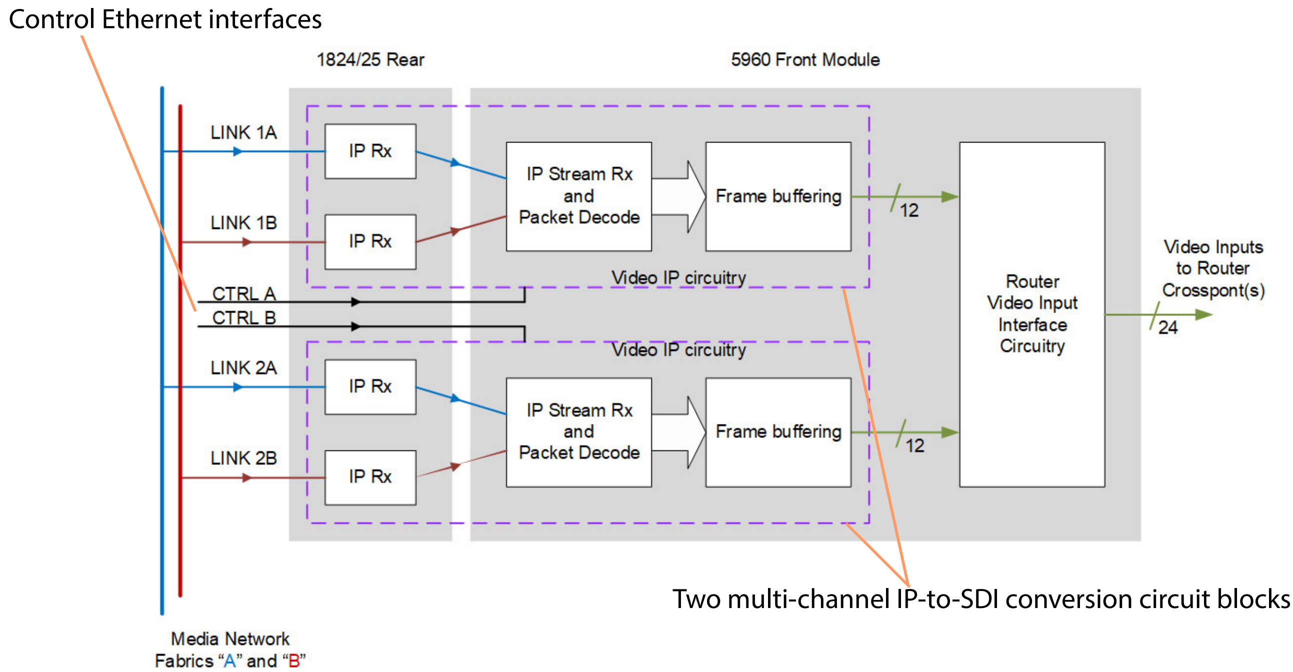


Figure 127 5960-1824/25 Block diagram

7.24.1.1 IP-to-SDI Block

Each multi-channel IP-to-SDI input circuit block:

- Accepts 12 Video IP streams from a pair of high-performance 40G rear Ethernet ports via the rear panel.
- Can support media network redundancy.
- Can support in-band or out-of-band control.
- Converts 12 video IP streams to SDI.
- Supplies 12 SDI video sources to the router core.
- Is independently configurable (independent from each other and from the host router). Configuration is done either via:
    - rear panel control interfaces (**CTRL A** and **CTRL B**); or
    - media links (**LINK 1A** and **LINK 1B**, and **LINK 2A** and **LINK 2B**).

  See Figure 127.

7.24.1.2 IP-to-SDI and IQMIX40

Each multi-channel IP-to-SDI block is based on a Grass Valley IQMIX40 modular card circuit. Functionally, each block is essentially an instance of an IQMIX40 card which is preset for 12 video channels of video 'IP to SDI' conversion (IQMIX40 SDI channels 1 to 12.).

For each multi-channel block, 12 video IP streams are received at 12 spigots and IP-to-SDI conversion is done. The 12 resulting (internal) SDI video signals are passed to router video input circuitry on the 5960 and then onwards to the router core.

Note: **Spigot** - Each IP spigot of an IP block:

- Receives video IP streams from *both* IP inputs (i.e. from Link A and Link B).
- Processes video, audio and metadata data packets into 12 SDI signals.

An IQMIX40 module itself has a total of 16 preset channels of 'IP-to-SDI' or 'SDI-to-IP' conversion, preset by the current software on the module. (Refer to the IQMIX40/41 User Manual on the Grass Valley website for more details about this modular product.) Software on a 5960 is preset for 12 channels of 'IP-to-SDI' conversion (per IP-to-SDI block).

Each IP-to-SDI block is configured separately to the router and independently.

7.24.2 5960 Module Profile

Note: The 5960 has 3 micro SD cards (see Figure 128) containing board software/firmware:

uSD card	Firmware Number	Comment
A	PA1328	For the router video input interface circuitry.
B	PA1329	For the video IP circuitry (two identical circuits).
C	PA1329	

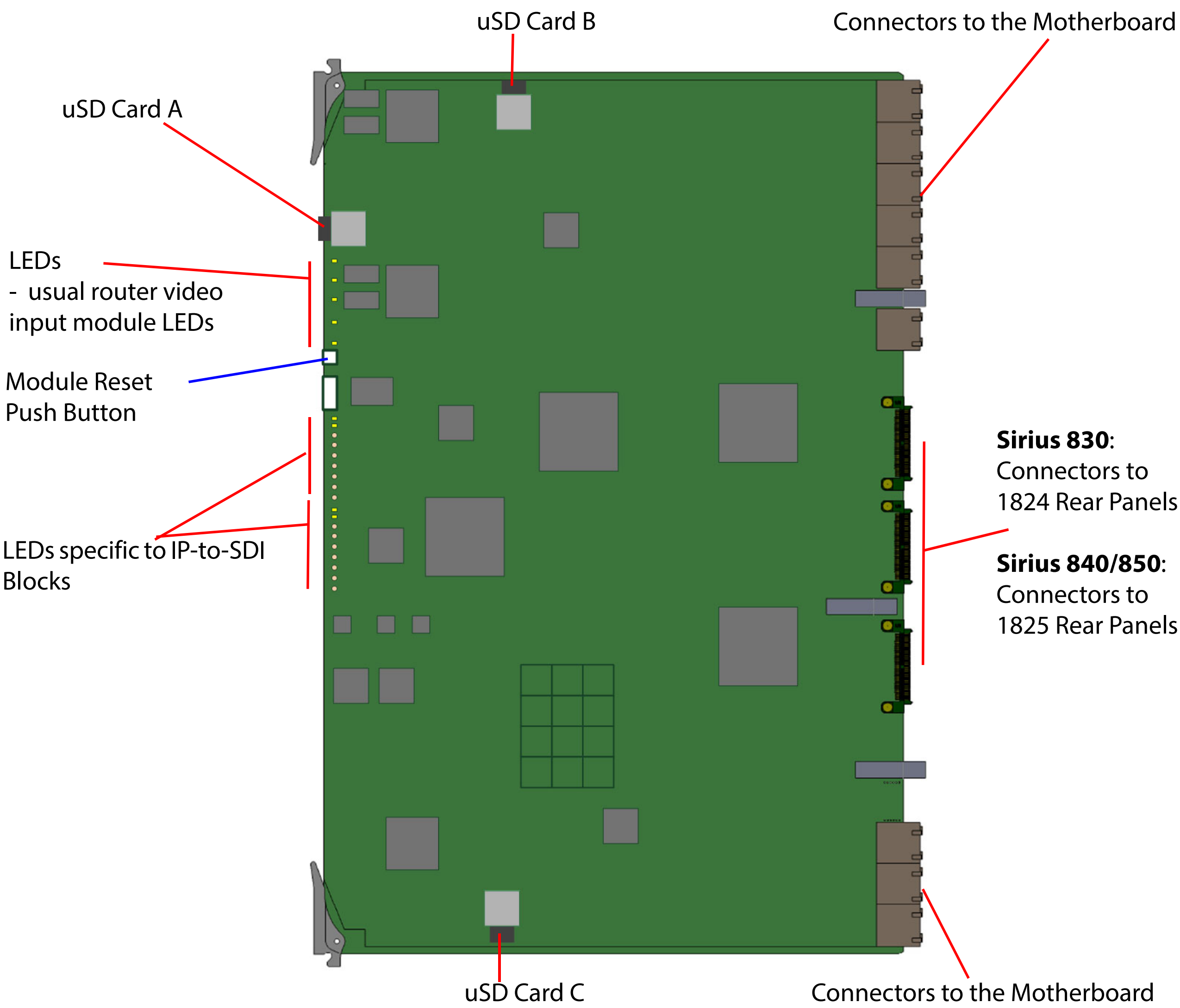


Figure 128 5960 Video IP 24 Channel Video Input Module

Note:

- Jumpers and Headers on the module are for Grass Valley Use Only.
- In normal operation, no jumper links or headers are fitted.

The 5960 Video IP Input Module is compatible with the rear panels listed in Table 45.

Table 45 5960 Rear Panel Compatibility

Sirius 800 Router	Rear Panel	See Section
Sirius 830	1824 4x 40Gb/s Video IP Input	See section 7.7, *Sirius 830: 1824 (40Gb/s) Video IP Input Rear* on page 126.

Table 45 5960 Rear Panel Compatibility (Continued)

Sirius 800 Router	Rear Panel	See Section
Sirius 840/850	1825 4x 40Gb/s Video IP Input	See section 7.16, *Sirius 840/850: 1825 (40Gb/s) Video IP Input Rear* on page 138.

7.24.3 5960 Input Module Front Controls and Indicators

The controls and indicators on the front edge of the module are shown in Figure 129. Table 46 and Table 47 show the LED color codes.

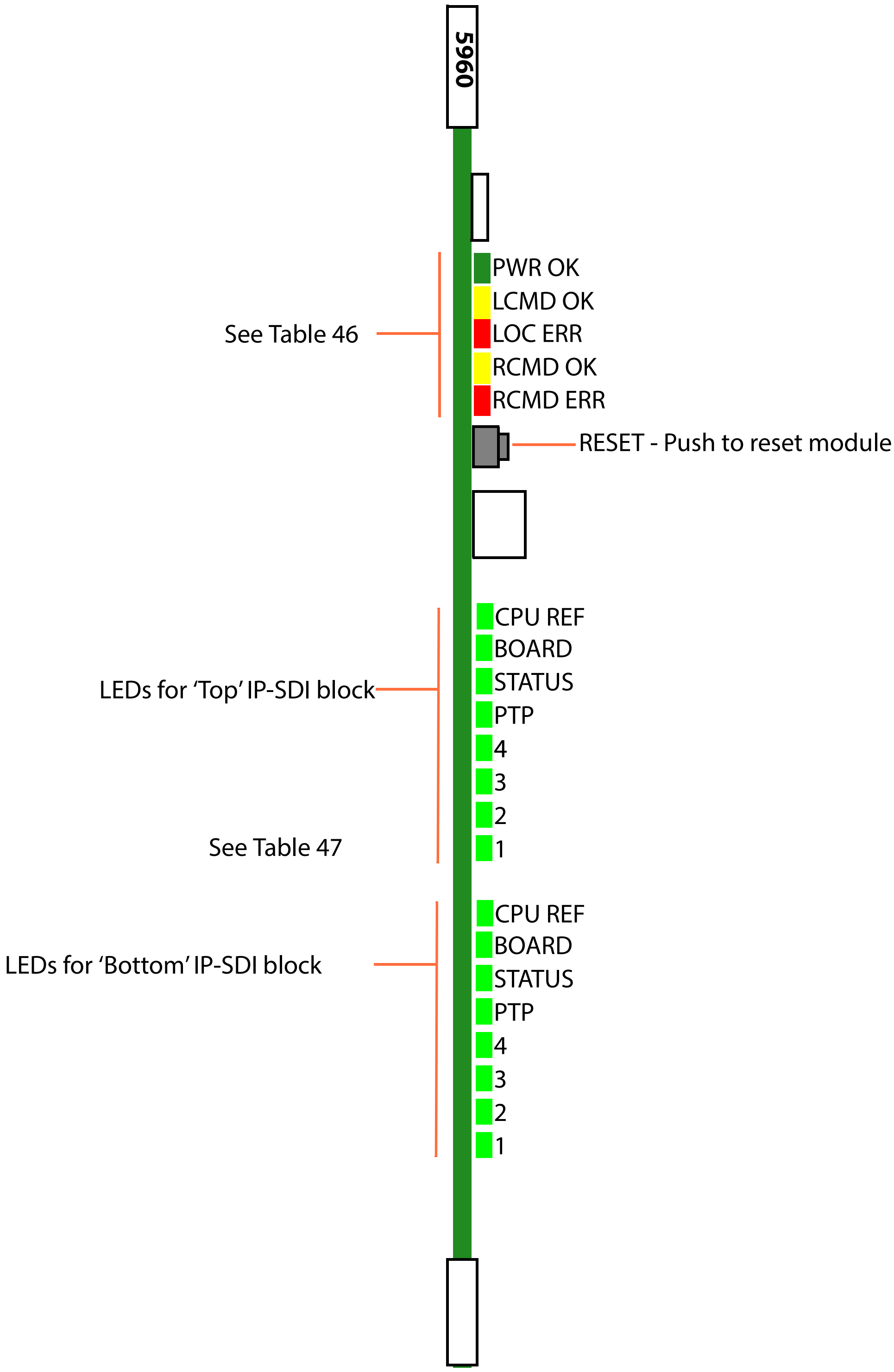


Figure 129 5960 Input Module Front Controls and LEDs

Table 46 5960 Input Module LED Information

LED Color	Label	Detail	Normal Working Status
Green	**PWR OK**	Power to the module	**On Solid** - working correctly
Yellow	**LCMD OK**	Receiving messages/commands from the local router control module (i.e. the router controller in this frame)	**Flashing** - receiving information and working correctly.
Red	**LOC ERR**	Communications error with messages from local router control module (i.e. the router controller in this frame). See **Note 1**.	**Off** - normal state **Flashing** - Communications error. (The command message from the router controller is corrupt or has not been received.)
Yellow	**RCMD OK**	Receiving messages/commands from remote router control module (i.e. the router controller in the frame linked to this frame)	**Sirius 830/840/850 (no expansion):** **Off** - Expansion not used. **Sirius 850 (expanded to second frame):** **Flashing** - receiving information, working correctly
Red	**RCMD ERR**	Communications error with messages from remote router control module (i.e. the router controller in the frame linked to this frame). See **Note 2**.	**Sirius 830/840/850 (no expansion)**: **Off** - Expansion not used. **Sirius 850 (expanded to second frame)**: **Off** - normal state, **Flashing** - Command message from the remote router controller is corrupt or not received.
Note 1:	A communications error could be caused by a hardware failure or incorrect module insertion. Check the module is inserted correctly. If "LOC ERR" and "LCMD OK" LEDs are both flashing, it suggests a mismatch in the configuration of the router controller: Check the Nucleus controller configuration.		
Note 2:	A communications error could be caused by a hardware failure or incorrect module insertion. Check: • The module is inserted correctly • The four RJ45 connections between the router frames are fitted correctly (see section 10.2). If "RCMD ERR" and "RCMD OK" LEDs are both flashing, it suggests a mismatch in the configuration of the router controller. Check the Nucleus controller configuration.		

Table 47 5960 IP-to-SDI Block LED Information

LED Color	Label	Detail	Normal Working Status
GREEN	**CPU REF**	Flashing = Watchdog timer OK Off = Watchdog not OK	Flashing green
GREEN	**BOARD**	Flashing = PTP sync OK Off = PTP sync failed	Flashing green
GREEN	**STATUS**	On = PTP lock OK Off = PTP lock failed	On
RED	**PTP**	Flashes Red at 1 Hz:	Flashing red
	4	For Grass Valley engineering use.	-
	3	For Grass Valley engineering use.	-
	2	For Grass Valley engineering use.	-
	1	For Grass Valley engineering use.	-

7.24.4 Router Configuration

The 5960 module behaves in a similar way to other router video input modules as far as the host router's router controller in concerned. The 'module type' must be set up accordingly in the Module Configuration Editor of the Grass Valley WorkBench tool when configuring the router.

Table 48 5960 Router Configuration Module Type

Front Module	Module Type
5960	IPInput

7.24.5 Module Configuration and Initial Setup

The 5960-1824/25 module combination contains two IQMIX40-like IP-to-SDI blocks. Each must be configured separately to the router and independently:

- control interface CTRL A is used to configure the IP-to-SDI block at the top; and
- control interface CTRL B is used for the bottom block.

The default control interface IP addresses for the two IP-to-SDI blocks on the module are identical and given in Table 49.

Table 49 5960 IP-to-SDI Block Control Interface Default IP Address

IP-to-SDI Block of 5960	Default Control IP Address
Top	10.54.31.60
Bottom	10.54.31.60
Note:	The *default* IP Addresses are the same and require initial set up to unique, working IP addresses.

7.24.5.1 Initial Setup

See Appendix F, *5960 IP-to-SDI Initial Setup* on page 438.

7.24.5.2 Configuration

See Appendix F, *5960 IP-to-SDI Configuration* on page 438.

8 Crosspoint Modules

Chapter contains:

Crosspoint Modules

8.1 5905 Sirius 800 Series Video Crosspoint Module

Note:

- Earlier Sirius 800 routers were fitted with 5901 video crosspoint modules, see Appendix C.3 for module details.
- On newer systems or when spares are required the 5905 video crosspoint module can be used as a direct replacement.
- 5905 and 5901 video crosspoint modules can be freely mixed in a router frame.

The Sirius 800 routers all use the same video crosspoint modules with the larger routers fitted with more video crosspoint modules to cope with the higher number of routes that can be set.

See section 8.2 for details of the Sirius 830 video crosspoint module arrangement and section 8.3 for the Sirius 840/850 video crosspoint module arrangement.

The Video Crosspoint modules each have a configuration of 288 inputs and 288 outputs.

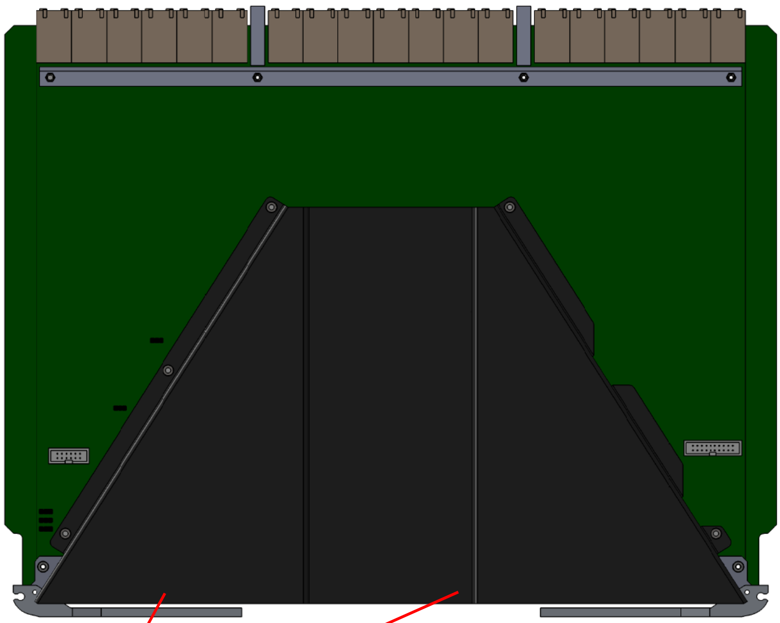


Figure 130 5905 Video Crosspoint Module

Note:

- Jumpers and Headers are present on the video crosspoint module and these are for Grass Valley Use Only.
- In normal operation no Jumper links or headers are fitted.

8.1.1 5905 Video Crosspoint Module LED Information

Table 50 shows the LED color code on the 5905 Video Crosspoint Module, and Figure 131 shows the front edge of the module.

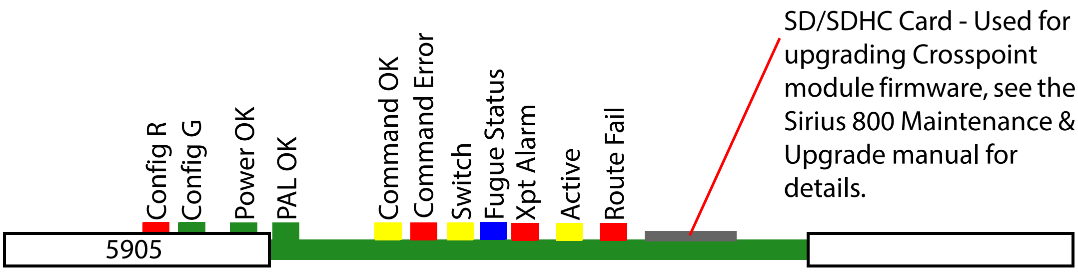


Figure 131 5905 Video Crosspoint Module LEDs

Note: If the active LED is not illuminated, it is safe to remove the video crosspoint module without affecting any active routes.

Table 50 5905 Video Crosspoint Module LED Information

LED Color	Label	Detail	Status
Red	Config R	FPGA status	**Flashing rapidly between Red & Green** (2 Hz each LED) - starting up **Green On Solid & Red Off** - normal state working correctly **Green Off & Red On Solid** - FPGA programming fault found. Remove module and refit to force a reboot. **Red & Green Flashing very rapidly in sync** (4 Hz each LED) - A change has been made to the module settings database in RAM but it has not yet been written to flash memory. This is not a fault and the flash memory will be updated after a period of inactivity. Do not remove power from the module while this indication is present as the flash may become corrupted. Other indications are displayed when performing a firmware upgrade, see the Sirius 800 Maintenance & Upgrade manual for details.
Green	Config G		
Green	Power OK	Power to the module	**On Solid** - working correctly
Green	PAL OK	FPGA Working	**Flashing** - the FPGA is working correctly
Yellow	Command OK	Command from the Control module	**Flashing** - receiving information and working correctly

Table 50 5905 Video Crosspoint Module LED Information (Continued)

LED Color	Label	Detail	Status
Red	Command Error	Error with command from the Control module	**Off** - normal state **Flashing** - the command message from the router controller is corrupt or hasn't been received. If all of the crosspoint modules indicate a Command Error check that the router controller is operating correctly. If only one of the crosspoint modules indicates the error contact Grass Valley Customer Support (see *Grass Valley Technical Support*, on page 476 for contact details).
Yellow	Switch	Flashes on a take signal when switching a route	**Off** - normal state **Flashes** - each time a route is set
Blue/Green	Fugue Status	CPU status of on-board operating system. The LED is approximately 25 mm (1 Inch) from the edge of the board.	**Flashing Green**, **Green**, **Blue** - normal operation, the CPU is programmed and running **Brief Flash Red** at startup - normal **Flashing Red** - CPU error. Remove module and refit to force a reboot.
Red	Xpt Alarm	Displays if there is a problem with any crosspoints	**Off** - normal state **On solid** - problem with one or more crosspoints on the module. **Flashing** - Crosspoint module overheating, make sure the fan assemblies are all closed and the fans are all operating correctly.
Yellow	Active	Route is active on crosspoint	**Flashing** - when this module is routing one or more signals to live outputs. Removing the crosspoint module will disturb the signal(s) passing through the crosspoint module.
Red	Route Fail	Illuminated if a route failure has been detected on this crosspoint	**Off** - normal state **Flashing** - receiving error messages related to a route failure

8.2 Sirius 830: Video Crosspoint Arrangement

The Sirius 830 has two horizontally mounted video crosspoint modules situated near the top of the frame that send signals to the output modules. The lower module is the main video crosspoint module, the upper module is optional and for redundancy. For video crosspoint module locations, see *Sirius 830 Module Locations*, on page 100.

The 288^2 router requires a minimum of one crosspoint module. The redundant crosspoint can take the place of the main crosspoint module in the unlikely event of a failure. If the redundant crosspoint is active, due to a main crosspoint failure, the system is no longer redundant.

8.2.1 Sirius 830: Redundant Video Crosspoint Operation

The redundant crosspoint design is based around protecting against crosspoint module failure. In normal operation, all the routes pass through the main routing crosspoint module.

The redundant signal path algorithm checks the signal paths on the main crosspoint module in turn by configuring the redundant crosspoint module to mimic the main crosspoint module. The algorithm compares the signal standard of each signal path through the main crosspoint module with the signal standard of the equivalent path through the redundant module.

The algorithm also compares the signal lock status of each signal as it enters and leaves the main crosspoint module. A difference between the incoming and outgoing signal lock status indicates a route failure.

Each signal path is compared in turn until all of the paths on the main module have been checked. Once all signal paths have been checked the algorithm repeats the checking process.

If the algorithm finds a difference in the signal standard of a path passed by the main and redundant crosspoint modules or if a signal lock status check fails for a route the failure is flagged and the control system can (if configured) move the route to the redundant crosspoint module. If more routes fail then they can also be moved to the redundant crosspoint module.

The algorithm will continue to check the crosspoint module for further failures. At this point the crosspoint matrix is still capable of setting all 288^2 routes but redundancy protection has been lost. This failure must be addressed immediately to regain redundancy for the crosspoint matrix.

Additionally if any one of the following situations occur the router controller will move all routes to the redundant crosspoint module:

- The main crosspoint module is removed from the router.
- The router controller looses communications with the main crosspoint module.
- The crosspoint module reports one or more of its power rails has a fault.

To replace the failed crosspoint module all the routes on the failed module must be moved to the redundant crosspoint module, see section 8.4.1 for details.

Example:

Router pre-configured to move the failed route to the redundant crosspoint module.

- Output 1 on the main crosspoint fails:

  Output 1 on the output module switches to the redundant path
- If Output 2 on the main crosspoint fails:

  Output 2 on the output module switches to the redundant path

Note:
- Any failure needs addressing immediately to retain protection, see section 8.4.1 for details.

8.3 Sirius 840/850: Video Crosspoint Arrangement

The Sirius 840 router has five crosspoint modules situated below the input modules mounted horizontally, that send signals to the output modules, four are used as actual crosspoint modules, the fifth is optional and for redundancy. For Sirius 840 video crosspoint module locations see section 6.3.1.

The Sirius 850 has the same video crosspoint module configuration as the Sirius 840 and also has a second set of video crosspoint modules mounted above the input modules that send signals to the expansion modules, four are used as actual crosspoint modules, the fifth is optional and for redundancy. For Sirius 850 video crosspoint module locations see section 6.3.3.

Note:

- In order to route any input to any output a minimum of four crosspoint modules must be fitted.
- Fitting a fifth crosspoint will give the router redundancy.
- Video signals passing through the main crosspoint modules are routed to output channels 1 to 576.
- Video signals passing through the expansion crosspoint modules are routed to expansion output channels 577 to 1152.

The crosspoint modules are mapped to inputs or outputs as shown in Table 51 The redundant crosspoint module can take the place of any of the four main crosspoints in the unlikely event of a failure.

Table 51 Sirius 840/850 Crosspoint Arrangement

Crosspoint	Input	Output
1	Odd	Odd
2	Even	Odd
R	Any	Any
3	Odd	Even
4	Even	Even

If the redundant video crosspoint module (**R**) has become active due to a route failure in a main crosspoint module, it takes the place of that failed main module but the system is no longer fully redundant: Another route failure in the same failed main module *is* protected against by the redundant video crosspoint; however, a route failure in one of the other main crosspoint modules can only be protected against once a failed main module is replaced.

When the failed crosspoint is replaced, the user must move routes from the redundant crosspoint back to the main crosspoint, see section 8.4.1 for details.

8.3.1 Sirius 840/850: Redundant Crosspoint Operation

The redundant crosspoint design is based around protecting against a single signal path failure. In normal operation, all the routes pass through the four main routing crosspoint modules.

The redundant signal path algorithm checks the signal paths on each of the main crosspoint modules in turn by configuring the redundant crosspoint module to mimic the main module being checked. The algorithm compares the signal standard of each signal path through the main crosspoint module with the signal standard of the equivalent path through the redundant module.

The algorithm also compares the signal lock status of each signal as it enters and leaves the main crosspoint module. A difference between the incoming and outgoing signal lock status indicates a route failure.

Each signal path is compared in turn until all of the paths on the main module have been checked. The algorithm then moves on to check the next main crosspoint module in the same way.

If the algorithm finds a difference in the signal standard of a path passed by the main and redundant crosspoint modules or if a signal lock status check fails for a route the failure is flagged and the control system can (if configured) move the route to the redundant crosspoint module. Once this has happened, the redundant crosspoint cannot take the place of any of the other three main crosspoint modules. If more routes fail on the main crosspoint that has already been substituted by the redundant crosspoint, then they can move to the redundant crosspoint.

The algorithm will continue to check the crosspoint module with the failure for further failures. The other three main crosspoint modules are no longer checked. At this point the crosspoint matrix is still capable of setting all 576^2 routes but redundancy has been lost. This failure must be addressed immediately to regain redundancy for the crosspoint matrix.

Additionally if any one of the following situations occur the router controller will move all routes to the redundant crosspoint module:

- A main crosspoint module is removed from the router.
- The router controller looses communications with a main crosspoint module.
- A main crosspoint module reports one or more of its power rails has a fault.

To replace a failed crosspoint module all the routes on the failed module must be moved to the redundant crosspoint module, see section 8.4.1 for details.

Checking of all of the main crosspoint modules will be resumed when the failed crosspoint module has been replaced.

Example:

Router pre-configured to move the failed route to the redundant crosspoint module.

- Output 1 on Main Crosspoint 1 fails:

  Output 1 on the output module switches to the redundant path
- Output 7 on Main Crosspoint 1 fails:

  Output 7 on the output module switches to the redundant path

Note: Any failure needs addressing immediately to retain protection, see section 8.4.1 for details.

8.4 Video Crosspoint Failure

If Video Redundancy is enabled (see section 8.6) and a video crosspoint routing failure is detected by the redundant crosspoint checking algorithm the Nucleus router controller performs one of the following actions based on the configuration in Workbench (see section for details on changing this setting):

- Move the failed route to the redundant crosspoint (default when shipped).
- Move all routes from the crosspoint module with the failure to the redundant crosspoint module
- Just notify the user and leave them to take appropriate action.

Note:

- Any failure needs addressing immediately to retain protection.
- For information on replacing the failed crosspoint card see section 8.4.1.
- Following a change in source for a given output (routing change) it can take several seconds to check the Sirius 800 redundancy. It is assumed that it is okay until this is done and so no alarm is flagged during this checking period.

8.4.1 Replacing a Failed Video Crosspoint Module using the Door PC

Note:

- The fan assembly should be placed back into the closed position as soon as possible after opening, as this ensures correct ventilation of the frame. Failure to do this will result in failure.
- In practice the maximum time that a fan assembly can be left open will depend on a number of factors such as; ambient temperature, frame loading, crosspoint routings, etc. To ensure correct operation under all conditions the fan assemblies should be left open for no more than 4 minutes at a time.
- Take care not to trap any cables when opening and closing the fan door.

If one or more routes fail on a video crosspoint module this will be displayed on the Main or Expansion Video Crosspoint Matrix Status screen.

Sirius 830 - see Figure 40 on page 67 for button and parameter locations.

Sirius 840/850 - see Figure 41 on page 67 for button and parameter locations.

A typical example of how the buttons will look is listed below.:

- **Fail Found indicator** - Red
- **Fault Present indicator** - Red
- **First Failure Detected** - **Failed Source** and **Destinations** will display the first failed route
- **XpntCardNone** - Grey
- **Sirius 830**
  - **XpntCardMain830** Yellow (indicates the crosspoint has failed)
- **Sirius 840/850**
  - **XpntCardxxxToxxx_x** - Yellow (where xxx is the failed crosspoint module)

1. Touch the Free Failed Crosspoint button to move all of the routes from the failed video crosspoint module to the redundant video crosspoint if Workbench has not been configured to do this automatically.
2. Check that the “Active” LED on the failed video crosspoint module is off and then remove the failed video crosspoint module (see section 8.1.1 for the location of the Active LED).
3. Replace the failed video crosspoint module with a replacement working crosspoint module.
4. The replacement video crosspoint module is automatically tested and the **Fault Present** indicator will change back to Green if the replacement is fully working.
5. Touch the **Fault Fixed** button to move all of the routes from the redundant video crosspoint module to the fixed video crosspoint module.

- The Main or Expansion Video Crosspoint Matrix Status screen should now return to its working state:

  Sirius 830 - see Figure 40 on page 67 for button and parameter locations.

  Sirius 840/850 - see Figure 41 on page 67 for button and parameter locations.

  - **Fail Found indicator** - Green
  - **Fault Present indicator** - Green
  - **First Failure Detected** - **Failed Source** and **Destinations** will both be reset to Zero
  - **XpntCardNone** - Yellow
- **Sirius 830**
  - **XpntCardRedundant830** - Grey
  - **XpntCardMain830** - Grey
- **Sirius 840/850**
  - **XpntCardOddToOdd_1** - Grey
  - **XpntCardEvenToOdd_2** - Grey
  - **XpntCardRedundant_R** - Grey
  - **XpntCardOddToEven_3** - Grey
  - **XpntCardEvenToEven_4** - Grey

8.5 5903 Sirius 800 Audio Crosspoint Module

The 5903 Audio Crosspoint modules each have a maximum configuration of 36864 inputs by 18432 outputs. The maximum number of audio crosspoints that can be used on each audio crosspoint module varies depending on which router the audio crosspoint module is mounted in, see Table 52.

Table 52 Maximum Number of Audio Crosspoints

Router	Maximum Number of Audio Crosspoints
Sirius 830	9216 inputs by 9216 outputs Max.
Sirius 840	18432 inputs by 18432 outputs Max.
Sirius 850 (Not Expanded)	18432 inputs by 18432 outputs Max.
Sirius 850 (Expanded, two frame system)	36864 inputs by 18432 outputs Max.

There are two horizontally mounted audio crosspoint modules that send signals to the output modules.

- **Sirius 830** - For audio crosspoint module locations see section 6.2.
- **Sirius 840** - For audio crosspoint module locations see section 6.3.
- **Sirius 850** - For audio crosspoint module locations see section 6.3.3.

The left hand 5903 is the main audio crosspoint module when the router is powered on and the right hand 5903 is optional for redundancy.

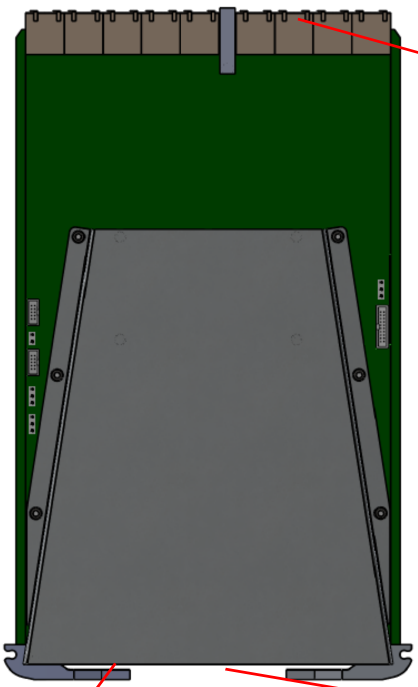


Figure 132 5903 Crosspoint Module

Note:

- Jumpers and Headers are present on the audio crosspoint module and these are for Grass Valley Use Only.
- In normal operation no Jumper links or headers are fitted.

8.5.1 5903 Audio Crosspoint Module LED Information

Table 53 shows the LED color code for the LEDs at the front of the 5903 Audio Crosspoint module, and Figure 133 shows the front edge of the module.

Note: If the Route Active LED is not illuminated, it is safe to remove the crosspoint module without affecting any active routes (see section 8.5.5 for details).

Figure 133 5903 Sirius 800 Audio Crosspoint Module LEDs

Table 53 5903 Audio Crosspoint Module LED Information

LED Color	Function	Detail	Status
Green	Power OK	Power to the module	**On Solid** - working correctly
Red	Config R (located behind the Power OK LED)	FPGA status	**Flashing rapidly between Red & Green** (2 Hz each LED) - starting up **Green On Solid & Red Off** - normal state working correctly **Green Off & Red On Solid** - FPGA programming fault found. Remove module and refit to force a reboot. Other indications are displayed when performing a firmware upgrade, see the Sirius 800 Maintenance & Upgrade manual for details.
Green	Config G (located behind the Power OK LED)		
Yellow	Command OK	Command from the Control module	**Flashing** - receiving information and working correctly
Red	Command Error	Error with command from the Control module	**Off** - normal state. **Flashing** - the command message from the router controller is corrupt or hasn't been received.
Green	Route Active	Route is active on crosspoint	**On** - if any signal is routed through this crosspoint module. Removing the crosspoint module will disturb the signal(s) passing through the crosspoint module. **Off** - no signal is present on this crosspoint module.
Red	Route Fail	One or more audio transport streams have failed	**Off** - normal state **Flashing** - there is a fault with one or more audio transport streams passing through the crosspoint module. For details on replacing the crosspoint module see section 8.5.5.

Table 53 5903 Audio Crosspoint Module LED Information (Continued)

LED Color	Function	Detail	Status
Green	CLK Master	Clock Master	The 5903 module either generates the audio system clock or uses the clock generated on the other crosspoint (if fitted). In normal operation the main crosspoint module generates the audio system clock and the redundant crosspoint module is slaved to that. **On** - this crosspoint module is supplying the audio system clock. **Off** - this crosspoint module's clock is slaved to the other crosspoint module. **Note**: If the 5903 module supplying the audio system clock fails then it is important that clock generation is moved to the working crosspoint before the failed crosspoint is replaced (see section 8.5.5 for details).

8.5.2 Sirius 800 Audio Crosspoint Arrangement

The Sirius 800 routers have two horizontally mounted audio crosspoint modules that send audio signals to the output modules. The 5903 audio crosspoint module is used with the audio capable input (4915, 5919 and 5915) and output modules (4929, 5949, 4925 and 5925).

For audio crosspoint module locations see section 6.2.1 (Sirius 830), section 6.3.1 (Sirius 840) or section 6.3.3 (Sirius 850).

The router requires a minimum of one audio crosspoint module. The optional redundant crosspoint module can take the place of the main crosspoint module in the event of a failure. If the redundant crosspoint module has become active due to a failure on the main crosspoint module, the system is no longer redundant.

8.5.3 Audio Crosspoint Operation

Each audio capable input module (4915, 5919 and 5915) creates two identical multiplexed audio transport streams, each of which contains all of the audio channels on the input module (up to 768 mono channels). One transport stream is sent to the main audio crosspoint module and a duplicate transport stream is sent to the redundant audio crosspoint module.

Similarly each audio crosspoint module generates a multiplexed audio transport stream (up to 768 mono channels) to each audio capable output module (4929, 55949/5949, 4925 and 5925). Each of the output modules receives one transport stream from each of the audio crosspoint modules.

8.5.4 Redundant Audio Crosspoint Operation

The redundant crosspoint design is based around protecting against crosspoint module failure. In normal operation all of the routes pass through both crosspoint modules and the individual output modules will use the audio signals from the main crosspoint module.

If an output module detects an error in the transport stream from the main audio crosspoint module or if the stream is not present it will use the transport stream from the redundant audio crosspoint module. The Route Fail LED on the audio crosspoint module with the failure will flash red, see section 8.5.1 for the location of the status LEDs.

At this point the crosspoint matrix is still capable of setting all audio routes but redundancy protection has been lost. This failure must be addressed immediately to regain redundancy for the crosspoint matrix.

For example:

- If Audio Output 1 on the main crosspoint fails:
  The output module that Audio Output 1 is routed to selects the redundant crosspoint audio transport stream.
- If Audio Output 2 on the main crosspoint fails:
  The output module that Audio Output 2 is routed to selects the redundant crosspoint audio transport stream.

Note:

- Any failure needs addressing immediately to retain protection.
- For information on replacing the failed crosspoint card see section 8.5.5 below.

8.5.5 Replacing a Failed Audio Crosspoint Module

A failed audio crosspoint module can be replaced by either using the Door PC to move the routes from the failed module to the working module or without using the Door screen. Both methods are described in this section.

- Replacing an audio crosspoint module using the Door PC, see section 8.5.5.1.

or

- Replacing an audio crosspoint module without using the Door PC, see section 8.5.5.2.

8.5.5.1 Replacing an Audio Crosspoint Module using the Door PC

If one or more routes fail on an audio crosspoint module this will be displayed on the Audio Crosspoint Matrix Status screen. A typical example of how the buttons will look is listed below (see Figure 43 on page 72 for button and parameter locations):

- **Fail Found indicator** - Red
- **Fault Present indicator** - Red
- **First Failure Detected** - **Failed Incoming Stream** and/or **Failed Outgoing Stream** will display the first failed stream(s)
- **XpntCardNone** - Grey
- **XpntCardRedundant**: Grey
- **XpntCardMain**: Yellow (indicates the main audio crosspoint has failed)

1. Touch the **Free Failed Crosspoint** button to move all of the routes from the failed audio crosspoint module to the other audio crosspoint module.

Note:

- The fan assembly should be placed back into the closed position as soon as possible after opening, as this ensures correct ventilation of the frame. Failure to do this will result in failure.
- In practice the maximum time that a fan assembly can be left open will depend on a number of factors such as; ambient temperature, frame loading, crosspoint routings, etc. To ensure correct operation under all conditions the fan assemblies should be left open for no more than 4 minutes at a time.
- Take care not to trap any cables when opening and closing the fan door.

2. Open the router door and then open the fan door to locate the audio crosspoint modules.

3. Check that the “Route Active” LED on the failed audio crosspoint module is off and then remove the failed audio crosspoint module (see section 8.5.1 for the location of the Route Active LED).
4. Replace the failed audio crosspoint module with a replacement working crosspoint module and close and secure the fan door and router door.
5. The replacement audio crosspoint module is automatically tested and the Fault Present indicator will change back to Green if the replacement is fully working.
6. Touch the **Fault Fixed** button to move all of the routes from the redundant crosspoint module to the replacement audio crosspoint module.
7. The Audio Crosspoint Matrix Status screen should now return to its working state (see Figure 43 on page 72 for button and parameter locations):
   - **Fail Found indicator** - Green
   - **Fault Present indicator** - Green
   - **First Failure Detected** - **Failed Incoming Stream** and **Failed Outgoing Stream** will be reset to 0
   - **XpntCardNone** - Yellow
   - **XpntCardRedundant** - Grey
   - **XpntCardMain** - Grey

8.5.5.2 Replacing an Audio Crosspoint Module without using the Door PC

Note:

- The fan assembly should be placed back into the closed position as soon as possible after opening, as this ensures correct ventilation of the frame. Failure to do this will result in failure.
- In practice the maximum time that a fan assembly can be left open will depend on a number of factors such as; ambient temperature, frame loading, crosspoint routings, etc. To ensure correct operation under all conditions the fan assemblies should be left open for no more than 4 minutes at a time.
- Take care not to trap any cables when opening and closing the fan door.

1. Open the router door and then open the fan door to locate the audio crosspoint modules. Identify the faulty audio crosspoint module, the “Route Fail” LED will be flashing Red (see section 8.5.1 for the location of the status LEDs).
2. Press the **Reset** button on the failed audio crosspoint module (Figure 133 on page 194) so that the working crosspoint module uses its own audio system clock.

   CLK Master LED = On for the working audio crosspoint module, see section 8.5.1 for the location of the “CLK Master” LED.
3. The faulty audio crosspoint module can be hot swapped for a working audio crosspoint module without causing any disturbance to audio on the router.
4. Close and secure the fan door and router door.

8.6 Enabling/Disabling Video/Audio Redundancy

8.6.1 Video Redundancy

The video redundant crosspoint algorithm is enabled or disabled by using the Generic Configuration Editor. See the Workbench manual for information on using the Generic Configuration editor.

Nucleus2 Controller Navigate to:

```
Devices | Devices[1]: LocalRouterDevice | LocalRouterControl |
RouterSpecificControl: Sirius800Control | RedundantXpntControl |
Enable = True
```

Select the required action from the drop down menu:

- Redundant crosspoint algorithm enabled = True
- Redundant crosspoint algorithm disabled = False

Note:

- **Sirius 850 single frame**: Enabling video redundancy will enable redundancy for the main and expansion crosspoint modules in the router (if fitted).
- **Sirius 850 dual frame systems**: Enabling video redundancy in frame one will enable redundancy for the main crosspoint modules mounted in frame one and the expansion crosspoint modules mounted in frame two. The reverse is true for frame two. In a dual frame system if redundancy is enabled in one frame it must also be enabled in the other frame.

Important:

- If video redundancy is enabled or disabled the configuration must be pushed by Workbench to the controller for the new setting to take effect.
- If the action on fail setting (see section) for video or audio needs to be changed make these changes at the same time and only one push is then required.
- In a dual controller system use the **Push Config to Controller(s)** button in Workbench to make sure both controllers are set the same.

8.6.2 Audio Redundancy - Nucleus2 Controller Only

The audio redundant crosspoint algorithm is enabled or disabled by using the Online Editor. See the Workbench manual for information on using the Online Editor.

Nucleus2 Controller Navigate to:

```
Devices | Devices[1]: LocalRouterDevice | LocalRouterControl |
RouterSpecificControl: Sirius800Control |
RedundantAudioXpntControl | Enabled = True
```

Select the required action from the drop down menu:

- Redundant crosspoint algorithm enabled = True
- Redundant crosspoint algorithm disabled = False

Important:

- If audio redundancy is enabled or disabled the controller must be reset for the new setting to take effect.
- If the action on fail setting (see section) for video or audio needs to be changed make these changes at the same time and only one database push is then required.
- In a dual controller system both controllers must have the same redundancy settings.

The action on crosspoint failure for video and audio is set from the Workbench controller on-line editor. See the Workbench manual for information on using the on-line editor.

Nucleus2 Controller Navigate to:

```
Devices | Devices[1]: LocalRouterDevice | LocalRouterControl |
RouterSpecificControl: Sirius800Control
```

Nucleus2 Controllers

Video navigate to:

```
| RedundantXpntControl | ActionOnFail = MoveFailedRoute|
```

Select the required action from the drop down menu:

- NoAction = Notify the user and leave them to take appropriate action
- MoveFailedRoute = Move the failed route to the redundant crosspoint (default when shipped)
- MoveAllRoutes = Move all routes from the crosspoint with the failure to the redundant crosspoint

Audio (Nucleus2 only) navigate to:

```
| RedundantAudioXpntControl | FailedAction = MoveFailedStream|
```

Select the required action from the drop down menu:

- **`MoveFailedStream =`** Move the failed stream to the redundant crosspoint (default when shipped)
- **`MoveAllStreams`** = Move all streams from the crosspoint with the failure to the redundant crosspoint

Important:

- If the video or audio action on fail setting is changed the controller must be reset for the new settings to take effect.
- If video or audio redundancy is enabled or disabled (see section 8.6) make these changes at the same time and push the configuration to the controller using Workbench, a reset is not be required after the push.
- In a dual controller system both controllers must have the same redundancy settings.

9 Output Modules and Output Rear Panels

Chapter contains:

Output Modules and Output Rear Panels

9.1 4929 Audio AES/MADI O/p Module with Audio Delay

4929 Sirius 800 Audio AES/MADI Output Module with Audio Delay:

Important: Early Sirius 800 routers must be modified by Grass Valley before they can be used with the 4929. See section 1.14 to check if the router needs modifying.

The 4929 Sirius 800 Audio AES/MADI output module with audio delay can transmit either 120 AES outputs (balanced or unbalanced) with up to 3 MADI output channels or 12 channels of MADI outputs depending on the rear panel fitted. The 4929 Output Module is compatible with the rear panels listed in Table 54

Table 54 4929 Rear Panel Compatibility

Rear Panel	See Section
Up to 120 AES outputs and up to 3 MADI output channels:	
1353 Balanced AES + HD BNC MADI rear panel	See section 9.12
1356 Unbalanced AES + HD BNC MADI rear panel	See section 9.13
1298 Balanced AES rear panel (no MADI) - No longer supplied	See Appendix C.5.1
Up to 12 MADI output channels:	
1295 MADI Output BNC rear panel	See section 9.10
1296 MADI Output Fiber rear panel	See section 9.11

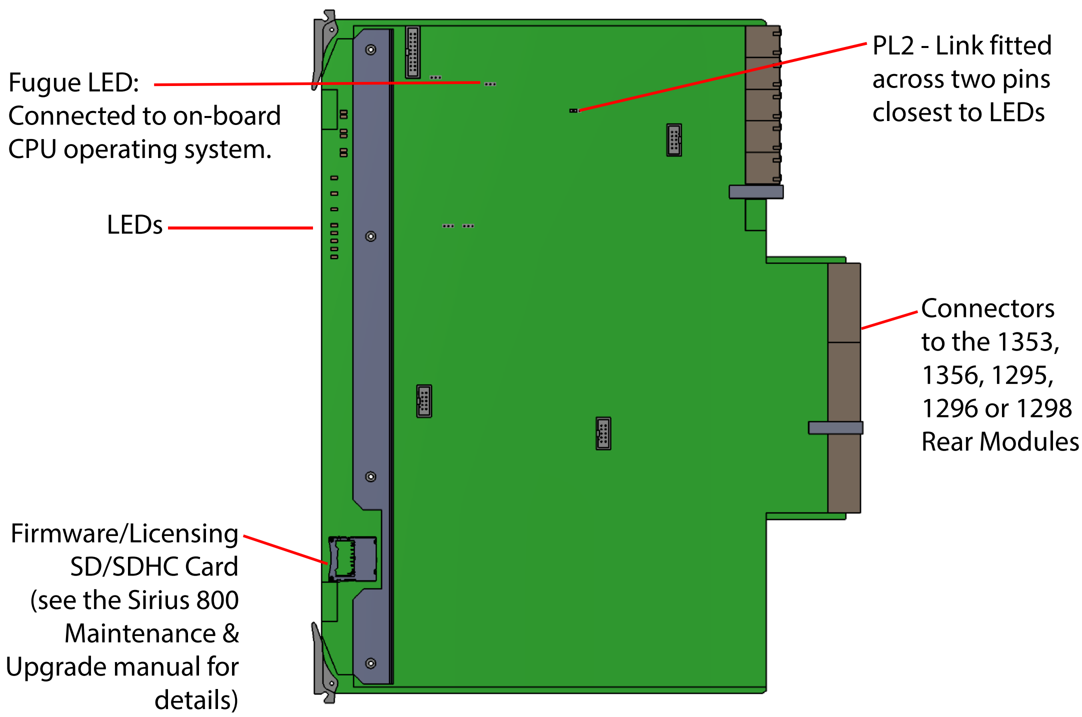


Figure 134 4929 120 Channel AES/MADI Output Module

Note:

- Jumpers and Headers are present on the audio output module and these are for Grass Valley Use Only.
- In normal operation no jumper links or headers are fitted except for PL2 which has a link fitted across the two pins closest to the LEDs on the front of the module.

9.1.1 Duplicate MADI Outputs

When fitted with the 1295 or 1296 MADI rear panels the 4929 module outputs 12 MADI channels and a further 12 duplicate MADI channels.

The main and backup connections are shown in the rear panel diagrams listed below:

Table 55 MADI Main and Backup Connections

Rear Panel	See Figure Number
1295 BNC rear panel	See Figure 157 on page 236.
1296 Fiber rear panel	See Figure 158 on page 237.

9.1.2 Configuring MADI to 56 or 64 Channels

Individual MADI channels are configured to output in 56 or 64 channel MADI using the Workbench Online Editor.

Nucleus2 Router Control Module Navigate to:

```
Controller | Devices | Devices[1]: LocalRouterDevice |
LocalRouterConfig | ModuleConfigurations |
ModuleConfiguration[XXX]: AudioOutput | MADIControl |
MADIControl[YY] | Format=
```

Where:
XXX= the Module ID of the Audio Output Module (see the Workbench manual for details)
YY = the MADI channel (1 to 12) being configured

Select the number of MADI channels from the drop down menu:

- `MADI56` = configures the MADI channel to 56 channels
- `MADI64` = configures the MADI channel to 64 channels

Note: Ensure both Nucleus2 router control modules are configured the same by using the **Copy to Partner** function in Workbench once configurations changes have been made.

9.1.3 AES Audio Outputs

- Up to 120 balanced or unbalanced AES outputs (dependent on rear panel fitted)
- Re-generates the AES clock from incoming data (nominal 48 kHz)
- VU&C (Validity, User and Channel status) flags are regenerated to a default standard on each channel when re-aligning audio. (See Table 147 on page 421 for default standard details).
- Pass asynchronous audio or Dolby E transparently at the original sample rate.
- Asynchronous channels pass VU&C data transparently (parity is recalculated for each output).
- Up to 3 MADI outputs are also available on HD BNC connectors (with correct rear panels, see section 9.15 for details)
    - Up to 64 channels of audio per MADI output

9.1.4 MADI Audio Outputs

To connect MADI audio outputs from a 4929 input module it must be used with either a 1295 BNC or 1296 Fiber rear panel.

- Up to 12 MADI outputs, (one main and one duplicate output of each channel).

Note: When fiber SFP modules are used the main and duplicate MADI outputs span two separate SFP modules to guard against an SFP failure, see section 9.11 for details.

- Up to 64 channels of audio per MADI output.
- Maximum of 768 (12 x 64) audio channels per 4929 audio output module.
- MADI streams are generated locked to the AES reference. All audio must be synchronous for fully transparent operation. Re-generate VU&C data. (See Table 147 on page 421 for default standard details).
- Asynchronous AES channels will be added to the MADI using drop/repeat techniques.
- Asynchronous Dolby E will not pass error free through MADI outputs.

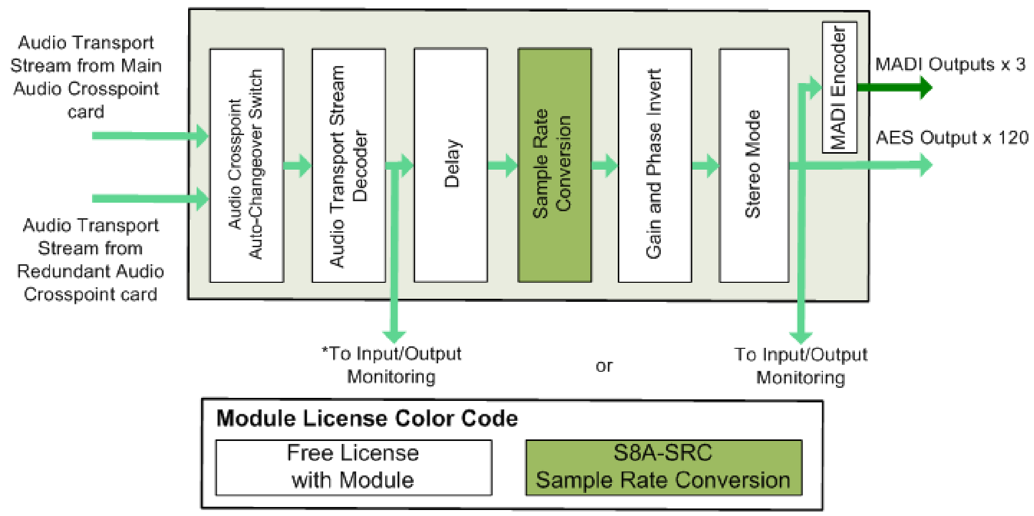
9.1.5 Audio Processing on the Output Module

The 4929 audio output module can manipulate the audio channels received from the audio crosspoint before outputting them.

Note:
- Sample Rate Conversion (SRC) is a licensed option and must be purchased for each module it is used on (See section 1.6 for details).
- The audio processing functions allow delay, gain control, phase invert and stereo mode (left/right swap, left both, right both or mono mix). The audio processing is standard for each audio module.

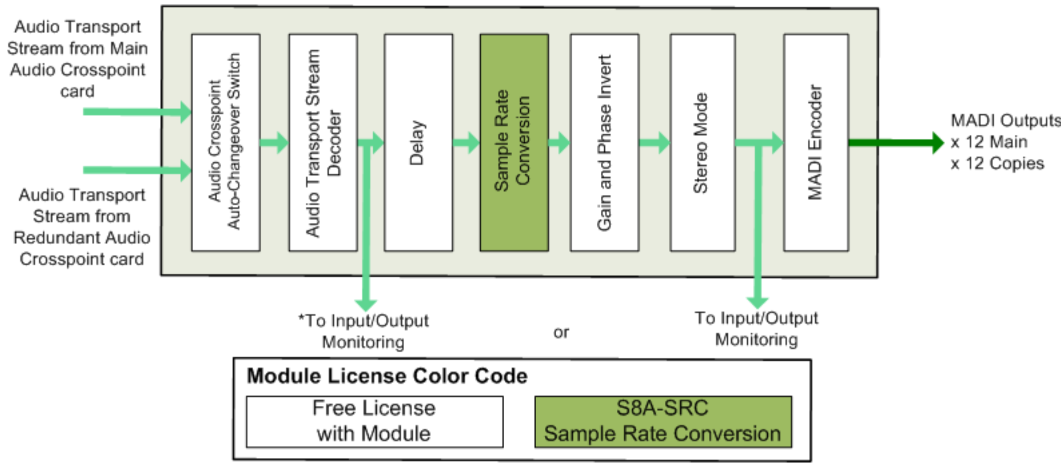
Audio processing is controlled from Workbench, RollCall or RollPod panels.

Figure 135 and Figure 136 show the order that the processing is applied to the audio signals.



*Input/Output Monitoring selected from either the input or the output of the module (pre- or post-processing). See section 3.6.2 for details on how to configure this using the router Door screen.

Figure 135 Audio Channel Processing Block Diagram (AES Rear Panel)



*Input/Output Monitoring selected from either the input or the output of the module (pre- or post-processing). See section 3.6.2 for details on how to configure this using the router Door screen.

Figure 136 Audio Channel Processing Block Diagram (MADI Rear Panel)

9.1.5.1 Audio Delay

Delay is applied to an audio output channel in steps of 0.25 ms:

- MADI - in a range of 0 to 2 Seconds @ 48 kHz
- AES - in a range of 0 to 2 Seconds @ 48 kHz

9.1.5.2 Sample Rate Conversion

Sample Rate Conversion (SRC) allows the sample rate of audio from the audio crosspoint to be converted to a different sample rate and output from the 4929 module. The following figures show the SRC section of the Workbench audio output processing screens for both AES and MADI.

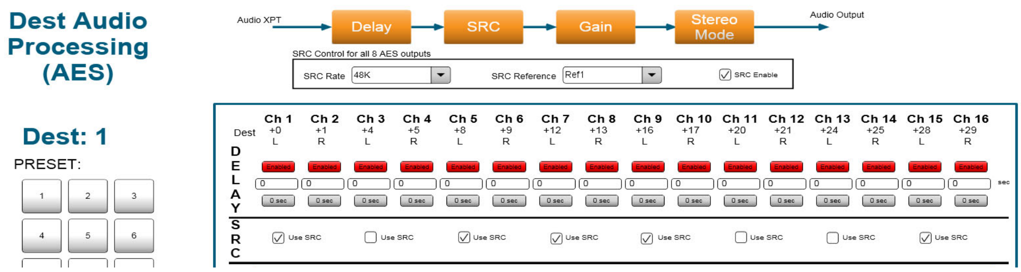


Figure 137 Example Workbench AES Audio Processing Screen Showing SRC Settings

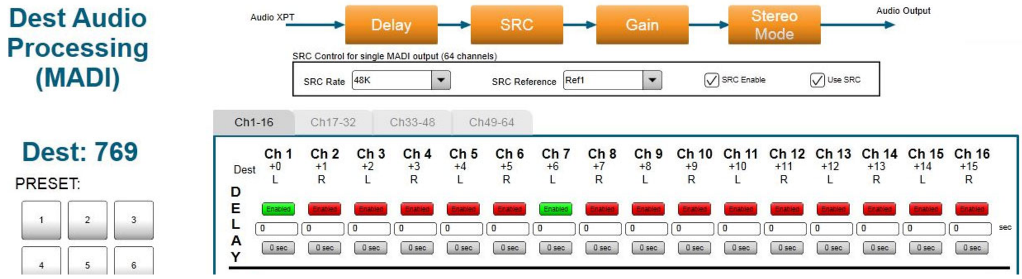


Figure 138 Example Workbench MADI Audio Processing Screen Showing SRC Settings

SRC Operation

- The audio outputs use sample rate converted to one of five references:
    - Ref 1 - Derived Reference 1 (Video)
    - Ref 2 - Derived Reference 2 (Video)
    - Ref 3 - Derived Reference 3 (Video)
    - Ref 4 - Derived Reference 4 (Video)
    - Ref 5 - AES Reference input
- Supported input sample rates from the audio crosspoint: 32 kHz, 44.1 kHz or 48 kHz
- **AES** - Sample rate conversion is applied to groups of eight audio pairs rather than individual channels. All selected pairs in the group will be synchronous to each other and output at the same selected sample rate. Deselected pairs will pass through with their sample rates unchanged.
    - Supports conversion to: 32 kHz, 44.1 kHz or 48 kHz

Note:
- When sample rate converting AES to 44.1 kHz the output must be locked to a 44.1 kHz AES reference.
- When sample rate converting AES to 32 kHz or 48 kHz the output can be locked to any video reference or to the AES reference (but not an AES reference of 44.1 kHz).

- **MADI** - Sample rate conversion is applied to all pairs in the MADI output stream rather than individual channels. All pairs in the MADI stream will be synchronous to each other and output at the same selected sample rate.
    - Supports conversion to: 48 kHz
- Channels within a pair must be the same initial sample rate and synchronous to each other. If they are asynchronous to each other then sample drop or repeat is used on the right channel to match the left channel.
- Pairs within an AES group or MADI output stream can be asynchronous to each other and can be different sample rates to each other when they enter the sample rate conversion process.
- The output from the sample rate conversion can be locked to the AES reference input or one of the four physical video reference inputs.
    - If no reference signal is present on the selected reference input all the SRCs on the 4929 module using that reference input will be free running and independent of any other module in the frame.

Dolby Signals

- Dolby signals must be routed as a synchronous AES pair. The Dolby signal will automatically bypass the SRC even if the pair is selected for sample rate conversion. Any near rate reference locking is achieved by dropping or repeating Null samples in the guard band.

Example SRC mode (AES)

SRC settings required to convert a group of eight AES pairs to 44.1 kHz locked to the AES reference (See Figure 137 on page 204 for setting locations):

SRC Rate: 44.1 K

SRC Reference: Ref 5 (must be 44.1 kHz)

SRC Enable: Checked

Use SRC: Checked for each of the eight pairs

Example SRC mode (MADI)
SRC settings required to convert a MADI stream to 48 kHz locked to video reference 2 (See Figure 138 on page 204 for setting locations):

SRC Rate: 48 K

SRC Reference: Ref 2

SRC Enable: Checked

Use SRC: Checked

SRC straight through mode

- If an AES pair doesn't have sample rate conversion enabled (**Use SRC** unchecked) and doesn't have a reference selected (**Reference** Disabled) then that pair will be output at the same sample rate as the left channel of the pair. In the case of a MADI stream all of the pairs will be output at the same sample rate as the first active channel of the MADI stream.

Note:

- The maximum sample rate that can be input to the SRC in straight through mode is 50 kHz.
- **AES** - If channels within a pair are asynchronous to each other then sample drop or repeat is used on the right channel to match the left channel.
- **MADI** - If channels from the audio crosspoint are asynchronous to each other then sample drop or repeat is used on all channels to match the first active channel in the MADI stream.

Example SRC straight through mode (AES)
SRC settings required for SRC straight through mode for one or more of a group of eight AES pairs (See Figure 137 on page 204 for setting locations):

SRC Rate: Any

SRC Reference: Disabled

SRC Enable: Checked

Use SRC: Unchecked for the pair(s) required to work in SRC straight through mode

Example SRC straight through mode (MADI)
SRC settings required for straight through mode for a MADI stream
(See Figure 138 on page 204 for setting locations):

SRC Rate: Any

SRC Reference: Disabled

SRC Enable: Checked

Use SRC: Unchecked

Reference lock only mode

- A group of pairs or a MADI stream can be locked to the AES reference or one of the four physical video reference inputs without sample rate conversion being enabled.
    - If no reference signal is present on the selected reference input all the SRCs on the 4929 module using that reference input will be free running and independent of any other module in the frame.

Note:
- **AES** - If channels within a pair are asynchronous to each other then sample drop or repeat is used on the right channel to match the left channel.
- **MADI** - If channels from the audio crosspoint are asynchronous to each other then sample drop or repeat is used on all channels to match the first active channel in the MADI stream.

Example reference lock only mode (AES)
SRC settings required for reference lock only mode on a group of eight AES pairs locked to video reference 1 (See Figure 137 on page 204 for setting locations):

SRC rate: Any

SRC Reference: Ref 1

SRC Enable: Unchecked

Use SRC: Unchecked

Example reference lock only mode (MADI)
SRC settings required for reference lock only mode on a MADI stream locked to the AES reference (See Figure 138 on page 204 for setting locations):

SRC Rate: Any

SRC Reference: Ref 5

SRC Enable: Unchecked

Use SRC: Unchecked

9.1.5.3 Gain Control and Phase Invert

Gain

Gain is applied to an audio output channel as Silence (mute) or in steps of 0.1dB in a range of -72 dB to +30 dB.

Phase Invert

Phase invert will invert the audio waveform.

9.1.5.4 Stereo Mode

Stereo Mode is used to manipulate stereo pairs. Options include: Left/Right Swap, Left Both, Right Both and Mono Mix.

Left/Right Swap

Left/Right swap is used to swap the two audio channels of an AES pair over.

Left Both & Right Both

Left Both and Right Both are used to duplicate the selected channel of a stereo pair and pass the two identical channels out of the router in place of the original pair.

Mono Mix

Mono Mix is used to mix a stereo pair together to create a single mono signal. This single mono signal is passed out of the router on both of the original channels.

The Mono Mix is: $\frac{A + B}{2}$

9.1.6 4929 Connections to the Audio Crosspoints

The 4929 audio output module receives two identical multiplexed audio transport streams, each of which contains all of the audio channels on the output module (up to 768 mono channels). One transport stream is received from the main audio crosspoint module and a duplicate transport stream is received from the redundant audio crosspoint module. The output module monitors the transport streams received from each of the audio crosspoint modules for errors. If an error is found the output module will use the transport stream from the other audio crosspoint module if it is fitted.

Important:

- Due to the nature of multiplexed audio transport streams there is an extremely small delay between groups of channels as the transport stream is constructed. If the audio is locked to the input these delays will need to be considered.
- If the audio is locked to an external reference or is sample rate converted these delays are managed by the router and the audio will remain co-timed.

9.1.7 4929 Output Module LED Information

Table 56 shows the LED color code on the 4929 Output Module, and Figure 139 shows the front edge of the output module.

Table 56 4929 Output Module LED Information

LED Color	Label	Detail	Normal Working Status
Blue/Green	Fugue Status	CPU status of on-board operating system	**Flashing sequence Green, Green, Blue** - normal operation the CPU is programmed and running **Brief Red Flash at startup** - normal **Flashing Red** - CPU Error. Remove module and refit to force a reboot.

Table 56 4929 Output Module LED Information (Continued)

LED Color	Label	Detail	Normal Working Status
Red Green	LED R LED G	FPGA status	**Flashing rapidly between Red & Green** (2 Hz each LED) - starting up **Green On Solid & Red Off** - normal state working correctly **Green Off & Red On Solid** - FPGA programming fault found. Remove module and refit to force a reboot. **Red & Green Flashing very rapidly in sync** (4 Hz each LED) - A change has been made to the module settings database in RAM but it has not yet been written to flash memory. This is not a fault and the flash memory will be updated after 10 seconds of no audio setting changes being made. Do not remove power from the module while this indication is present as the flash may become corrupted. Other indications are displayed when performing a firmware upgrade, see the Sirius 800 Maintenance & Upgrade manual for details.
Green	Power OK	Power to the module	**On Solid** - working correctly
Yellow	Command OK	Receiving messages from local Nucleus control module (the Nucleus controller in this frame)	**Flashing** - receiving information and working correctly
Red	Error	Error with messages from local Nucleus control module (the Nucleus controller in this frame)	**Off** - normal state **Flashing** - the command message from the router controller is corrupt or hasn't been received. This communications error could be caused by a hardware failure or incorrect Insertion. Check that the module is inserted correctly. If the "Error" LED is flashing at the same time as the "Command OK" LED is flashing it suggests a mismatch in the configuration of the Nucleus controller. Check the controller configuration.
Green	Video Ref 1	External Video Reference 1 Status	**On Solid** - external video reference present and local oscillators locked. **Off** - external video reference not present.
Green	Video Ref 2	External Video Reference 2 Status	**On Solid** - external video reference present and local oscillators locked. **Off** - external video reference not present.

Table 56 4929 Output Module LED Information (Continued)

LED Color	Label	Detail	Normal Working Status
Green	Video Ref 3	External Video Reference 3 Status	**On Solid** - external video reference present and local oscillators locked. **Off** - external video reference not present.
Green	Video Ref 4	External Video Reference 4 Status	**On Solid** - external video reference present and local oscillators locked. **Off** - external video reference not present.
Green	AES Ref	External AES Reference Status	**On Solid** - external AES reference present and local oscillators locked. **Off** - external video reference not present.

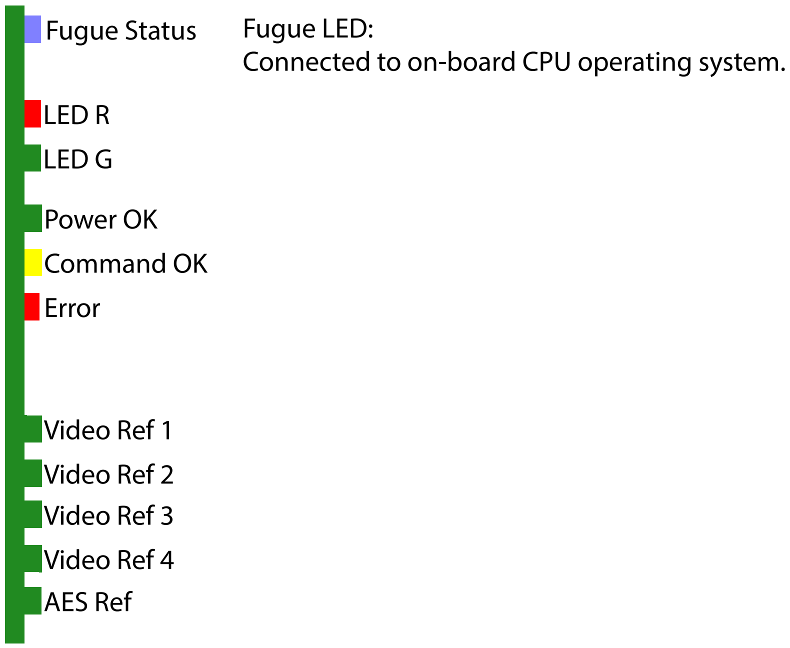


Figure 139 4929 Output Module LEDs

9.2 55926 and 5926 Standard Video O/p Module (Non Expandable)

55926 and 5926 Sirius 800 Standard Video Output Module (Non Expandable):

The 55926 and 5926 Sirius 800 standard video output module with re-clocking has 24 video output channels and can handle SD, ASI and HD signals up to 3Gb/s. The 55926 is a form, fit and function replacement for the 5926.

Note: **Sirius 850**: If video expansion is required from a second Sirius 850 frame use the 55938/5938 video output module, See section 10.3.

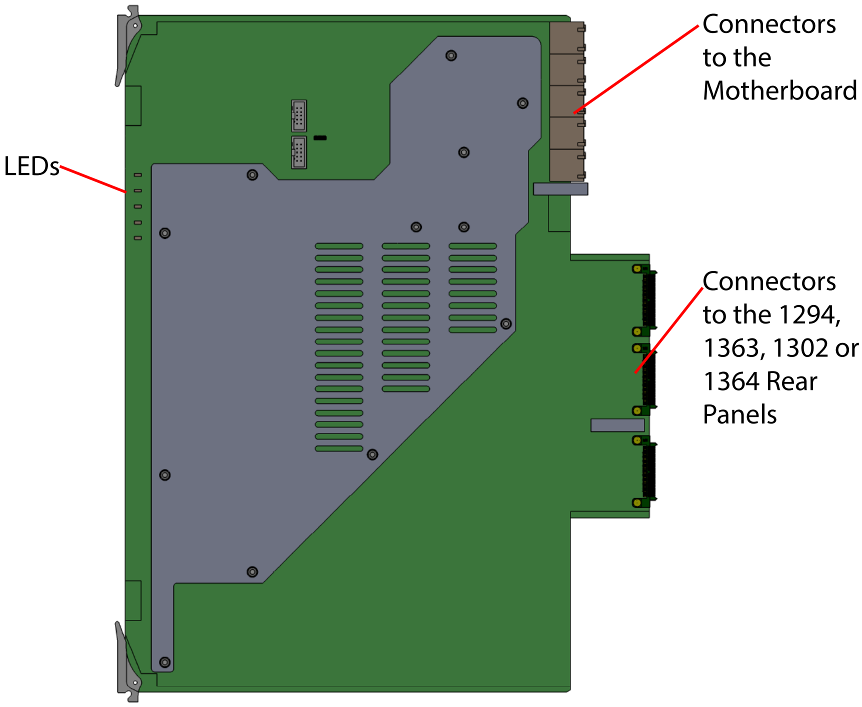


Figure 140 55926/5926 Sirius 800 Standard Video Output Module (Non Expandable)

Note:

- Jumpers and Headers are present on the video output module and these are for Grass Valley Use Only.
- In normal operation no jumper links or headers are fitted.

The 55926/5926 video output module is compatible with the rear panels listed in Table 57

Table 57 55926/5926 Rear Panel Compatibility

Rear Panel	See Section
1294 BNC rear panel	See section 9.5
1363 HD BNC rear panel	See section 9.6
1302 Fiber rear panel	See section 9.7
1364 DS-Link rear panel	See section 9.8

9.2.1 55926/5926 Output Module LED Information

Table 58 shows the LED color code on the 55926/5926 Output Module, and Figure 141 shows the front edge of the output module.

Table 58 55926/5926 Output Module LED Information

LED Color	Label	Detail	Normal Working Status
Green	Power OK	Power to the module	**On Solid** - working correctly
Yellow	Local Command OK	Receiving messages from local Nucleus control module (the Nucleus controller in this frame)	**Flashing** - receiving information and working correctly
Red	Local Command Error	Error with messages from local Nucleus control module (the Nucleus controller in this frame)	**Off** - normal state **Flashing** - the command message from the router controller is corrupt or hasn't been received. This communications error could be caused by a hardware failure or incorrect insertion. Check that the module is inserted correctly. If the “Local Command Error” LED is flashing at the same time as the “Local Command OK” LED is flashing it suggests a mismatch in the configuration of the Nucleus controller. Check the controller configuration.
Yellow	Remote Command OK	Receiving messages from local Nucleus control module (the Nucleus controller in the frame linked to this frame)	**Flashing** - receiving information and working correctly
Red	Remote Error	Error with messages from local Nucleus control module (the Nucleus controller in the frame linked to this frame)	**Off** - normal state **Flashing** - the command message from the router controller is corrupt or hasn't been received. This communications error could be caused by a hardware failure or incorrect Insertion. Check that the module is inserted correctly. If the “Error” LED is flashing at the same time as the “Command OK” LED is flashing it suggests a mismatch in the configuration of the Nucleus controller. Check the controller configuration.

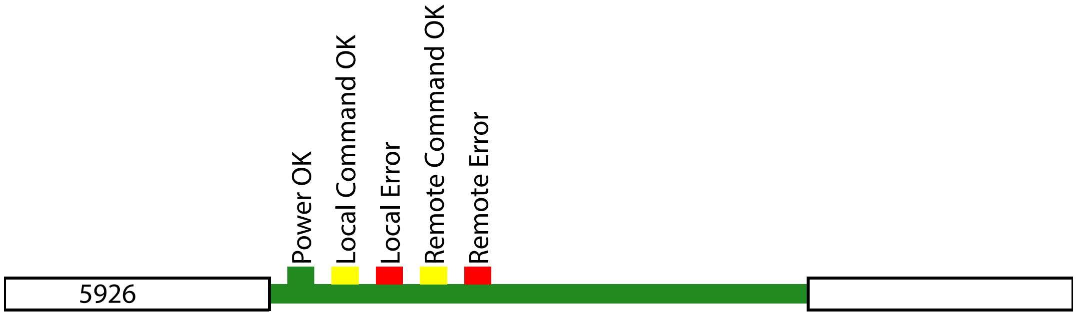


Figure 141 55926/5926 Output Module LEDs (5926 shown)

9.3 55949 and 5949 Video Embedding & AHP O/p Module, Delay & Sync

55949 and 5949 Sirius 800 Video Embedding & AHP Output Module with Delay and Sync Capability:

Important: Early Sirius 800 routers must be modified by Grass Valley before they can be used with the 55949/5949. See section 1.14 to check if the router needs modifying.

WARNING:

The 55949/5949 module heat sink can get very hot during normal operation. When removing the module from a router do not touch the heat sink until it has had time to cool down.

The 55949 and 5949 Sirius 800 video embedding & AHP output module with delay and sync capability has 24 video output channels and can handle SD and HD signals up to 3Gb/s. The module also accepts DVB-ASI input signals, but there is *no processing* in this case.

The 55949 module is a form, fit and function replacement for the 5949 module.

Note: The 55949 module does require some different FPGA firmware to the 5949.

The 55949/5949 module can be used for expansion in dual frame Sirius 850 systems, see section 10.2.

The audio embedder synchronously re-inserts up to 16 mono audio channels per video output channel (16 for SD and HD) giving up to 768 audio channels per 55949/5949 output module.

The 55949/5949 AHP video output module contains a powerful processing engine that can manipulate the individual audio channels passing through it (see section 9.3.1). The output module also contains frame/line synchronizers allowing video signals to be synchronized with router references (see section 9.3.1.1). Audio and video processing are licensed features which must be purchased for each module they are needed on, See section 1.9.1 for licensing details.

The 55949/5949 output module synchronizes routed audio channels (by drop/repeat) to re-time to the video signal for embedding. All VANC (Vertical Ancillary) data and all non-audio HANC (Horizontal Ancillary) data is removed.

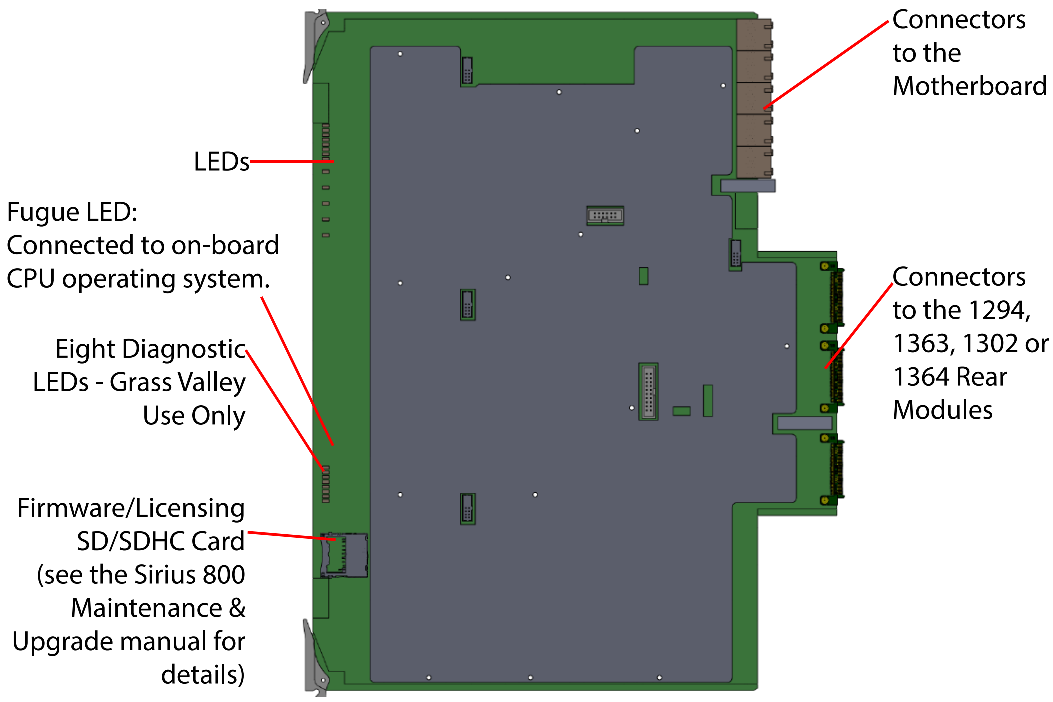


Figure 142 55949/5949 24-Channel Video Output Module with Audio Embedding

Note:
- Jumpers and Headers are present on the video output module and these are for Grass Valley Use Only.
- In normal operation no jumper links or headers are fitted.

The 55949/5949 video output module is compatible with the rear panels listed in Table 57

Table 59 55949/5949 Rear Panel Compatibility

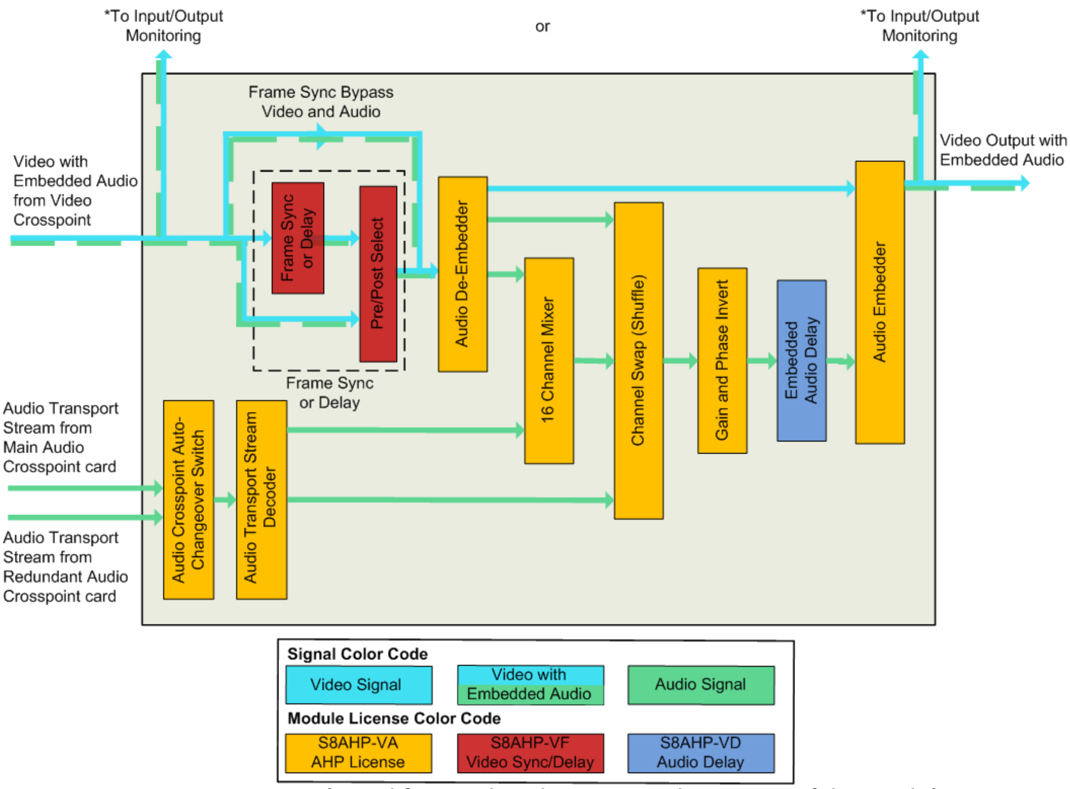
Rear Panel	See Section
1294 BNC rear panel	See section 9.5
1363 HD BNC rear panel	See section 9.6
1302 Fiber rear panel	See section 9.7
1364 DS-Link rear panel	See section 9.8

9.3.1 Processing on the Output Module

The 55949/5949 video output module can manipulate the audio channels received from the crosspoint modules before outputting them.

Note: Video and Audio processing are licensed options and must be purchased for each module they are used on (See section 1.6 for details).

Processing is configured in Workbench. Figure 143 shows the order that the video and audio processing is applied to the signal.



*Input/Output Monitoring selected from either the input or the output of the module (pre- or post-processing). See section 3.6.2 for details on how to configure this using the router Door PC.

Figure 143 Processing Block Diagram

If any audio channels routed from the audio crosspoints are asynchronous to the video signal they are being embedded in the output module will use drop/repeat to synchronize the audio channels with the video signal.

9.3.1.1 Frame/Line Sync and Video Delay

The video processing block can be used for frame/line sync or video delay on a channel by channel basis but they cannot both be used on the same channel.

> **Note:** Video Frame Synchronization is achieved by dropping or repeating video frames when the Frame Buffer is empty or full.
>
> Selecting audio post synchronization means that when a video frame is dropped or repeated a frame of audio will also be dropped or repeated.
>
> Selecting audio pre synchronization means that when a video frame is dropped or repeated the audio will not be dropped or repeated so will no longer be associated with the original video frame resulting in lip sync mismatch.
>
> Therefore Grass Valley recommends that the synchronizers are used to re-time video in synchronous systems only.

Figure 144 Example Workbench Frame Sync/Delay Summary Screen

The video channel is selected using the dial-up panel. The Frame Sync/Delay screen displays the currently detected video standard for the selected channel.

The configuration buttons at the top of the screen are used to configure the general behavior of the video channel.

The **Summary** tab displays all of the possible video standards and whether they are configured for frame sync or delay. The signal standard is auto detected and the channel uses the settings defined in the appropriate Frame sync or Delay tab for that standard.

Table 60 Frame Sync/Delay Summary Screen

Function	Function Description
Channel Configuration (Applies to all video standards)	
Detected Standard:	Displays the detected video standard for the selected video channel.
Summary button	Click on the Summary button to return to the summary screen
Frame Sync Enabled	Check the box to enable frame/line sync on the selected video channel.

Table 60 Frame Sync/Delay Summary Screen (Continued)

Function	Function Description
Audio Selection	Select the embedded audio from before or after the frame sync block by clicking on the required option.
Sync Function	Select to sync to frame or to line by clicking on the required option.
Summary tab (**Standard** & **Mode**) for each video input standard	
Frame Sync Indicator	Green when frame sync is enabled for the video standard. Red when frame sync is not enabled for the video standard
Delay Indicator	Green when video delay is enabled for the video standard. Red when video delay is not enabled for the video standard

Frame/Line Sync

A video output signal can set to frame or line sync to a video reference signal (physical or derived) as long as the video output signal and reference frame rates match. An offset can be applied to the output signal relative to the frame or line sync to allow for delays later in the system.

The offset for frame sync is set in frames, lines and pixels or in milliseconds. The offset for line sync is set in pixels or in milliseconds. The offset settings can be preset for each standard of video signal that might be expected to be routed to the output. Video offset is set in steps of 0.00001 ms up to a maximum of 14 frames for progressive video standards or 14 fields for interlaced video standards.

The embedded audio can be sourced from before or after the frame sync block using the Pre/Post Selector as required.

Each video standard has a tab for frame sync configuration and a tab for delay configuration. The signal standard is auto detected and the channel uses the settings defined in the appropriate Frame sync or Delay tab for that standard.

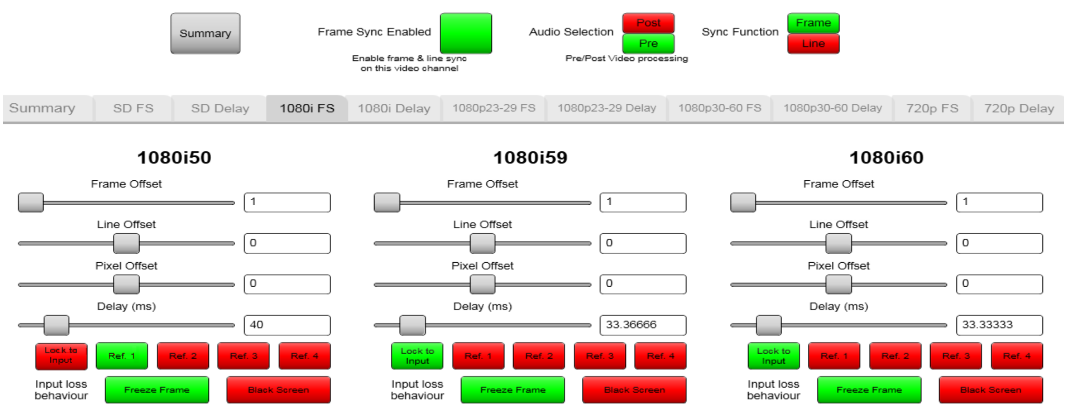


Figure 145 Example Workbench 1080i Frame Sync Settings Tab

The example in Figure 145 shows:

- **1080i50** - set to **Ref 1** so a 1080i50 signal will use frame sync settings in the **1080i FS** tab.
- **1080i59** - set to **Lock to Input** so a 1080i59 signal will use delay settings in the **1080i Delay** tab.
- **1080i60** - set to **Lock to Input** so a 1080i60 signal will use delay settings in the **1080i Delay** tab.

Table 61 Frame Sync Configuration

Function	Function Description
XXXX FS tab (where XXXX is the video standard, e.g. **1080i FS**) Video standard configuration tabs for Frame/Line Sync	
Frame Offset*	Select the number of frames of offset from the reference. Only available if **Sync Function** is selected as **Frame**. If **Line** is selected then the frame slider is not visible.
Line Offset*	Select the number of lines of offset from the reference. Only available if **Sync Function** is selected as **Frame**. If **Line** is selected then the frame slider is not visible.
Pixel Offset*	Select the number of pixels of offset from the reference.
Delay ms*	Select the offset in milliseconds from the reference.
*When setting any one of the above values the other settings will automatically changes to reflect the setting being made.	
Reference	**Lock to Input**- Select **Lock to Input** to enable video delay for the video standard. **Reference 1** to **4** - Select which video reference the signal will be synchronized to.
Input Loss behavior	**Freeze Frame** - in the event of input signal loss the last good frame is output. **Black Screen** - in the event of input signal loss a black screen is output.

Video Delay

Delay is applied to a video output channel in frames, lines, pixels or in milliseconds. Video delay is set in steps of 0.00001 ms up to a maximum of 14 frames for progressive video standards or 14 fields for interlaced video standards.

Note: To enable video delay for a particular video standard **Lock to Input** must be selected in either the delay tab or the frame sync tab of the same standard.

Each video standard has a tab for frame sync configuration and a tab for delay configuration. The signal standard is auto detected and the channel uses the settings defined in the appropriate Frame sync or Delay tab for that standard.

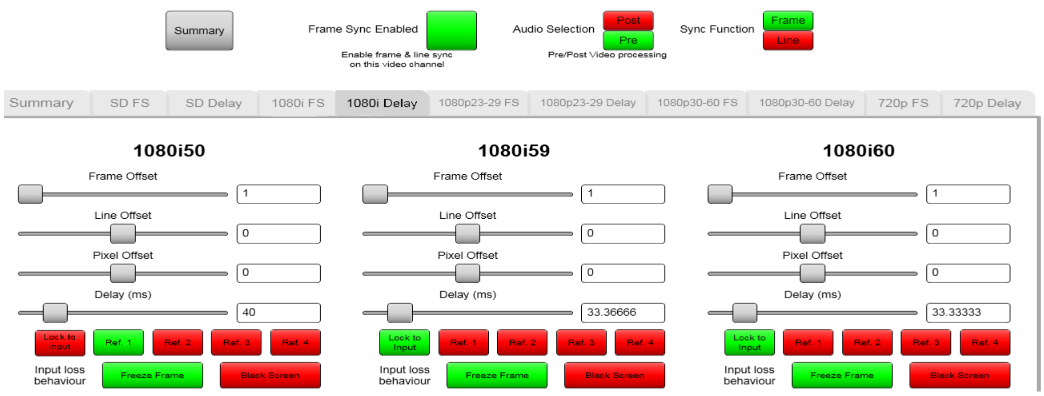


Figure 146 Example Workbench 1080i Delay Settings Screen

The example in Figure 146 shows:

- **1080i50** - set to **Ref 1** so a 1080i50 signal will use frame sync settings in the **1080i FS** tab.
- **1080i59** - set to **Lock to Input** so a 1080i59 signal will use delay settings in the **1080i Delay** tab.
- **1080i60** - set to **Lock to Input** so a 1080i60 signal will use delay settings in the **1080i Delay** tab.

Table 62 Video Delay Configuration

Function	Function Description
XXXX Delay tab (where XXXX is the video standard, e.g. **1080i Delay**) Video standard configuration tabs for Delay	
Frame Offset*	Select the number of frames of video delay. Only available if **Sync Function** is selected as **Frame**. If **Line** is selected then the frame slider is not visible.
Line Offset*	Select the number of lines of video delay. Only available if **Sync Function** is selected as **Frame**. If **Line** is selected then the frame slider is not visible.
Pixel Offset*	Select the number of pixels of video delay.
Delay ms*	Select the video delay in milliseconds.
*When setting any one of the above values the other settings will automatically change to reflect the setting being made.	
Reference	**Lock to Input**- Select **Lock to Input** to enable video delay for the video standard. **Reference 1** to **4** - Not used for Delay.
Input Loss behavior	**Freeze Frame** - in the event of input signal loss the last good frame is output. **Black Screen** - in the event of input signal loss a black screen is output.

9.3.1.2 16 Channel Mixer

There are 16 Mixers available per video output channel and each mixer can mix up to 16 channels of audio. Each 16 channel mixer is used to mix two or more audio output channels together to create a single mono signal that is output from the mixer.

The mixing process is purely additive and the gain of the mixed signal will need to be reduced to ensure it has the correct gain level.

9.3.1.3 Channel Swap (Shuffle)

The channel shuffler is used to change the channel order of one or more of the audio channels

9.3.1.4 Gain control and Phase Invert

Gain

Gain is applied to an audio output channel as Silence (mute) or in steps of 0.1dB in a range of -72 dB to +30 dB.

Phase Invert

Phase invert will invert the audio waveform.

9.3.1.5 Embedded Audio Delay

Embedded audio delay is applied to an audio input channel in steps of 0.25 ms in a range of 0 to 5.46 Seconds.

9.3.2 55949/5949 Connections to the Audio Crosspoints

The 55949/5949 video output module receives two identical multiplexed audio transport streams, each of which contains all of the audio channels on the output module (up to 768 mono channels). One transport stream is received from the main audio crosspoint module and a duplicate transport stream is received from the redundant audio crosspoint module. The output module monitors the transport streams received from each of the audio crosspoint modules for errors. If an error is found the output module will use the transport stream from the other audio crosspoint module if it is fitted.

Important:

- Due to the nature of multiplexed audio transport streams there is an extremely small delay between groups of channels as the transport stream is constructed. If the audio is locked to the input these delays will need to be considered.
- If the audio is locked to an external reference these delays are managed by the router and the audio will remain co-timed.

9.3.3 55949/5949 Output Module LED Information

Table 63 shows the LED color code on the 55949/5949 Output Module, and Figure 147 shows the front edge of the output module.

Table 63 55949/5949 Output Module LED Information

LED Color	Label	Detail	Normal Working Status
Red Green	1	FPGA 1 status	**Each Pair of FPGA LEDS:** **Flashing rapidly between Red & Green** (2 Hz each LED) - starting up **Green On Solid & Red Off** - normal state working correctly Green Off & Red On Solid - FPGA programming fault found. Remove module and refit to force a reboot. **Red & Green Flashing very rapidly in sync** (4 Hz each LED) - A change has been made to the module settings database in RAM but it has not yet been written to flash memory. This is not a fault and the flash memory will be updated after 10 seconds of no audio setting changes being made. Do not remove power from the module while this indication is present as the flash may become corrupted. Other indications are displayed when performing a firmware upgrade, see the Sirius 800 Maintenance & Upgrade manual for details.
Red Green	2	FPGA 2 status	
Red Green	3	FPGA 3 status	
Red Green	4	FPGA 4 status	
Green	Power OK	Power to the module	**On Solid** - working correctly

Table 63 55949/5949 Output Module LED Information (Continued)

LED Color	Label	Detail	Normal Working Status
Yellow	Local Command OK	Receiving messages from local Nucleus control module (the Nucleus controller in this frame)	**Flashing** - receiving information and working correctly
Red	Local Command Error	Error with messages from local Nucleus control module (the Nucleus controller in this frame)	**Off** - normal state **Flashing** - the command message from the router controller is corrupt or hasn't been received. This communications error could be caused by a hardware failure or incorrect insertion. Check that the module is inserted correctly. If the “Local Command Error” LED is flashing at the same time as the “Local Command OK” LED is flashing it suggests a mismatch in the configuration of the Nucleus controller. Check controller configuration.
Yellow	Remote Command OK	Receiving messages from remote Nucleus control module (the Nucleus controller in the frame linked to this frame)	**Sirius 830/840/850 (no expansion)**: **Off** - Expansion not used. **Sirius 850 (expanded to second frame)**: **Flashing** - receiving information and working correctly
Red	Remote Error	Error with messages from remote Nucleus control module (the Nucleus controller in the frame linked to this frame)	**Sirius 830/840/850** (no expansion): **Off** - Expansion not used. **Sirius 850** (expanded to second frame): **Off** - normal state, **Flashing** - the command message from the remote router controller is corrupt or hasn’t been received. This communications error could be caused by a hardware failure or incorrect insertion. Check that the module is inserted correctly and the four RJ45 connections between the frames are fitted correctly (see section 10.2). If the “Remote Error” LED is flashing at the same time as the “Remote Command OK” LED is flashing it suggests a mismatch in the configuration of the Nucleus controller. Check controller configuration.
Blue/Green	Fugue Status	CPU status of on-board operating system	**Flashing sequence Green, Green, Blue** - normal operation the CPU is programmed and running **Brief Red Flash at startup** - normal **Flashing Red** - CPU Error. Remove module and refit to force a reboot.

Table 63 55949/5949 Output Module LED Information (Continued)

LED Color	Label	Detail	Normal Working Status
Amber		Eight Diagnostic LEDs - Grass Valley Use Only	**Normal LED Pattern Sequence** 1. All LEDs On for one Second 2. All LEDs Off except the top LED 3. All LEDs Off except the second LED from the top 4. This sequence continues until all LEDs are Off except for the bottom LED 5. All LEDs Off for 10 Seconds 6. Return to Step 1 Any other pattern - abnormal operation contact Grass Valley Customer Support

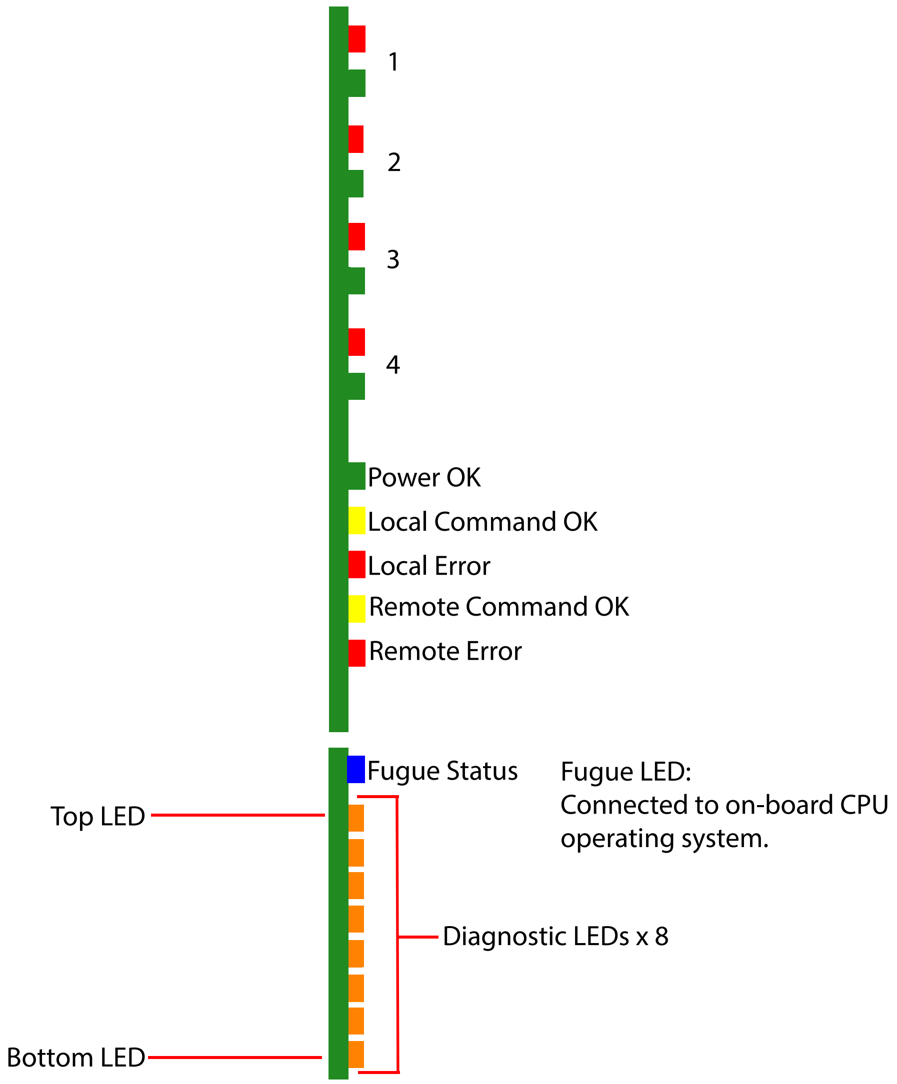


Figure 147 55949/5949 Output Module LEDs

9.4 5970 Video IP Output Module

9.4.1 Introduction

The 5970 Video IP Output Module provides video IP output capability to the Sirius 800 range. It works together with a Video IP Output rear panel (1832) and provides up to 4-off 40Gb/s Ethernet media links carrying 24 SDI video output IP streams from the router core.

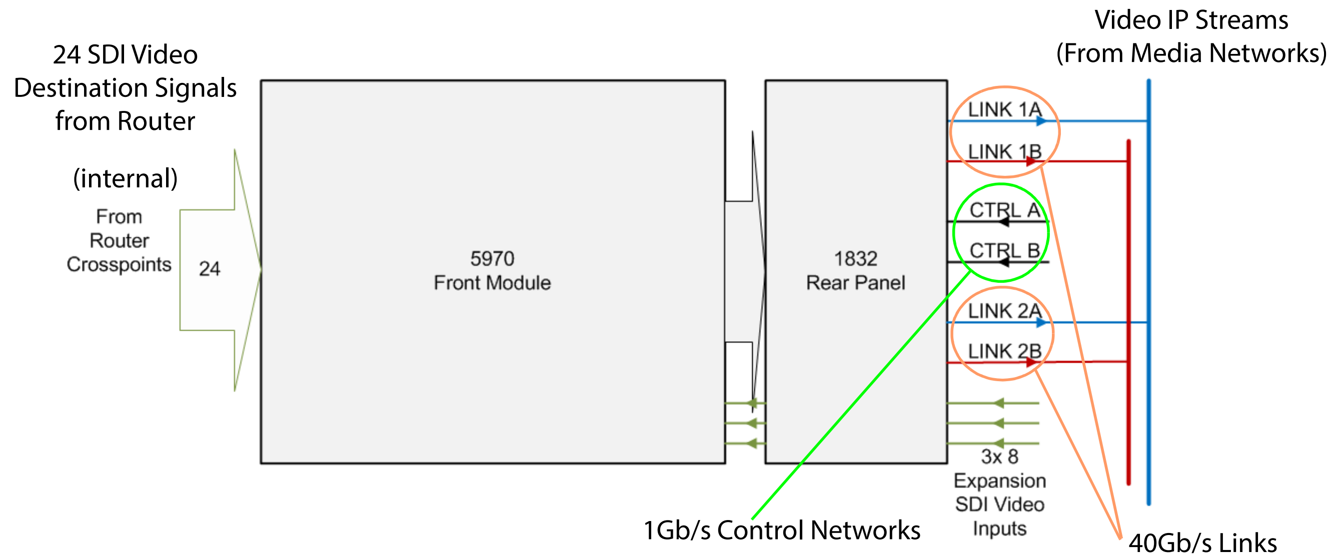


Figure 148 5970-1832 I/O Diagram

The 5970-1832 combination comprises two independent, multi-channel 'SDI-to-IP' circuit blocks (see Figure 149). 24 router crosspoint video signals (i.e. destinations, up to 3Gb/s video) are converted to video IP streams. (For Sirius 850 frame expansion systems, 24 expansion video inputs can be selectively converted to IP.) The 24 video IP streams are transmitted from high-performance IP network interfaces at the rear panel (1832). Each video output has associated frame buffering.

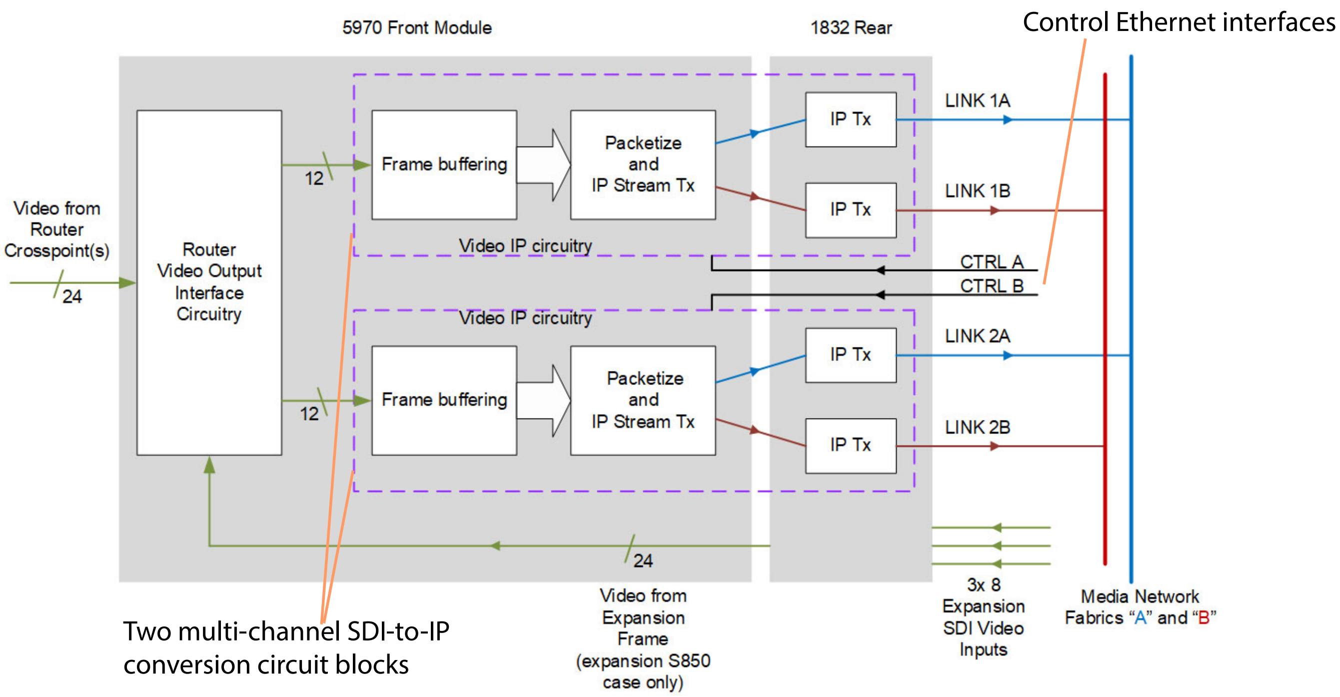


Figure 149 5970-1832 Block diagram

9.4.1.1 SDI-to-IP Block

Each multi-channel SDI-to-IP input circuit block:

- Uses 12 Video SDI signals internally from the router.
- Converts 12 SDI signals to 12 video IP streams.
- Supplies 12 video IP streams at a pair of high-performance 40G rear Ethernet ports via the rear panel.
- Can support media network redundancy.
- Can support in-band or out-of-band control.
- Is independently configurable (independent from each other and from the host router). Configuration is done either via:
    - rear panel control interfaces (**CTRL A** and **CTRL B**); or
    - media links (**LINK 1A** and **LINK 1B**, and **LINK 2A** and **LINK 2B**).

  See Figure 149.

9.4.1.2 SDI-to-IP and IQMIX40

Each multi-channel SDI-to-IP output block is based on a Grass Valley IQMIX40 modular card circuit. Functionally, each block is essentially an instance of an IQMIX40 card which is preset for 12 video channels of video 'SDI to IP' conversion (IQMIX40 SDI channels 1 to 12.).

For each multi-channel block, 12 router destination SDI video signals are used from video output circuitry and converted to 12 video IP streams. The IP streams are transmitted from 12 spigots and are sent out over two high-performance Ethernet interfaces.

Note: **Spigot** - Each IP spigot:

- Processes 12 SDI signals into video, audio and metadata data packets.
- Sends video IP streams out on *both* IP outputs (i.e. on Link A and Link B)

An IQMIX40 module itself has a total of 16 preset channels of 'IP-to-SDI' or 'SDI-to-IP' conversion, preset by the current software on the module. (Refer to the IQMIX40/41 User Manual on the Grass Valley website for more details about this modular product.) Software on a 5970 is preset for 12 channels of 'SDI-to-IP' conversion (per SDI-to-IP block).

Each SDI-to-IP block is configured separately to the router and independently.

9.4.2 5970 Module Profile

Note: The 5970 has 3 micro SD cards (see Figure 150) containing board software/firmware:

uSD card	Firmware Number	Comment
A	PA1330	For the router video output interface circuitry.
B	PA1331	For the video IP circuitry (two identical circuits).
C	PA1331	

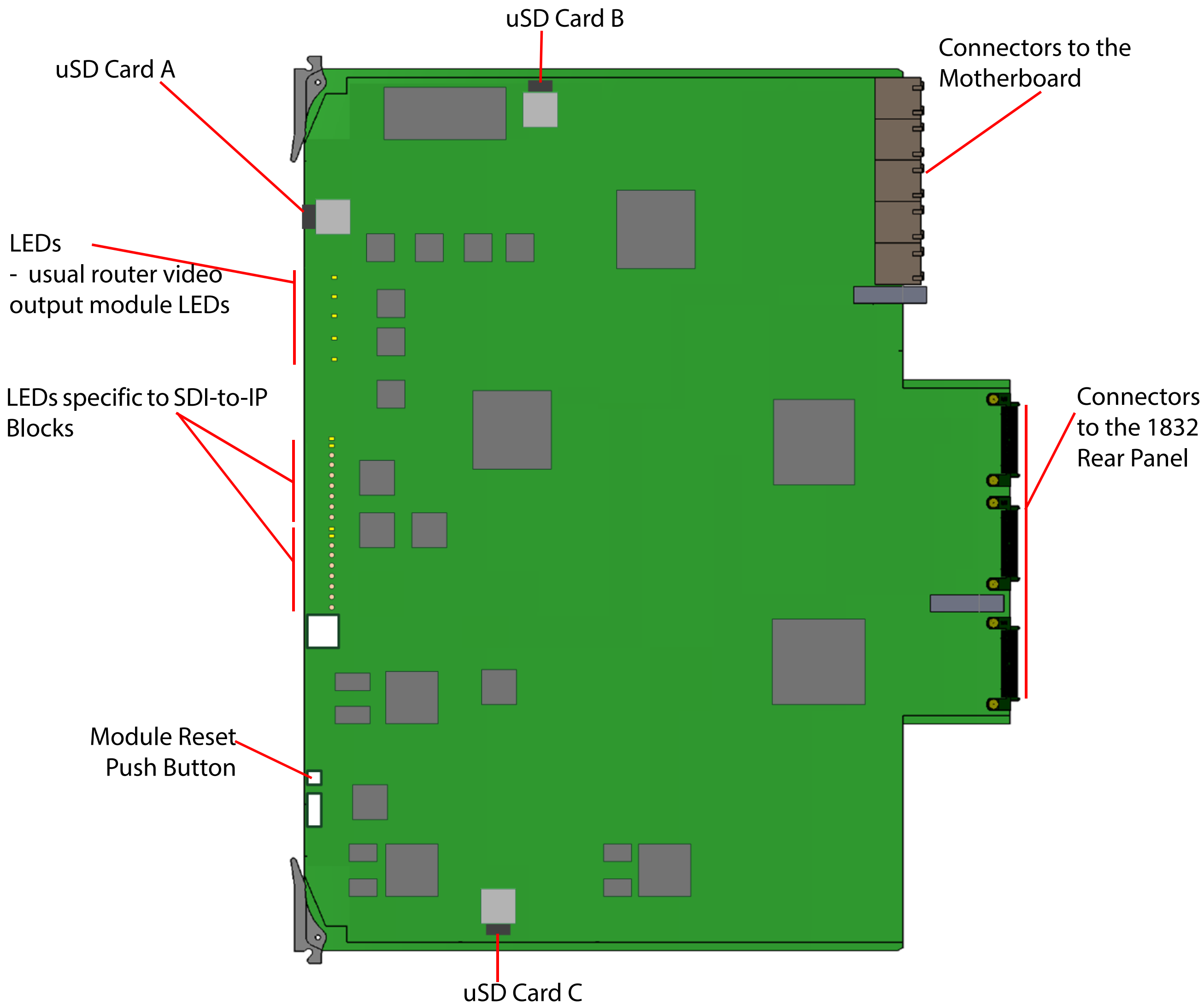


Figure 150 5970 Video IP Output Module

Note:
- Jumpers and Headers on the module are for Grass Valley Use Only.
- In normal operation no jumper links or headers are fitted.

The 5970 video output module is compatible with the rear panel listed in Table 64.

Table 64 5970 Rear Panel Compatibility

Rear Panel	See Section
1832 40Gb/s Video IP Output	See section 9.9 *1832 40Gb/s Video IP Output Rear Panel* on page 233

9.4.3 5970 Output Module LED Information

The controls and indicators on the front edge of the module are shown in Figure 151. Table 65 and Table 66 show the LED color codes.

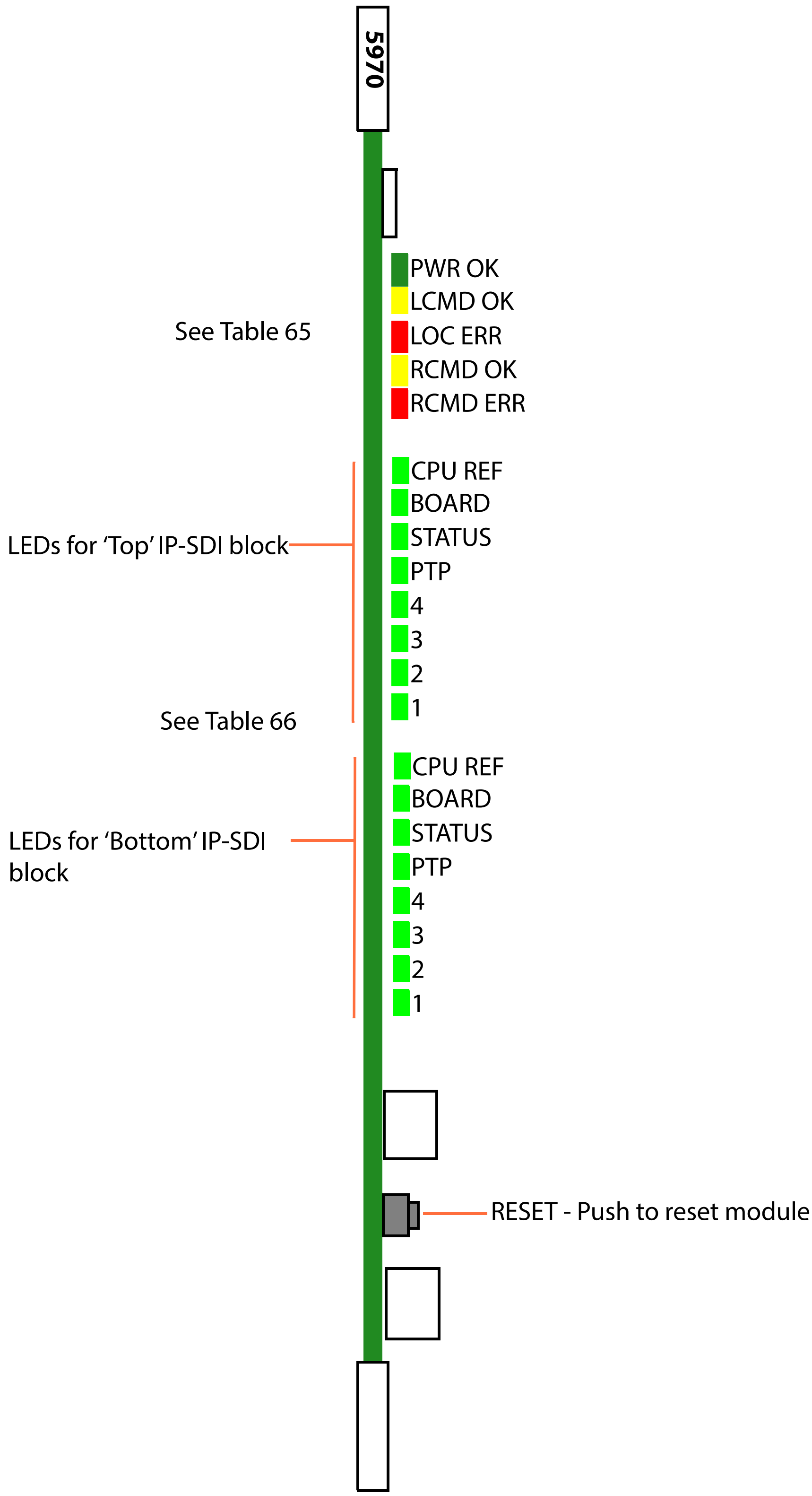


Figure 151 5970 Output Module Controls and LEDs

Table 65 5970 Output Module LED Information

LED Color	Label	Detail	Normal Working Status
Green	PWR OK	Power to the module	**On Solid** - working correctly
Yellow	LCMD OK	Receiving messages/commands from the local router control module (i.e. the router controller in this frame)	**Flashing** - receiving information and working correctly.
Red	LOC ERR	Communications error with messages from local router control module (i.e. the router controller in this frame) See **Note 1**.	**Off** - normal state **Flashing** - Communications error. The command message from the router controller is corrupt or has not been received.
Yellow	RCMD OK	Receiving messages/commands from remote Nucleus control module (i.e. the Nucleus controller in the frame linked to this frame)	**Sirius 830/840/850 (no expansion):** **Off** - Expansion not used. **Sirius 850 (expanded to second frame):** **Flashing** - receiving information, working correctly
Red	RCMD ERR	Communications error with messages from remote router control module (i.e. the router controller in the frame linked to this frame) See **Note 2**.	**Sirius 830/840/850 (no expansion)**: **Off** - Expansion not used. **Sirius 850 (expanded to second frame)**: **Off** - normal state, **Flashing** - Communications error. Command message from remote router controller is corrupt or not received.
Note 1:	A communications error could be caused by a hardware failure or incorrect module insertion. Check the module is inserted correctly. If “LOC ERR” and “LCMD OK” LEDs are both flashing, it suggests a mismatch in the configuration of the router controller: Check the Nucleus controller configuration.		
Note 2:	A communications error could be caused by a hardware failure or incorrect module insertion. Check: • The module is inserted correctly • The four RJ45 connections between the router frames are fitted correctly (see section 10.2). If “RCMD ERR” and “RCMD OK” LEDs are both flashing, it suggests a mismatch in the configuration of the router controller. Check the Nucleus controller configuration.		

Table 66 5970 SDI-to-IP Block LED Information

LED Color	Label	Detail	Normal Working Status
GREEN	CPU REF	Flashing = Watchdog timer OK Off = Watchdog not OK	Flashing green
GREEN	BOARD	Flashing = PTP sync OK Off = PTP sync failed	Flashing green
GREEN	STATUS	On = PTP lock OK Off = PTP lock failed	On
RED	PTP	Flashes red at 1 Hz.	Flashing red
	4	For Grass Valley engineering use.	-
	3	For Grass Valley engineering use.	-
	2	For Grass Valley engineering use.	-
	1	For Grass Valley engineering use.	-

9.4.4 Router Configuration

The 5970 module behaves in a similar way to other router video output modules as far as the host router's router controller in concerned. The 'module type' must be set up accordingly in the Module Configuration Editor of the Grass Valley WorkBench tool when configuring the router.

Table 67 5970 Router Configuration Module Type

Front Module	Module Type
5970	IPOutput

9.4.5 Module Configuration and Initial Setup

The 5970-1832 combination contains two IQMIX40-like SDI-to-IP blocks. Each must be configured separately to the router and independently:

- control interface CTRL A is used to configure the SDI-to-IP block at the top; and
- control interface CTRL B is used for the bottom block.

The default control interface IP addresses for the two SDI-to-IP blocks on the module are identical and given in Table 68.

Table 68 5970 SDI-to-IP Block Control Interface Default IP Address

SDI-to-IP Block of 5970	Default Control IP Address
Top	10.54.31.70
Bottom	10.54.31.70
Note:	The *default* IP Addresses are the same and require initial set up to unique, working IP addresses.

9.4.5.1 Initial Setup

See Appendix F, *5970 SDI-to-IP Initial Setup* on page 439.

9.4.5.2 Configuration

See Appendix F, *5970 SDI-to-IP Configuration* on page 439.

9.5 1294 Video BNC Output Rear Panel

The 1294 Sirius 800 video BNC output rear panel has 24 BNC outputs.

The 1294 rear panel is used with the 55949/5949/5925 video output module (24 channel video with audio embedder, re-clocking and AHP) and the 55926/5926 or 55938/5938 video output module (24 channel video with re-clocking).

The DS-Link expansion input connectors are used to expand a Sirius 850 system 1152[2], see section 10

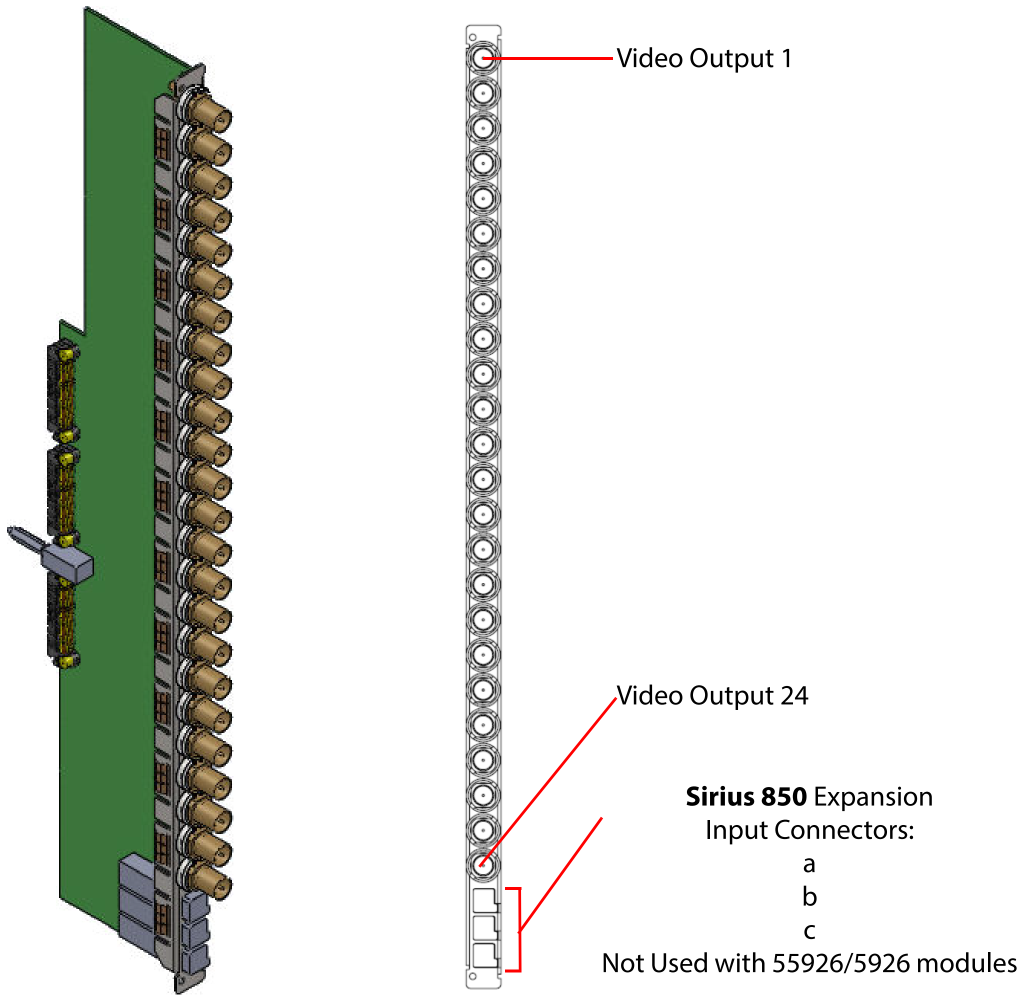


Figure 152 1294Sirius 800 Video BNC Output Rear Panel

All the BNC connectors on the output rear panel have Grass Valley's unique Catsii feature that illuminates each connector. See section 4 for details of the Catsii functionality.

9.6 1363 Video HD BNC Output Rear Panel

The 1363 Sirius 800 video HD BNC output rear panel has 24 HD BNC outputs and 3 DS-Link expansion inputs.

The 1363 rear panel is used with the 55949/5949/5925 video output module (24 channel video with audio embedder, re-clocking and AHP) and the 55926/5926 or 55938/5938 video output module (24 channel video with re-clocking).

The DS-Link expansion input connectors are used to expand a Sirius 850 system to 1152^2, see section 10

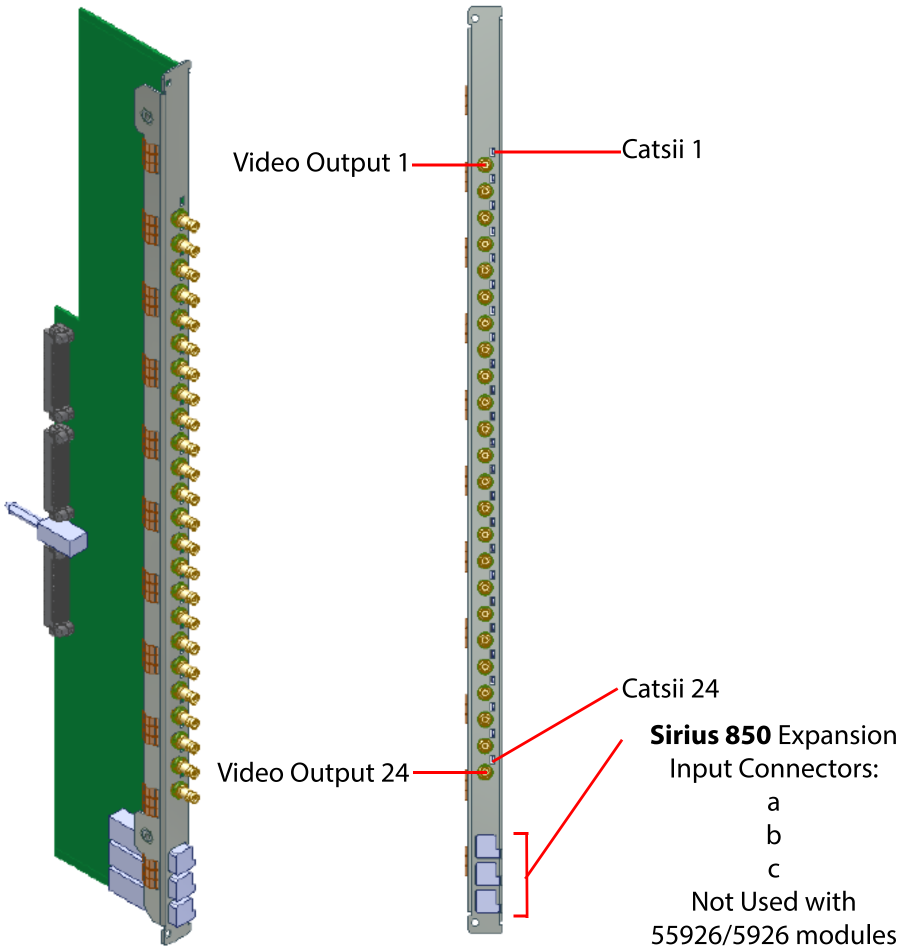


Figure 153 1363 Sirius 800 Video HD BNC Output Rear Panel

All the HD BNC connectors on the output rear panel have Grass Valley's unique Catsii feature that illuminates above each connector. See Section 4 *Catsii Functionality* on page 82 for details of the Catsii functionality.

- **DS-Link to DS-Link Cable - 6 metre**:
  Order Code FGAEY WDS6THIN
  Cable kit consists of 1 x 6 metre (19 Feet) DS-Link to DS-Link cable.

9.7 1302 Video Fiber Output rear panel

The 1302 Sirius 800 video fiber output rear panel has 12 fiber SFP cages with two outputs per fiber SFP module.

The 1302 rear panel is used with the 55949/5949/5925 output module (24 channel video with audio embedder, re-clocking and AHP) and the 55926/5926 or 55938/5938 video output module (24 channel video with re-clocking).

The DS-Link expansion input connectors are used to expand a Sirius 850 system 1152^2, see section 10

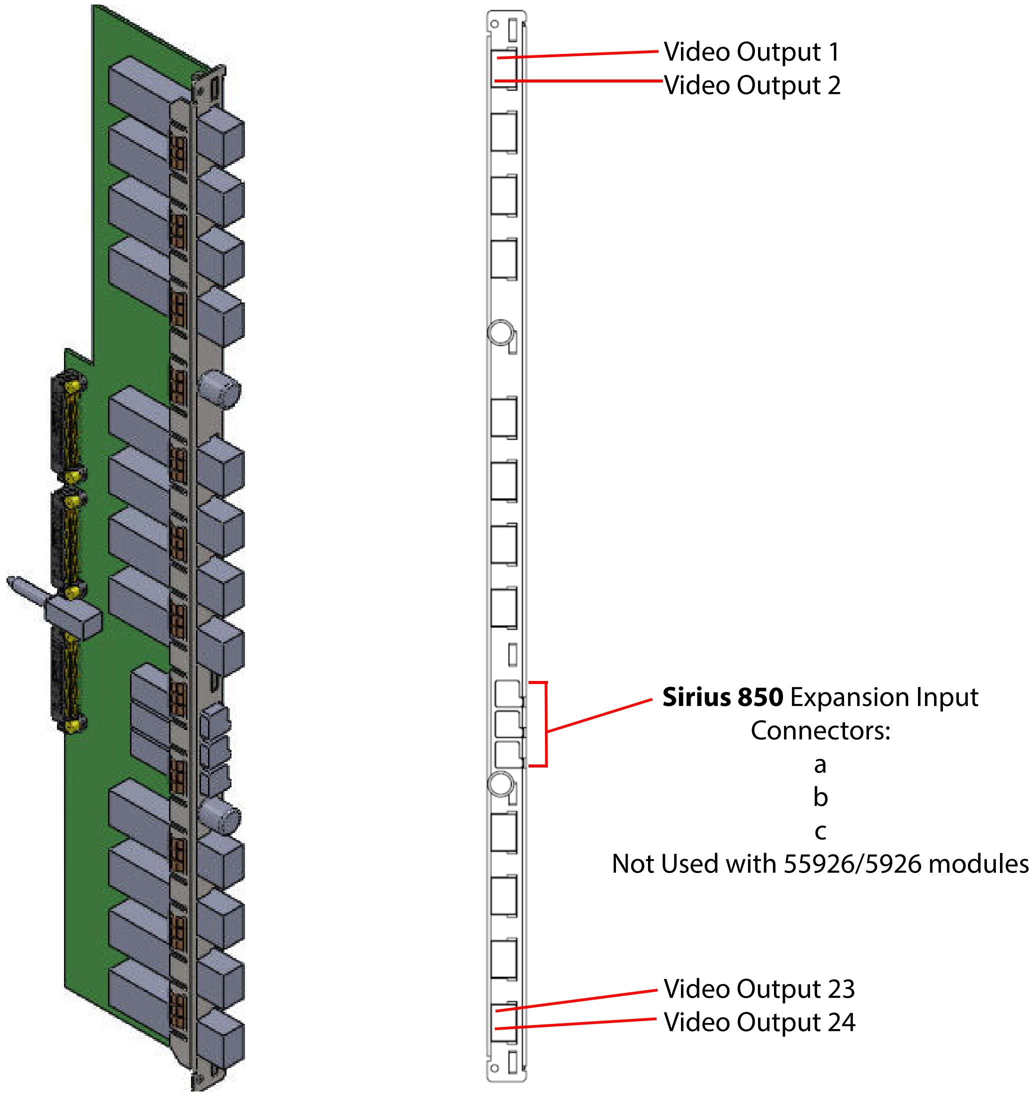


Figure 154 Sirius 800 video fiber output rear panel

All the fiber connectors on the output rear panel have Grass Valley's unique Catsii feature that illuminates each connector. See section 4 for details of the Catsii functionality.

When ordering the router the rear panels can be specified with or without fiber SFP transmitter modules. When the rear panels are ordered as spares they are supplied without Fiber SFP transmitter modules and these must be ordered separately. The Grass Valley order code for the standard SFP transmitter module is shown below.

- **Fiber SFP Transmitter Modul**e (Max 12 per rear panel)
  Order Code ST31ST31-3
  Fiber SFP 2 channel 1310nm -5 to 0 dBm output power. For 3G, HD, SD & MADI.

A number of CWDM Fiber SFP transmitter modules are also available, contact your local Grass Valley representative for details.

9.8 1364 Video DS-Link Output Rear Panel

The 1364 Sirius 800 video DS-Link output rear panel has 3 DS-Link outputs and 3 DS-Link expansion inputs.

The 1364 rear panel is used with the 55949/5949/5925 video output module (24 channel video with audio embedder, re-clocking and AHP) and the 55926/5926 or 55938/5938 video output module (24 channel video with re-clocking).

The DS-Link output connectors can be used to output signals to external Grass Valley IQ modular products or to expand a Sirius 850 system above 1152^2 (future enhancement).

The DS-Link expansion input connectors are used to expand a Sirius 850 system 1152^2, see section 10

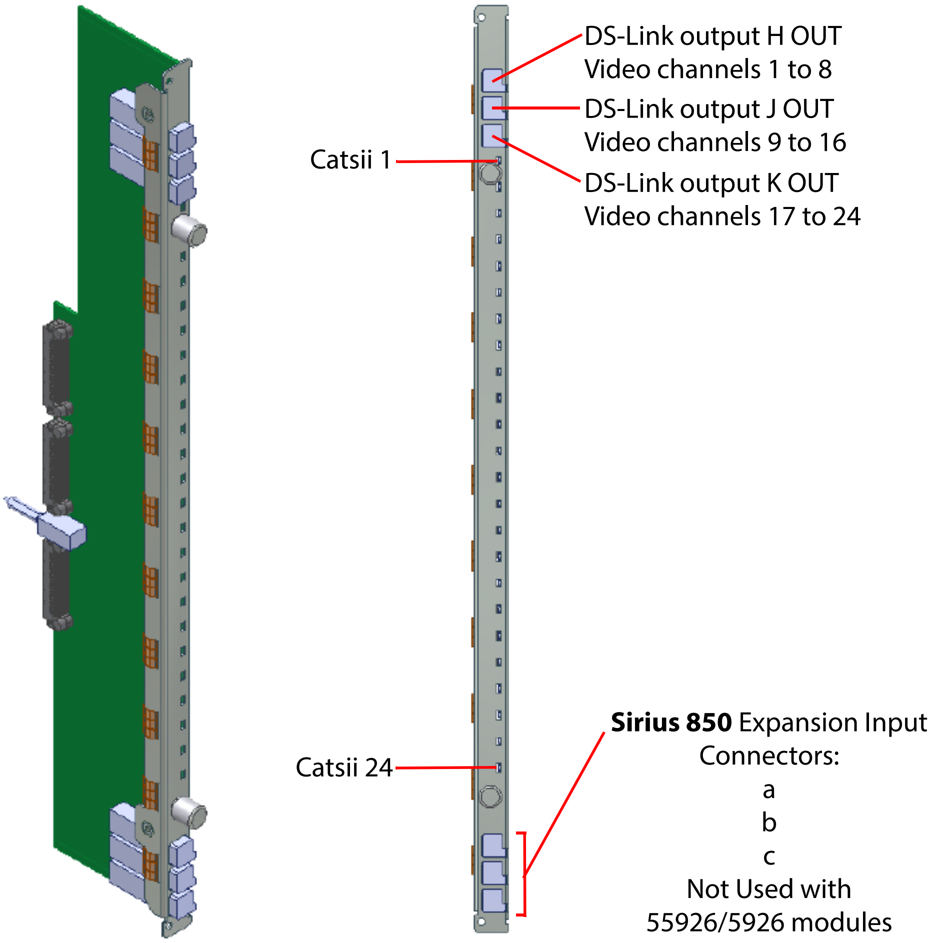


Figure 155 1364 Sirius 800 Video DS-Link Output Rear Panel

All the signal outputs on the output rear panel have Grass Valley's unique Catsii feature. See Section 4 *Catsii Functionality* on page 82 for details of the Catsii functionality.

- **DS-Link to DS-Link Cable - 6 metre**: Order Code FGAEY WDS6THIN
  Cable kit consists of 1 x 6 metre (19 Feet) DS-Link to DS-Link cable.

9.9 1832 40Gb/s Video IP Output Rear Panel

The 1832 Sirius 800 40Gb/s Video IP Output rear panel provides "Video over IP" output capability to the Sirius router frame for up to 24 video IP output streams. It has four Video IP output ports (high-performance Ethernet network ports) and two control network ports.

The 1832 rear panel works in tandem with a corresponding Video IP Output front module (*5970 Video IP Output Module* on page 223). The rear video IP stream output signals originate internally, in the router, from the front module.

The 1832 Video IP Output Rear Panel rear connections are:

- Four 40G QSFP cages:
  ("**LINK 1A**" and "**LINK 1B**", "**LINK 2A**" and "**LINK 2B**".)

  These form two 12-way channels of video IP output (24 video IP outputs in total).
- Two 1G SFP cages, each fitted with one 1Gb/s Ethernet SFP module:
  (Control interfaces "**CTRL A**" and "**CTRL B**".)

  These form two 1Gb/s Ethernet control ports.
- Three Densi-Shield style connectors, DS-Link, for router frame video input expansion ("**a in**", "**b in**", and "**c in**").

Each 12-way video IP output channel can be configured either for:

- **Redundancy -** (SMPTE 2022-7 Seamless Protection Switching.)

  For example, with "LINK 1A" and "Link 1B" connected to a "Main" and a "Backup" media network respectively.
- **Maximised Network Bandwidth**

  Both "A" and "B" links used together to double the available IP network bandwidth for the video IP streams.

Note: The 1832 is *not* shipped with QSFP transceiver modules fitted as standard,
A 40Gb/s Ethernet QSFP transceiver module must be fitted to each QSFP cage.

The 1832 is shipped with SFP transceiver modules already fitted to its control Ethernet ports (CTRL A, CTRL B). This is summarized in Table 69.

Table 69 1832 Ethernet Port Transceiver Modules - Fitted/Not Fitted

Rear Connection	Transceiver Module	Quantity	Shipping Status
Video IP	40Gb/s QSFP	4	NOT fitted
Control	1Gb/s SFP	2	Fitted

When the rear panels are ordered as spares, they are supplied without SFP modules, which must be ordered separately.

The Grass Valley order codes for fiber QSFP modules are shown below.

Order Code	Description
FGAN FCQ-40GE-LR4	40GBASE-LR4 long range QSFP for SMF
FGAN FCQ-40GE-SR	40GBASE-SR short range QSFP for MMF

Unused SFP cages are fitted with an SFP Blank.
Unused fiber outputs should be covered with a dust cover.

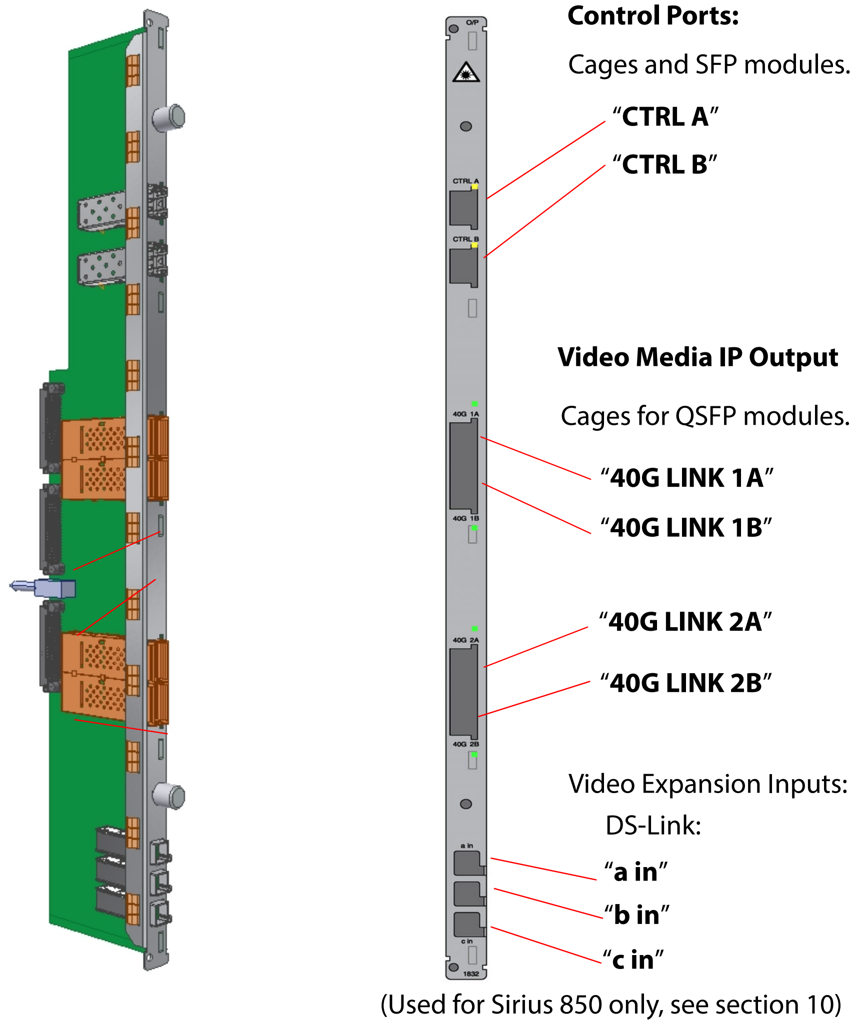


Figure 156   1832 Sirius 800 40Gb/s Video IP Output Rear Panel

9.9.1 Rear Panel LEDs

9.9.1.1 LINK A1, LINK A2, LINK B1, LINK B2

There are two LEDs per QSFP cage, showing:

- 'Activity' (closest to the cage); and
- 'Status' (furthest from the cage).

Table 70   QSFP Link LEDs

LED	Color	Description
Activity	Off	No activity on the link.
	Cyan	Link established and in use.
Status	**Green**	OK
	Blue	Error, see **Note 1**.
	Yellow	Warning, see **Note 1**.
	Red	Comms Fail, see **Note 1**.
Note 1:	For more information about these status conditions, refer to Grass Valley customer support.	

9.9.1.2 CTRL A, CTRL B

Each ‘Control’ SFP cage has a Yellow LED (situated above the cage on the module rear) to indicate network activity.

9.9.2 Configuration

The 1832 Video IP Output rear panel and its corresponding Video IP Output front module are configured together. Please refer to *5970 Video IP Output Module* on page 223 for further configuration information.

9.10 1295 Video/MADI BNC Output Rear Panel

The 1295 Sirius 800 video/MADI BNC output rear panel has 24 BNC outputs.

The 1295 rear panel is used with either:

- the 4929/4925 12 channel MADI output module with AHP (a duplicate of each MADI channel is output along with the main output); or with the
- 5923 video output module (24 channel video with re-clocking, no longer supplied with new systems, see Appendix C *5923/4 Sirius 840/850 Standard Video Output Module* on page 375).

The DS-Link expansion input connectors are used to expand a Sirius 850 system 1152[2], see section 10

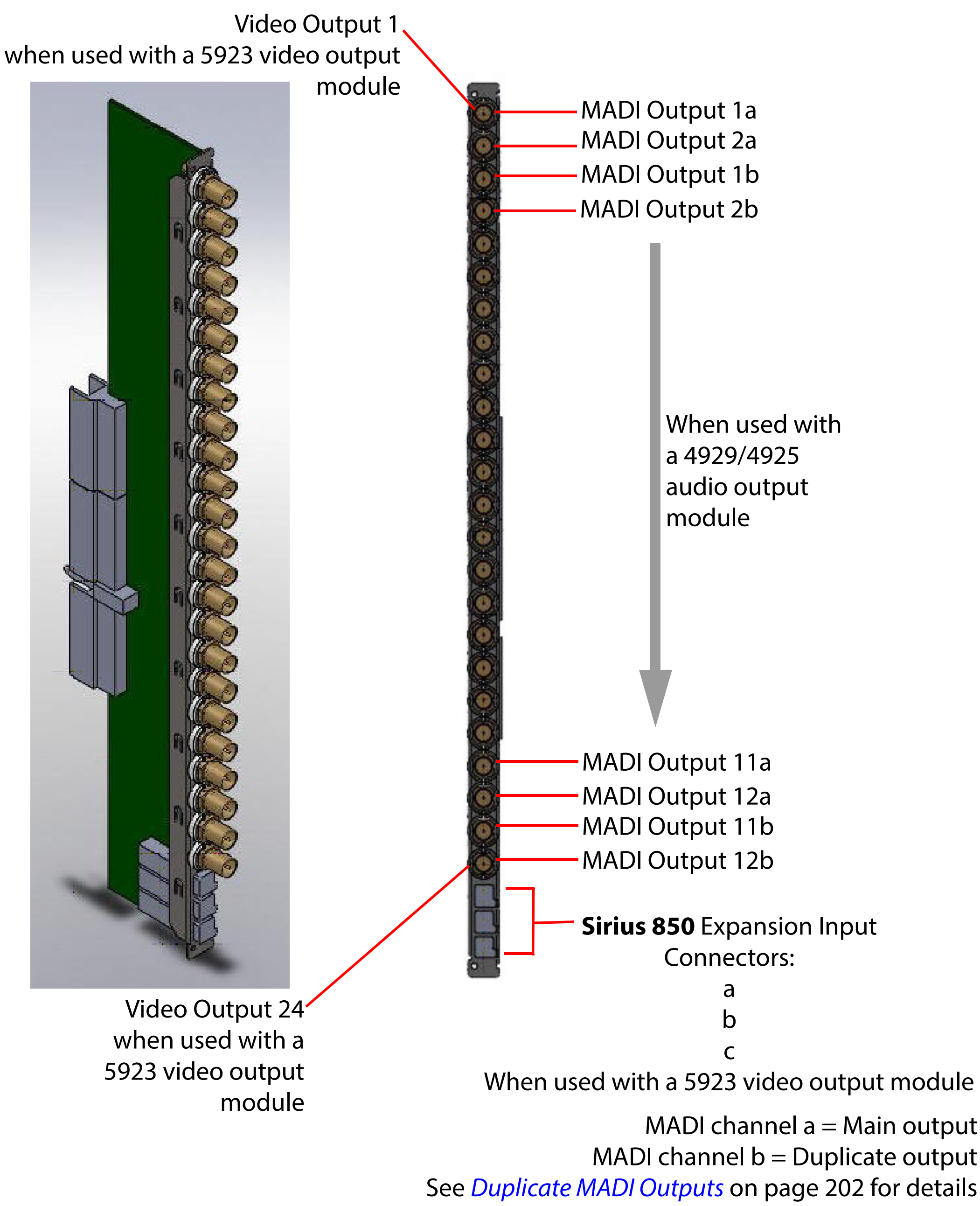


Figure 157 1295 Sirius 800 Video/MADI BNC Output Rear Panel

All the BNC connectors on the output rear panel have Grass Valley's unique Catsii feature that illuminates each connector. See section 4 for details of the Catsii functionality.

9.11 1296 Video/MADI Fiber Output Rear Panel

The 1296 Sirius 800 video/MADI fiber output rear panel has 12 fiber SFP cages with two outputs per fiber SFP module.

The 1296 rear panel is used with either the:

- 4929/4925 12 channel MADI output module with AHP (a duplicate of each MADI channel is output along with the main output); or with the
- 5924 video output module (24 channel video with re-clocking, no longer supplied with new systems, see Appendix C *5923/4 Sirius 840/850 Standard Video Output Module* on page 375).

The DS-Link expansion input connectors are used to expand a Sirius 850 system 1152[2], see section 10

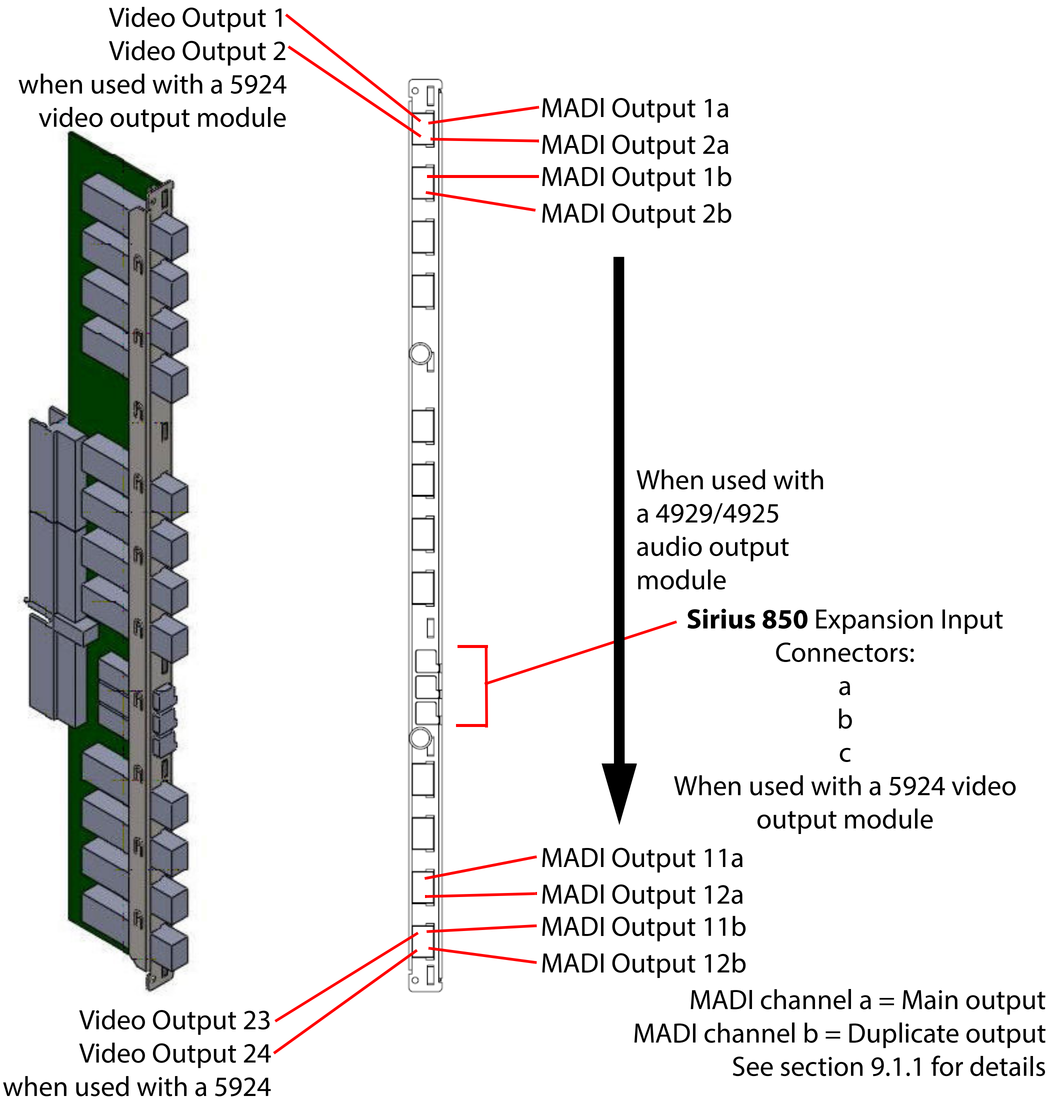


Figure 158 1296 Fiber Output Rear Panel

All the fiber connectors on the output rear panel have Grass Valley's unique Catsii feature that illuminates each connector. See section 4 for details of the Catsii functionality.

When ordering the router the rear panels can be specified with or without fiber SFP transmitter modules. When the rear panels are ordered as spares they are supplied without Fiber SFP transmitter modules and these must be ordered separately. The Grass Valley order code for the standard SFP transmitter module is shown below.

- **Fiber SFP Transmitter Module**
  Order Code ST31ST31-3
  Fiber SFP 2 channel 1310nm -5 to 0 dBm output power. For 3G, HD, SD & MADI.
  Max 12 per rear panel

A number of CWDM Fiber SFP transmitter modules are also available, contact your local Grass Valley representative for details.

9.12 1353 Balanced AES O/p Rear Panel with MADI Outputs

1353 Sirius 800 Balanced AES Output Rear Panel with MADI Outputs:

The 1353 Sirius 800 balanced AES output rear panel has 5 x 62 way female high density sockets for balanced AES audio outputs and HD BNC connectors for up to 3 MADI outputs.

Note: If unbalanced AES outputs are required see section 9.13 for details.

The 1353 rear panel is used with the 4929/4925 120 channel AES/MADI output module. For the wiring details for the 62 way D-Type sockets see section 9.12.1 and for details of the MADI inputs see section 9.15.

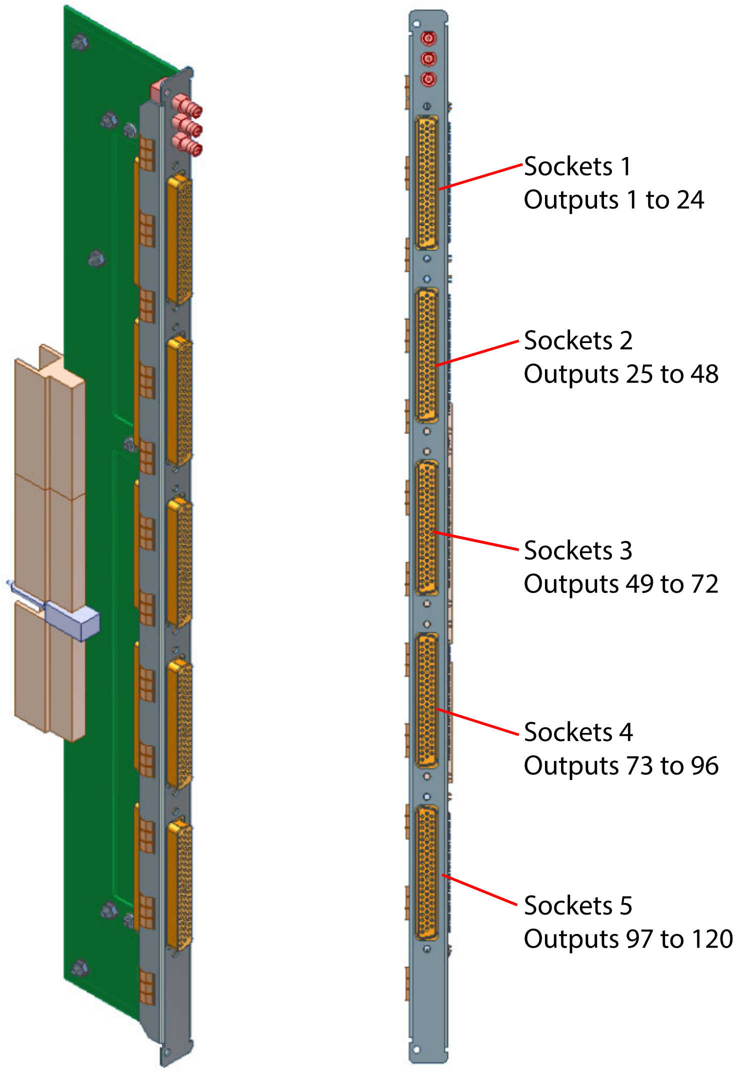


Figure 159 1353 Sirius 800 Balanced AES Output Rear Panel

9.12.1 62 Way High Density Balanced AES Socket Pin Outs

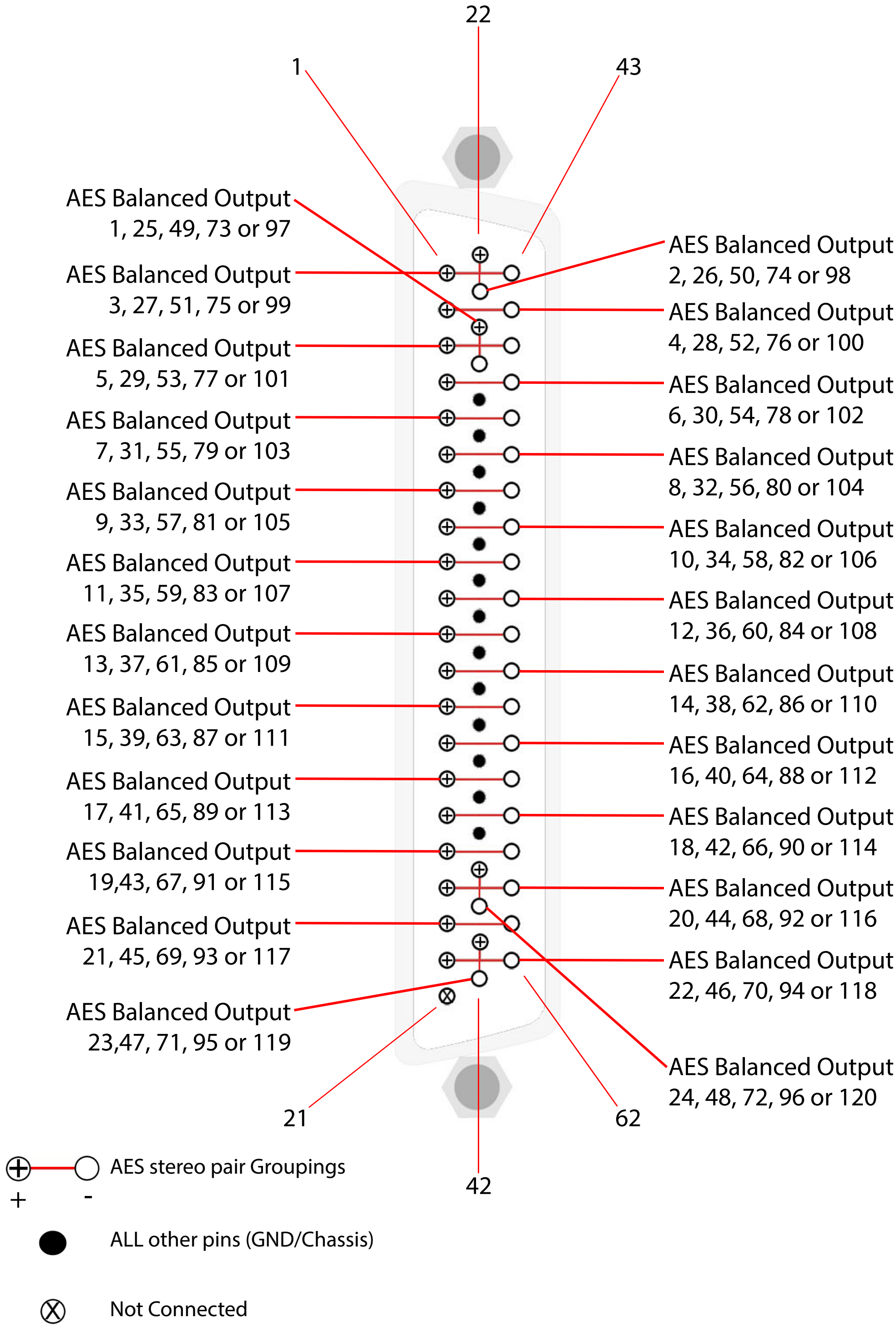


Figure 160 Balanced AES Rear Panel 62 Way High Density Socket (Viewed from the Rear of the Router)

Table 71 Balanced AES Rear Panel 62 Way High Density AES Connector Pin Outs

Pin Number	Socket 1 AES Balanced Output	Socket 2 AES Balanced Output	Socket 3 AES Balanced Output	Socket 4 AES Balanced Output	Socket 5 AES Balanced Output
24	1+	25+	49+	73+	97+
25	1-	25-	49-	73-	97-
22	2+	26+	50+	74+	98+
23	2-	26-	50-	74-	98-
1	3+	27+	51+	75+	99+
43	3-	27-	51-	75-	99-
2	4+	28+	52+	76+	100+
44	4-	28-	52-	76-	100-
3	5+	29+	53+	77+	101+
45	5-	29-	53-	77-	101-
4	6+	30+	54+	78+	102+
46	6-	30-	54-	78-	102-
5	7+	31+	55+	79+	103+
47	7-	31-	55-	79-	103-
6	8+	32+	56+	80+	104+
48	8-	32-	56-	80-	104-
7	9+	33+	57+	81+	105+
49	9-	33-	57-	81-	105-
8	10+	34+	58+	82+	106+
50	10-	34-	58-	82-	106-
9	11+	35+	59+	83+	107+
51	11-	35-	59-	83-	107-
10	12+	36+	60+	84+	108+
52	12-	36-	60-	84-	108-
11	13+	37+	61+	85+	109+
53	13-	37-	61-	85-	109-
12	14+	38+	62+	86+	110+
54	14-	38-	62-	86-	110-
13	15+	39+	63+	87+	111+
55	15-	39-	63-	87-	111-
14	16+	40+	64+	88+	112+
56	16-	40-	64-	88-	112-
15	17+	41+	65+	89+	113+
57	17-	41-	65-	89-	113-
16	18+	42+	66+	90+	114+
58	18-	42-	66-	90-	114-

Table 71 Balanced AES Rear Panel 62 Way High Density AES Connector Pin Outs (Continued)

Pin Number	Socket 1 AES Balanced Output	Socket 2 AES Balanced Output	Socket 3 AES Balanced Output	Socket 4 AES Balanced Output	Socket 5 AES Balanced Output
17	19+	43+	67+	91+	115+
59	19-	43-	67-	91-	115-
18	20+	44+	68+	92+	116+
60	20-	44-	68-	92-	116-
19	21+	45+	69+	93+	117+
61	21-	45-	69-	93-	117-
20	22+	46+	70+	94+	118+
62	22-	46-	70-	94-	118-
41	23+	47+	71+	95+	119+
42	23-	47-	71-	95-	119-
39	24+	48+	72+	96+	120+
40	24-	48-	72-	96-	120-
21	N/C	N/C	N/C	N/C	N/C
26 to 38	Signal GND	Signal GND	Signal GND	Signal GND	Signal GND

9.13 1356 Unbalanced AES O/p Rear Panel with MADI Outputs

1356 Sirius 800 Unbalanced AES Output Rear Panel with MADI Outputs:

The 1356 Sirius 800 balanced AES output rear panel has 5 x 62 way female high density sockets for balanced AES audio outputs and HD BNC connectors for up to 3 MADI outputs.

Note: If balanced AES outputs are required see section 9.12 for details.

The 1356 rear panel is used with the 4929/4925 120 channel AES/MADI output module. For the wiring details for the 62 way D-Type sockets see section 9.13.1 and for details of the MADI inputs see section 9.15.

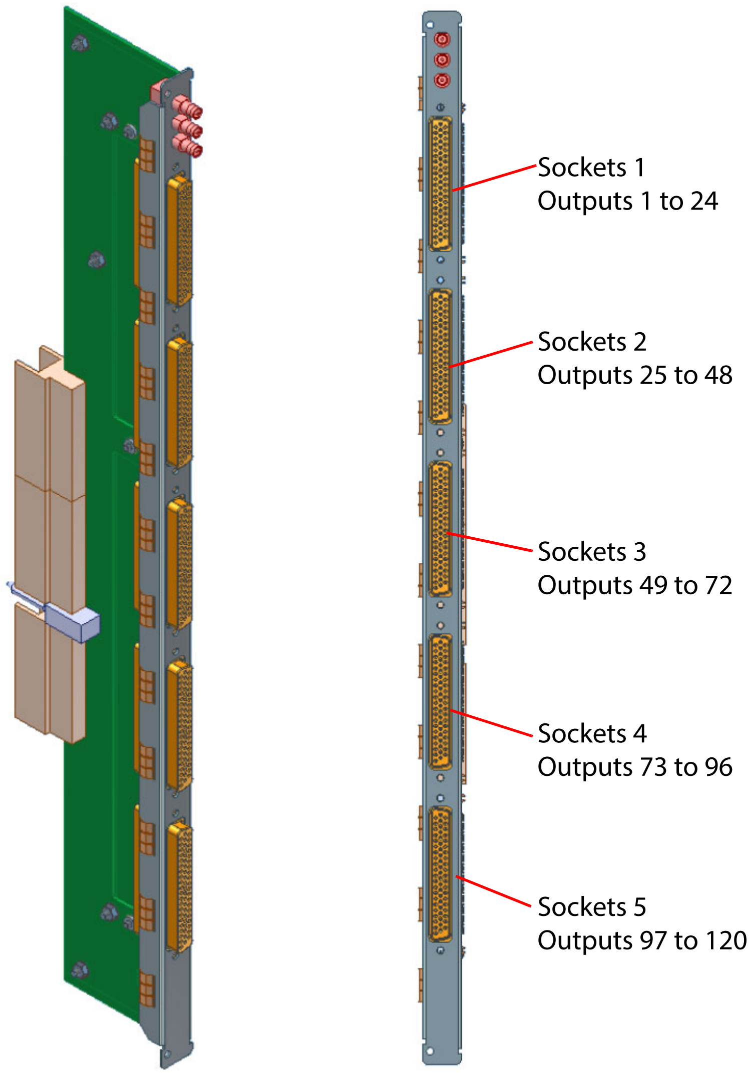


Figure 161 1356 Sirius 800 Unbalanced AES Output Rear Panel

9.13.1 62 Way High Density Unbalanced AES Socket Pin Outs

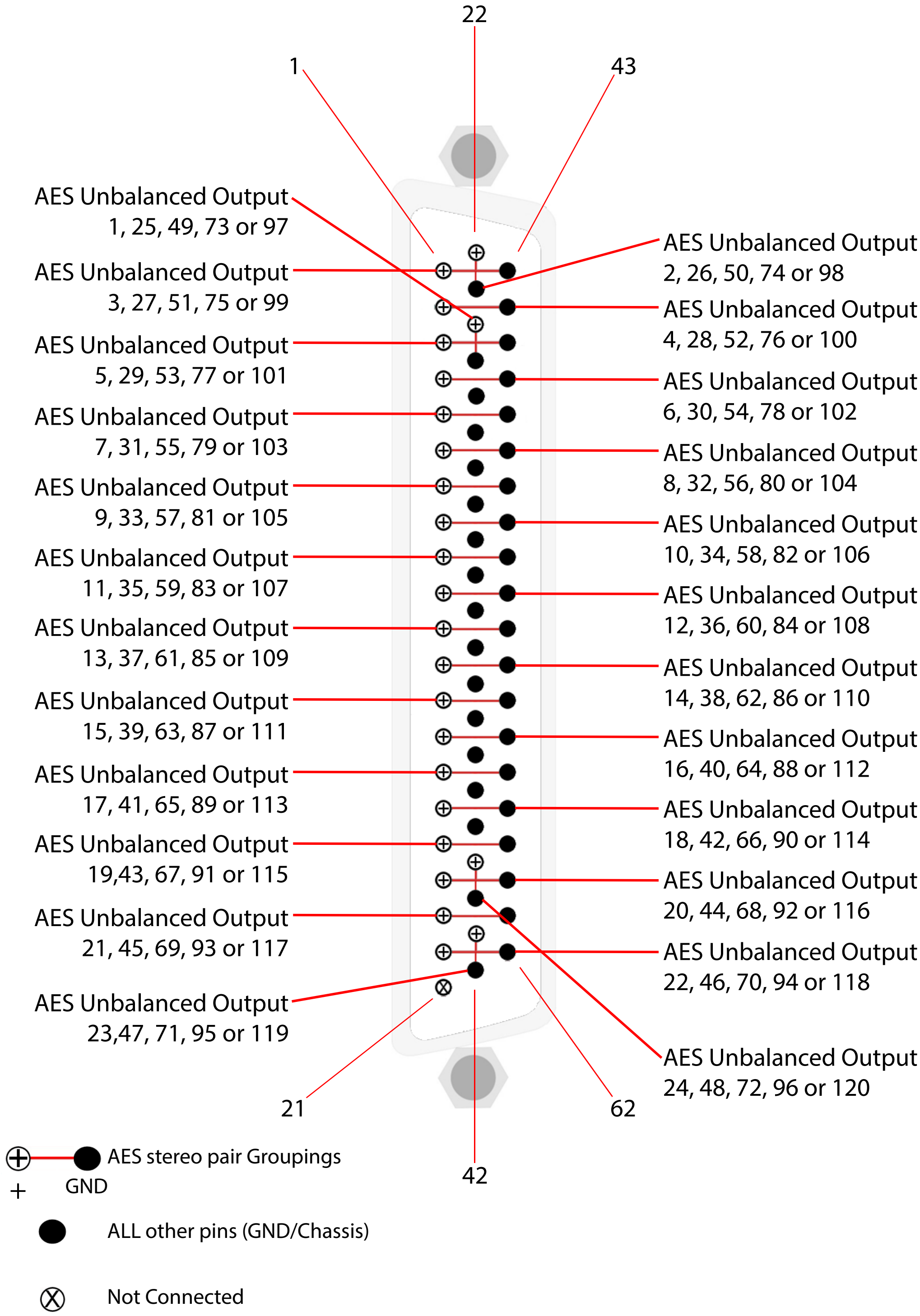


Figure 162 Unbalanced AES Rear Panel 62 Way High Density Socket (Viewed from the Rear of the Router)

Table 72 Unbalanced AES Rear Panel 62 Way High Density AES Socket Pin Outs

Pin Number	Socket 1 AES Unbalanced Output	Socket 2 AES Unbalanced Output	Socket 3 AES Unbalanced Output	Socket 4 AES Unbalanced Output	Socket 5 AES Unbalanced Output
24	1+	25+	49+	73+	97+
25	GND	GND	GND	GND	GND
22	2+	26+	50+	74+	98+
23	GND	GND	GND	GND	GND
1	3+	27+	51+	75+	99+
43	GND	GND	GND	GND	GND
2	4+	28+	52+	76+	100+
44	GND	GND	GND	GND	GND
3	5+	29+	53+	77+	101+
45	GND	GND	GND	GND	GND
4	6+	30+	54+	78+	102+
46	GND	GND	GND	GND	GND
5	7+	31+	55+	79+	103+
47	GND	GND	GND	GND	GND
6	8+	32+	56+	80+	104+
48	GND	GND	GND	GND	GND
7	9+	33+	57+	81+	105+
49	GND	GND	GND	GND	GND
8	10+	34+	58+	82+	106+
50	GND	GND	GND	GND	GND
9	11+	35+	59+	83+	107+
51	GND	GND	GND	GND	GND
10	12+	36+	60+	84+	108+
52	GND	GND	GND	GND	GND
11	13+	37+	61+	85+	109+
53	GND	GND	GND	GND	GND
12	14+	38+	62+	86+	110+
54	GND	GND	GND	GND	GND
13	15+	39+	63+	87+	111+
55	GND	GND	GND	GND	GND
14	16+	40+	64+	88+	112+
56	GND	GND	GND	GND	GND
15	17+	41+	65+	89+	113+
57	GND	GND	GND	GND	GND
16	18+	42+	66+	90+	114+
58	GND	GND	GND	GND	GND

Table 72 Unbalanced AES Rear Panel 62 Way High Density AES Socket Pin Outs (Continued)

Pin Number	Socket 1 AES Unbalanced Output	Socket 2 AES Unbalanced Output	Socket 3 AES Unbalanced Output	Socket 4 AES Unbalanced Output	Socket 5 AES Unbalanced Output
17	19+	43+	67+	91+	115+
59	GND	GND	GND	GND	GND
18	20+	44+	68+	92+	116+
60	GND	GND	GND	GND	GND
19	21+	45+	69+	93+	117+
61	GND	GND	GND	GND	GND
20	22+	46+	70+	94+	118+
62	GND	GND	GND	GND	GND
41	23+	47+	71+	95+	119+
42	GND	GND	GND	GND	GND
39	24+	48+	72+	96+	120+
40	GND	GND	GND	GND	GND
21	N/C	N/C	N/C	N/C	N/C
26 to 38	Signal GND	Signal GND	Signal GND	Signal GND	Signal GND

9.13.2 FGAEY 2502910A: Unbalanced 62 Way AES to BNC Breakout Cable

The optional breakout cable converts a single unbalanced 62 way high density AES connector to 24 unbalanced AES female BNC connectors.

The breakout cable is optional and not supplied with the AES rear panels. Five cables are required for all of the AES connectors on each AES rear panel.

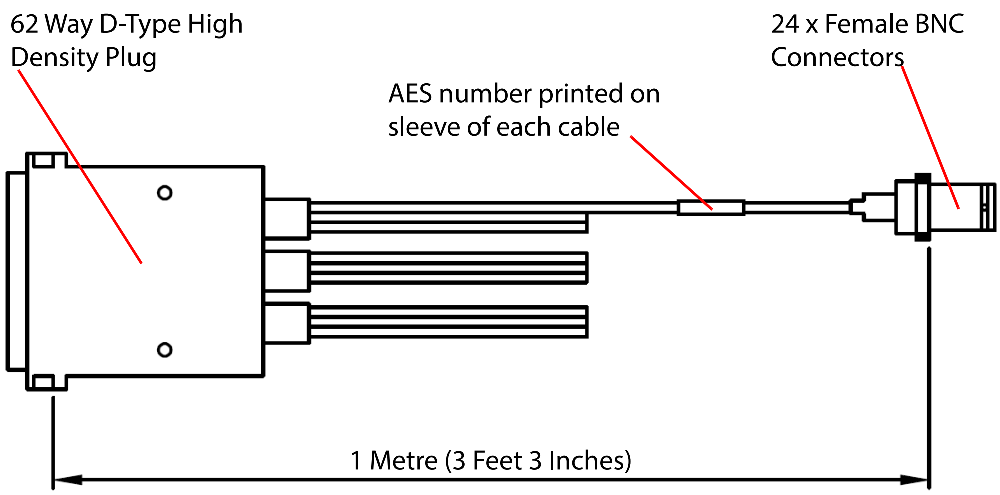


Figure 163 RMYS 2502910A Unbalanced AES Breakout Cable, 62 Way D-Type to 24 BNC Female

9.14 1842 12G-SDI HD-BNC Output Rear Panel

The 1842 12G-SDI HD-BNC video output rear panel may be fitted to any S800 router. The rear panel has six 12G (UHD) outputs and three DS-Link expansion video inputs.

Within the router, 24 3G-SDI signals are passed from a video output front module to the 1842 output rear. On the 1842, six 4-way multiplexing processes take place, each of which multiplexes four 3G-SDI sub-signals (four 2SI sub-images) together to form a 12G-SDI output signal.
Thus, six 12G-SDI signals are presented at the rear of the rear panel.

The rear panel can also operate in 6G output mode (i.e. four internal 2SI 1.5G-SDI sub-signals are passed from the video front module to the 1842 output rear).

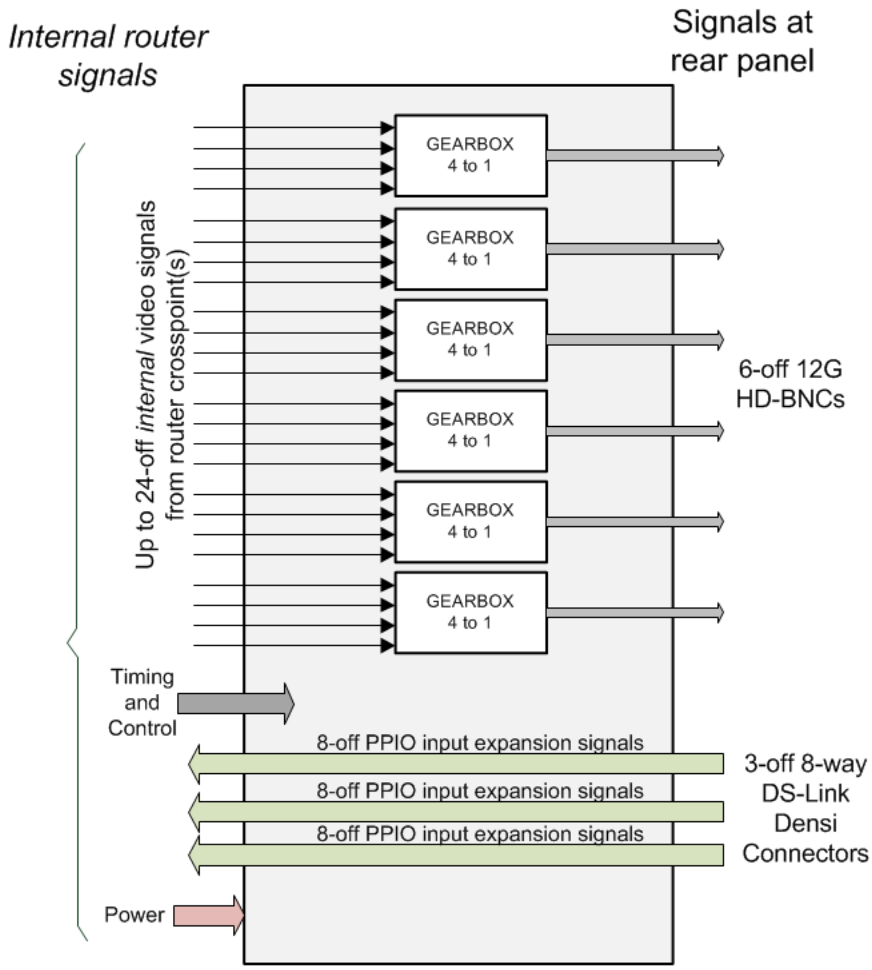


Figure 164 1842 Video 12G Output Rear Functional Block Diagram

The rear panel can also operate in pass-though mode where one SDI signal is passed through unmodified to an output (3G-SDI, HD-SDI, SD-SDI). Default operation is 12G.

Output rears do not configure their mode automatically. The mode of operation is set up in WorkBench or via a control screen of the router frame's Door PC.

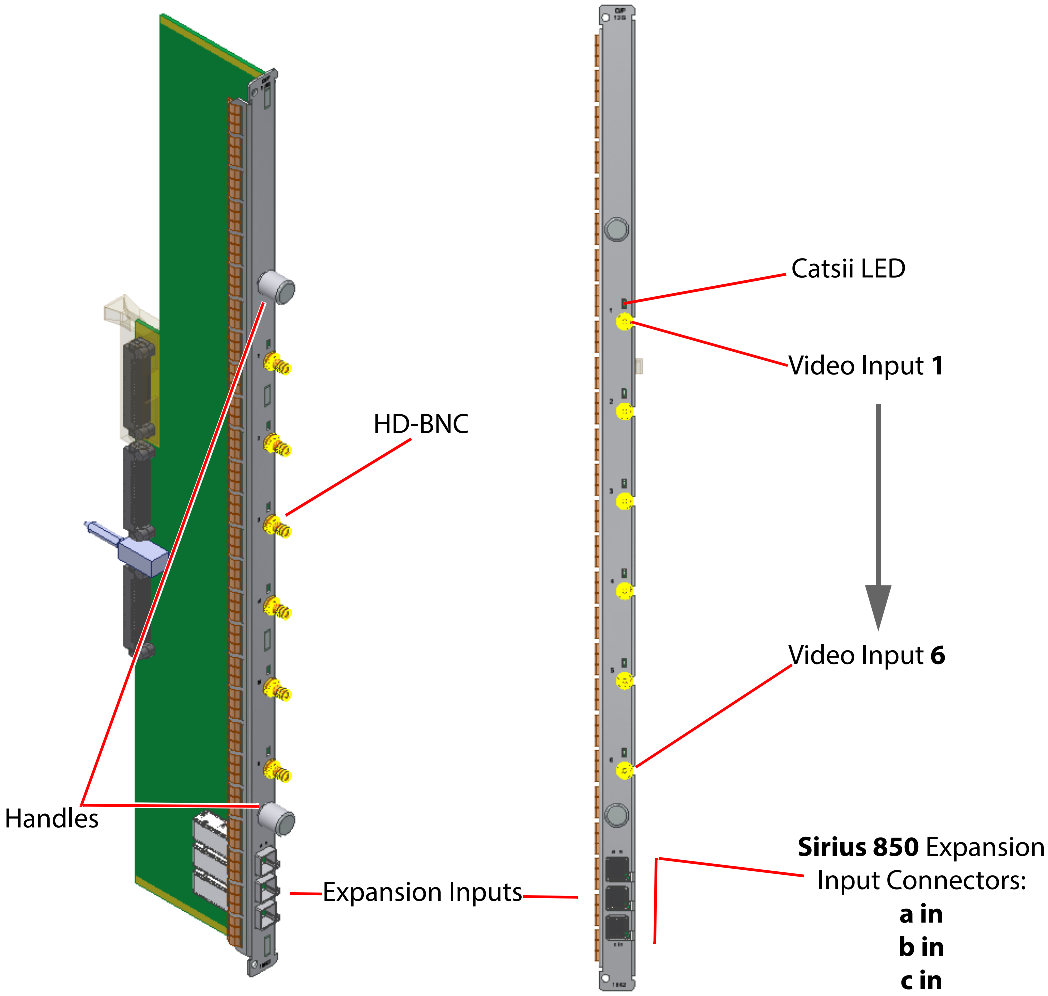


Figure 165 1842 12G-SDI HD-BNC Video Output Rear Panel (Sirius 800 Routers)

All the HD-BNC connectors have Grass Valley's unique Catsii 2 feature that illuminates each connector. See Section 4 *Catsii Functionality* on page 82 for details of the Catsii functionality.

The 1842 rear panels can be fitted to any Sirius 800 router's video output rear slot.

The DS-Link expansion video input connectors are used to expand a Sirius 850 system to 1152^2, see section 10. They carry multiple 3G video signals between the router frames.

- **DS-Link to DS-Link Cable - 6 metre**:
  Order Code FGAEY WDS6THIN
  Cable kit consists of 1 x 6 metre (19 Feet) DS-Link to DS-Link cable.

See Section 1.6 *Software Compatibility Matrix* on page 17 and Section 1.7 *12G SDI Rear Module Compatibility* on page 18 for information on compatibility.

9.15 HD BNC MADI Output Connectors

The HD BNC connector details are the same for the balanced and unbalanced AES rear panels (see section 9.12 or 9.13 for rear panel details).

The first and last MADI Channels in the following table assume that the HD BNC breakout cables are connected to an AES rear panel located in output slot 1 of the router.

Table 73 Starting and Ending MADI Channels for Slot 1

HD BNC Plug Marking	**First MADI Channel** (Slot 1)	**Last MADI Channel** (Slot 1)
MADI 1	577	640
MADI 2	641	704
MADI 3	705	768

Use the following formula to calculate the first and last MADI channels for any other router output slot:

First MADI Channel = ((Slot Number x 768) - 768) + X
Where X = the First MADI channel for the required MADI connector

Last MADI Channel = First MADI Channel + 63

Please see the following examples to see how this works in practice.

9.15.1 Example 1

Slot 5, MADI 1 Connector

First MADI Channel: ((5 x 768) - 768) + 577 ➔ (3840 - 768) + 577 ➔ 3072 + 577 = 3649
First MADI Channel = 3649

Last MADI Channel: 3649 + 63 = 3712
Last MADI Channel = 3712

9.15.2 Example 2

Slot 9, MADI 2 Connector

First MADI Channel: ((9 x 768) - 768) + 641 ➔ (6912 - 768) + 641 ➔ 6144 + 641 = 6785
First MADI Channel = 6785

Last MADI Channel: 6785 + 63 = 6848
Last MADI Channel = 6848

9.15.3 Example 3

Slot 12, MADI 3 Connector

First MADI Channel: ((12 x 768) - 768) + 705 ➔ (9216 - 768) + 705 ➔ 8448 + 705 = 9153
First MADI Channel = 9153

Last MADI Channel: 9153 + 63 = 9216
Last MADI Channel = 9216

10 Sirius 850: Video and Audio Expansion

Chapter contains:

Sirius 850: Video and Audio Expansion

Sirius 850 is field expandable up to either 576 x 1152 in a single frame or up to 1152^2 video (dependent on input/output card configuration) by linking two Sirius 850 frames together using expansion cables. No other external splitters or combiners are required and expansion can be carried out while the system is in use. Audio routing can be expanded up to a maximum of 36864^2 if both Sirius 850 routers are fully loaded with AHP capable input cards.

This section describes both expansion methods:

- Single Sirius 850 frame up to 576 x 1152 video - See section 10.1 for details.
- Dual Sirius 850 frames up to 1152^2 video - See section 10.2 for details.
- Dual Sirius 850 frames up to 36864^2 audio - See section 10.11 for details.

10.1 Single Sirius 850 Frame up to 576 x 1152 Video

To expand a Sirius 850 router up to 576 x 1152 video (dependent on input/output card configuration) the following extra modules are required:

- 4 x 5905 Video Crosspoint Modules mounted in upper part of the frame (a fifth crosspoint module is optional and provides redundancy for the video expansion crosspoint matrix). See section 8.1 for module details.
- The following Sirius 850 Standard Video Expansion Output Modules/Rears, depending on the number of extra video outputs required. Up to:
    - 24x 5928 with 1365/1366 rears; or
    - 24x 55928 with 11365/11366 rears.

  These are fitted into the top section of the Sirius 850 frame, and each module provides 24 outputs. See section 10.4 for module details.
- Rear panel expansion options - Fitted in the rear of the Sirius 850 frame, one for each front module fitted. Each rear providing 24 SDI outputs.
  Up to 24-off either:
    - 1290 Video DS Link Output Rear Panels, (See *1290 Sirius 850 Video Expansion Output Rear Panel*, on page 263, for module details.)
    - 11365/1365 Video DS Link Input/Output Rear Panels, (See *1365 Sirius 850 DS-Link In DS-Link Out Expansion Rear Panel*, on page 265, for module details.)
    - 11366/1366 Video HD BNC Output Rear Panels, (See *1366 Sirius 850 Video HD BNC Output Rear Panel*, on page 267, for module details.)

Video signals from the expansion video crosspoint matrix are passed to the 55928/5928 modules (destinations 577 to 1152) and the video signals are then output, for example, from 11366/1366 rear panels on HD BNC connectors.

When rear panel expansion cards are fitted to a Sirius 850 it is then a single frame 576 x 1152 router with no further expansion capability.

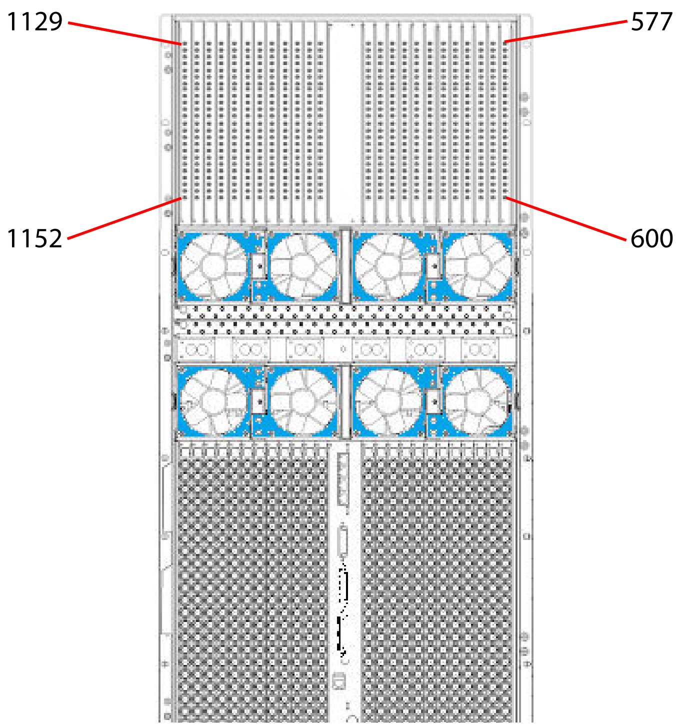


Figure 166 Single Sirius 850 Frame up to 576 x 1152 (top section of Sirius 850 shown)

Note:

- It is not possible to mix the 11365/1365/1290 and 11366/1366/1293 rear panels in a frame.
- If a second Sirius 850 frame is required at a future date all 11366/1366 rear panels must be removed and replaced with 11365/1365 expansion rear panels (see section 10.2 for details).

10.2 Dual Sirius 850 Frames up to 1152 x 1152 Video

The Sirius 850 is field expandable up to 1152 x 1152 video (dependent on input/output card configuration) by linking two Sirius 850 routers together using multi-way cables. No other external splitters or combiners are required and expansion can be carried out while the system is in use.

This section describes what hardware is required to expand an existing single router to a dual router system. See Figure 168 for a details of the video signal wiring between the routers and Figure 168 for a diagram of the control interconnections.

Existing Sirius 850 (Frame 1 of 2)

The following extra equipment is required for the existing Sirius 850 frame:

- 4 x 5905 Video Crosspoint Modules mounted in upper part of the frame (a fifth crosspoint module is optional and provides redundancy for the video expansion crosspoint matrix).
  See *5905 Sirius 800 Series Video Crosspoint Module*, on page 185, for module details.
- Up to 24 x 55928 or 5928 Sirius 850 Standard Video Expansion Output Modules, depending on the number of extra video outputs required. Fitted in the top section of the router, each 55928/5928 provides 24 outputs.
  See *5928 Sirius 850 Standard Video Expansion Output Module*, on page 259, for module details.
- Up to 24 x 11365 or 1365 Sirius 850 Video Expansion Output Rear Panels one for each 55928 or 5928 module fitted. Fitted in the rear of the router, each 11365 or 1365 is used to connect 24 signals to the remote Sirius 850 router. The interconnect cables are supplied with the rear panels. See *1365 Sirius 850 DS-Link In DS-Link Out Expansion Rear Panel*, on page 265, for module details.
- Up to 24 x expandable video output modules (55928/5938 and 55949/5949 as required) one expandable video output module for each 55928/5928 fitted in the remote router. Fitted in the output module slots of the router, they accept (via their rear panels and interconnect cables) the expansion outputs from the 11365/1365 rear panels in the remote router.
  See *55938 and 5938 S850 Standard Video O/p Module (Expandable)*, on page 257, for 5938.
  See *55949 and 5949 Video Embedding & AHP O/p Module, Delay & Sync*, on page 214, for 5949.

Note:

- The 1365 expansion cables cannot be connected to the 5926 output module.
- The 55926/5926 module can be directly replaced by the 55938/5938 module as it uses the same rear panels.

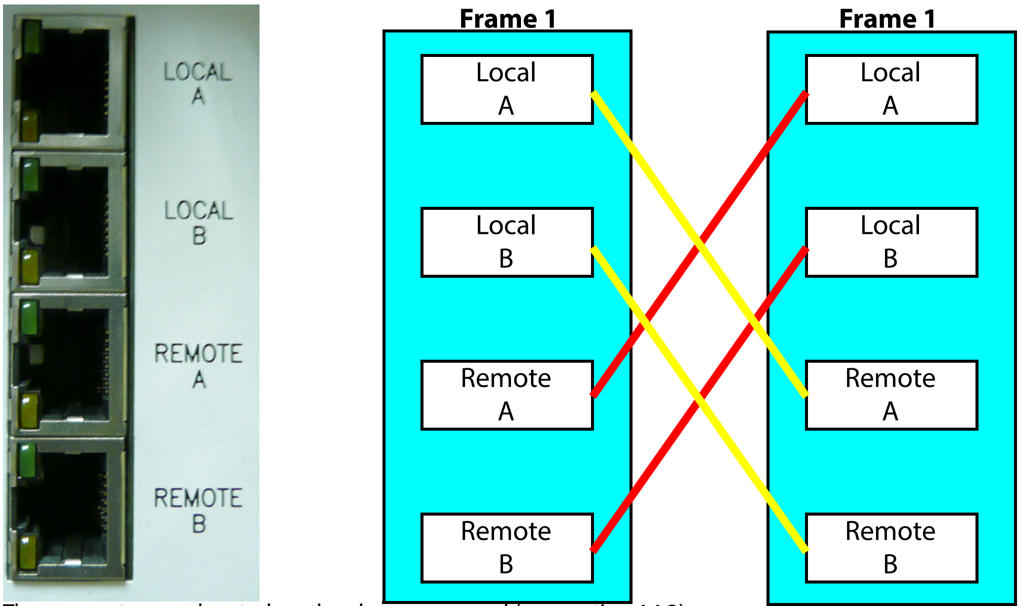
Second Sirius 850 (Frame 2 of 2)

The second Sirius 850 frame must be equipped with the expansion modules as listed above as well as the usual input modules, crosspoint modules, etc.

10.2.1 Control of a Dual Frame System

To link two Sirius 850 frame together it is recommended that they are both fitted with the same router controller type, either the Nucleus 2450, the Nucleus2 2464 or the Nucleus2 2463. The Nucleus modules control the main crosspoint modules of the local router and the expansion crosspoint modules of the remote router. Connecting the control busses of both frames together (Figure 167) enables the controllers to route the video input signals in the remote frame to the outputs of the local frame. The controller in the second frame works in the same way enabling control of up to 1152 x 1152 video across the two frames.

In a dual frame system, the controllers should be connected using equal-length standard Cat 5e Ethernet cables (not supplied). See Figure 167. See Table 74 for connections.



The connectors are located on the alarm rear panel (see section 14.3)

Figure 167 Control Expansion in a Two Frame Sirius 850 System

RJ45 connectors “Local A” and “Local B” take the local control signals (both outgoing clock and data and incoming data) from the local controller out to a remote frame. The connectors “Remote A” and “Remote B” receive commands from a remote controller and send the data back to the remote controller.

Table 74 Cat 5e Cable Connector Pin Outs for Dual Frame

RJ45 Cat 5e Connector Pin Out	Cat 5e Cable Wire Colors	RJ45 Cat 5e Connector Pin Out	Cat 5e Cable Pairs
1	White with Orange	1	
2	Orange	2	
3	White with Green	3	
4	Blue	4	
5	White with Blue	5	
6	Green	6	
7	White with Brown	7	
8	Brown	8	

Enabling video redundancy in frame one will enable redundancy for the main crosspoint modules mounted in frame one and the expansion crosspoint modules mounted in frame two. The reverse is true for frame two.

Note: In a dual frame system if redundancy is enabled in one frame it must also be enabled in the other frame. See section 8.2 for details on enabling/disabling video redundancy.

10.2.2 Signal Flow Between Frames

Important:

- Ensure the Frame IDs are correctly set for both the Sirius 850 frames when connecting them together. The rotary Frame ID switch is located on the alarm rear panel of the router, See section 14.3.1 for details.
- Each 1290/1365 rear panel must be connected to the expansion inputs of the corresponding output module in the second Sirius 850 frame, i.e. slot 1 to slot 1, slot 2 to slot 2, etc. The expansion input connectors are located below the output module rear panel connectors (1 to 24) and are marked a, b and c.

  1290: The connections on the 1290 rear panel are marked A, B and C. The expansion cables connect A to a, B to b and C to c.

  11365/1365: The connections on the 1365 rear panel are marked A OUT, B OUT and C OUT. The expansion cables connect A OUT to a, B OUT to b and C OUT to c.
- The Remote and Local control connections between the two frames are connected as detailed in section 10.2.1.
- It is not possible to mix the 1365/1290 and 1366/1293 Output Rear Panels in a frame.
- 11366/1366 and 1293 rear panels can be mixed if required.

Video signals can be routed via the expansion video crosspoint matrix and passed to the 5928 standard video expansion output modules. The expansion video signals are then output from the 1365 rear panels to the output modules (55938/5938, 55949/5949 or 5925) in the other frame using the supplied expansion cables.

Each 1290/1365 rear panel must be connected to the expansion inputs of the corresponding output module (5938, 5949 or 5925) in the other Sirius 850 frame, i.e. slot 1 to slot 1, slot 2 to slot 2, etc. The expansion input connectors are located below the output module rear panel connectors (1 to 24) and are marked a, b and c.

- **1290**: The connections on the 1290 rear panel are marked A, B and C. The expansion cables connect A to a, B to b and C to c (See Figure 168)
- **1365**: The connections on the 1365 rear panel are marked A OUT, B OUT and C OUT. The expansion cables connect A OUT to a, B OUT to b and C OUT to c (See Figure 168).

The expansion video signals are output from the rear panel connectors of the selected module.

The following figure shows the cabling for expansion from slot 1 between routers as an example. A single 1290/11365/1365 expansion output from each router is shown for clarity and the method can be applied to any of the other 1290/11365/1365 expansion outputs.

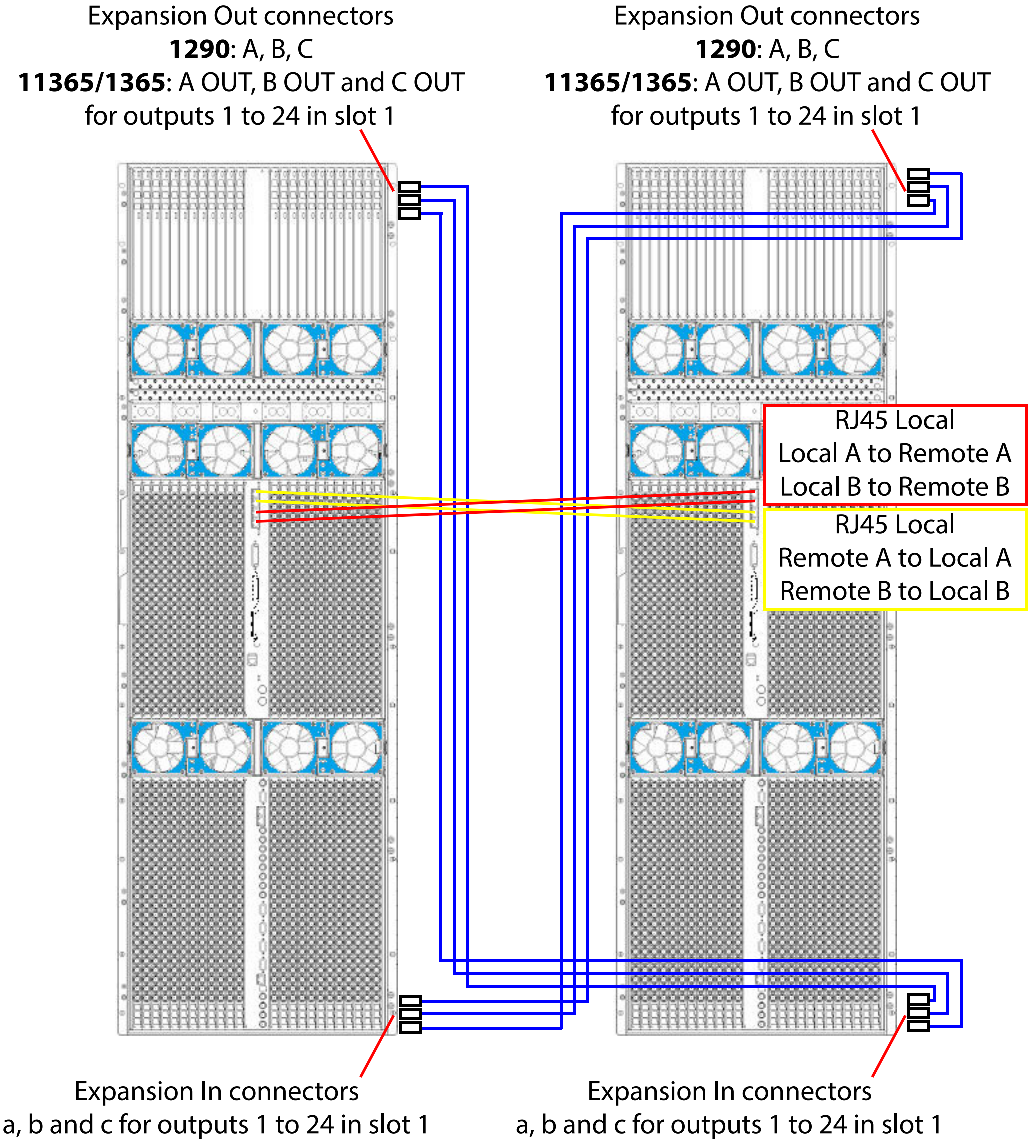


Figure 168 Two Sirius 850 Frames Connected Together (slot 1 cabling shown as an example)

10.3 55938 and 5938 S850 Standard Video O/p Module (Expandable)

55938 and 5938 Sirius 850 Standard Video Output Module (Expandable):

The 55938 and 5938 Sirius 850 standard video output module (expandable) has 24 video output channels and can handle SD, ASI and HD signals up to 3Gb/s. The 55938 is a form, fit and function replacement for a 5938. It is compatible with 5838 rears panels.

When the 5938 module is mounted in a Sirius 850 router it can receive video expansion signals from a 1365 24 channel expansion rear panel mounted in a second, linked, Sirius 850 frame (see section 10.2 for details).

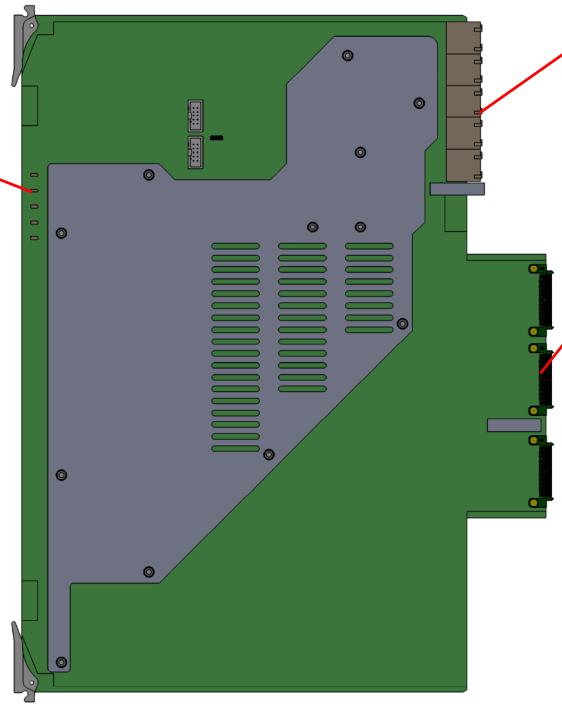


Figure 169 55938/5938 Sirius 850 Standard Video Output Module (Expandable)

Note:

- Jumpers and Headers are present on the video output module and these are for *Grass Valley use only*.
- In normal operation no jumper links or headers are fitted.

The 55938 and 5938 video output module are compatible with the rear panels listed in Table 75

Table 75 55938/5938 Rear Panel Compatibility

Rear Panel	See Section
1294 BNC rear panel	See section 9.5
1363 HD BNC rear panel	See section 9.6
1302 Fiber rear panel	See section 9.7
1364 DS-Link rear panel	See section 9.8

10.3.1 55938/5938 Output Module LED Information

Table 76 shows the LED color code on the 55928/5938 Module, and Figure 170 shows the front edge of the output module.

Table 76 55938/5938 Sirius 850 Standard Video Output Module (Expandable) LED Information

LED Color	Label	Detail	Normal Working Status
Green	Power OK	Power to the module	**On Solid** - working correctly
Yellow	Local Command OK	Receiving messages from local Nucleus control module (the Nucleus controller in this frame)	**Flashing** - receiving information and working correctly
Red	Local Command Error	Error with messages from local Nucleus control module (the Nucleus controller in this frame)	**Off** - normal state **Flashing** - the command message from the router controller is corrupt or hasn't been received. This communications error could be caused by a hardware failure or incorrect insertion. Check that the module is inserted correctly. If the "Local Command Error" LED is flashing at the same time as the "Local Command OK" LED is flashing it suggests a mismatch in the configuration of the Nucleus controller. Check the controller configuration.
Yellow	Remote Command OK	Receiving messages from remote Nucleus control module (the Nucleus controller in the frame linked to this frame)	**Sirius 850 (no expansion)**: **Off** - Expansion not used. **Sirius 850 (expanded to second frame)**: **Flashing** - receiving information and working correctly
Red	Remote Error	Error with messages from remote Nucleus control module (the Nucleus controller in the frame linked to this frame)	**Sirius 850 (no expansion)**: **Off** - Expansion not used. **Sirius 850 (expanded to second frame)**: **Off** - normal state, **Flashing** - the command message from the remote router controller is corrupt or hasn't been received. This communications error could be caused by a hardware failure or incorrect insertion. Check that the module is inserted correctly and the four RJ45 connections between the frames are fitted correctly (see section 10.2.1). If the "Remote Error" LED is flashing at the same time as the "Remote Command OK" LED is flashing it suggests a mismatch in the configuration of the Nucleus controller. Check the controller configuration.

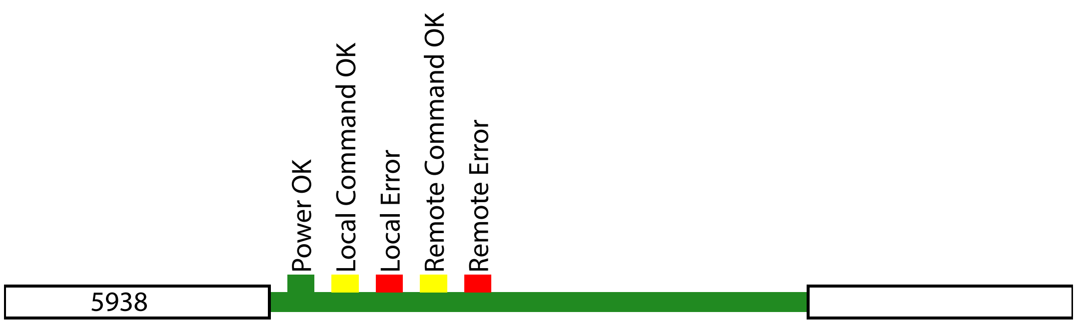


Figure 170 55938/5938 Sirius 850 Standard Video Output Module (Expandable) LEDs (5938 shown)

10.4 5928 Sirius 850 Standard Video Expansion Output Module

The 5928 Video Expansion Output Module has 24 video output channels and can handle SD, ASI and HD signals up to 3Gb/s.

CAUTION:

The 55928 front module (see see section 10.5) with 11365/11366 rear panel are designed to be functional replacements for the 5928 with 1365/1366 rears.

However, the modules are *not* mechanically identical and require specific rear panels:

- Use **55928** with a **11365 or 11366** rear panel only.
  It is *not* compatible with 1365 nor 1366 rears.
- Use **5928** with a **1365 or 1366** rear panels only.
  It is *not* compatible with 11365 nor 11366 rears.

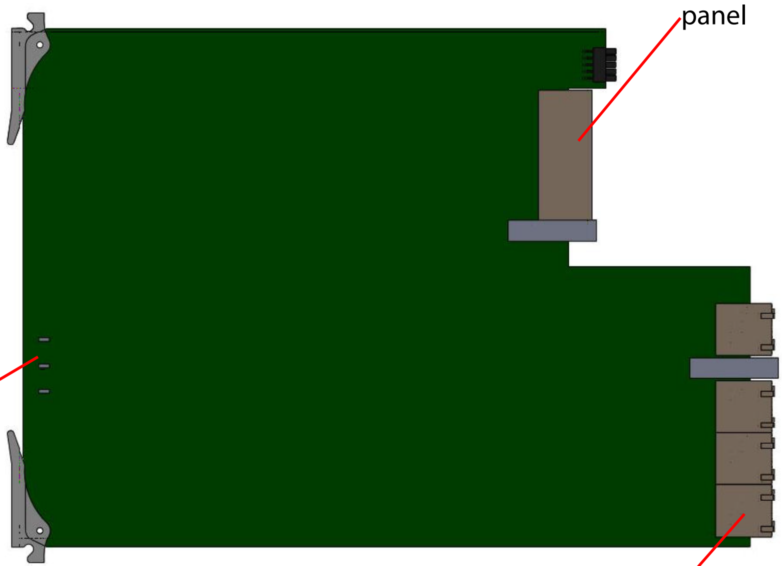


Figure 171 5928 Sirius 850 Standard Video Expansion Output Module

When the 5928 video expansion output modules are mounted in a Sirius 850 router they receive video signals from up to five expansion crosspoint modules. The expansion output signals are used in one of two ways depending on the expansion rear panel type that is fitted.

- 1290/1365 rear panel is used to pass the expansion video signals to a second Sirius 850 router, see section 10.6 and section 10.7 for details.
- 1366 rear panel has 24 x HD BNC outputs giving the router up to 576 further outputs (destinations 577 to 1152), see section 10.8.

Note:

- It is not possible to mix the 1365/1290 and 1366/1293 Output Rear Panels in a frame.
- 1365 and 1290 rear panels can be mixed if required.
- 1366 and 1293 rear panels can be mixed if required.

10.4.1 5928 Sirius 850 Standard Video Expansion Output Module LEDs

Table 77 shows the LED color code on the 5928 Sirius 850 standard video expansion output module, and Figure 172 shows the front edge of the module LEDs.

Table 77 5928 Sirius 850 Standard Video Expansion Output Module LED Information

LED Color	Function	Detail	Normal Working Status
Green	Power OK	Power to the card	**On Solid** - working correctly
Yellow	Command OK	Receiving messages from local Nucleus control module (the Nucleus controller in this frame)	**Flashing** - receiving information and working correctly
Red	Command Error	Error with messages from local Nucleus control module (the Nucleus controller in this frame)	**Off** - normal state **Flashing** - the command message from the router controller is corrupt or hasn't been received. This communications error could be caused by a hardware failure or incorrect insertion. Check that the module is inserted correctly. If the "Command Error" LED is flashing at the same time as the "Command OK" LED is flashing it suggests a mismatch in the configuration of the Nucleus controller. Check the controller configuration.

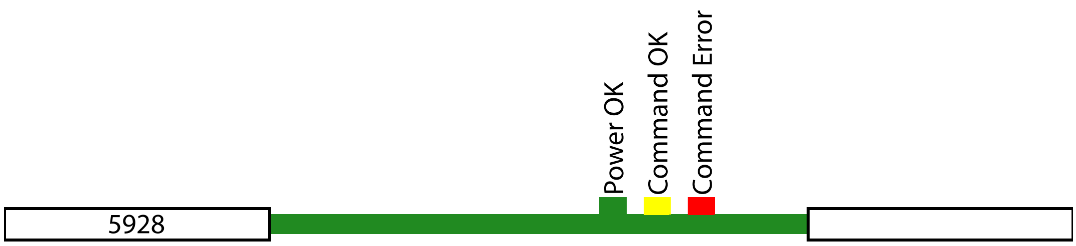


Figure 172 5928 Sirius 850 Standard Video Expansion Output Module LEDs

10.5 55928 Sirius 850 Standard Video Expansion Output Module

The 55928 Video Expansion Output Module has 24 video output channels and can handle SD, ASI and HD signals up to 3Gb/s.

CAUTION:

The 55928 front module with 11365/11366 rear panel are designed to be functional replacements for the 5928 (see section 10.4) with 1365/1366 rears.

However, the modules are *not* mechanically identical and require specific rear panels:

- Use **55928** with a **11365 or 11366** rear panel only.
  It is *not* compatible with 1365 nor 1366 rears.
- Use **5928** with a **1365 or 1366** rear panels only.
  It is *not* compatible with 11365 nor 11366 rears.

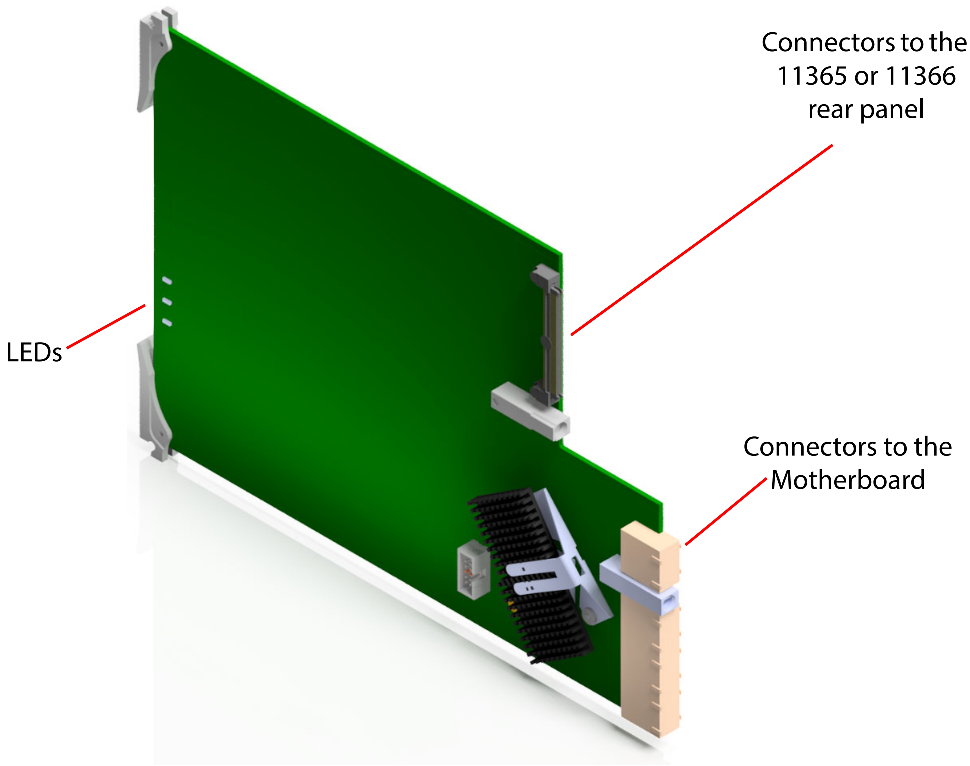


Figure 173 55928 Sirius 850 Standard Video Expansion Output Module

When the 55928 video expansion output modules are mounted in a Sirius 850 router they receive video signals from up to five expansion crosspoint modules. The expansion output signals are used in one of two ways depending on the expansion rear panel type that is fitted.

- 11365 rear panel is used to pass the expansion video signals to a second Sirius 850 router, see section 10.6 and section 10.7 for details.
- 11366 rear panel has 24 x HD BNC outputs giving the router up to 576 further outputs (destinations 577 to 1152), see section 10.8.

10.5.1 55928 Sirius 850 Standard Video Expansion Output Module LEDs

Table 77 shows the LED color code on the 55928 Sirius 850 standard video expansion output module, and Figure 172 shows the front edge of the module LEDs.

Table 78 55928 Sirius 850 Standard Video Expansion Output Module LED Information

LED Color	Function	Detail	Normal Working Status
Green	Power OK	Power to the card	**On Solid** - working correctly
Yellow	Command OK	Receiving messages from local Nucleus control module (the Nucleus controller in this frame)	**Flashing** - receiving information and working correctly
Red	Command Error	Error with messages from local Nucleus control module (the Nucleus controller in this frame)	**Off** - normal state **Flashing** - the command message from the router controller is corrupt or hasn't been received. This communications error could be caused by a hardware failure or incorrect insertion. Check that the module is inserted correctly. If the “Command Error” LED is flashing at the same time as the “Command OK” LED is flashing it suggests a mismatch in the configuration of the Nucleus controller. Check the controller configuration.

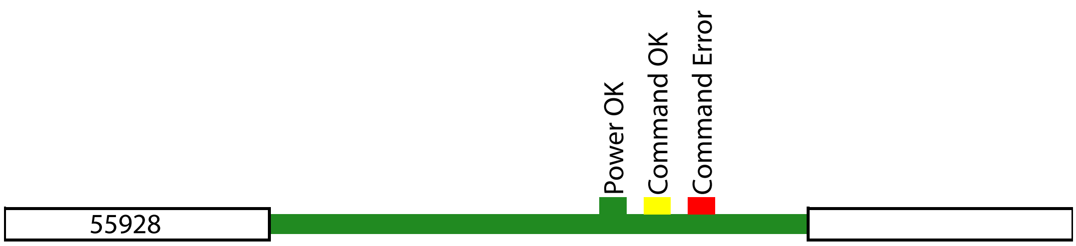


Figure 174 55928 Sirius 850 Standard Video Expansion Output Module LEDs

10.6 1290 Sirius 850 Video Expansion Output Rear Panel

The 1290 Sirius 850 Video Expansion Output Rear Panel is used to connect 24 signals to a second Sirius 850 expansion router, driving destinations 577 to 1152.

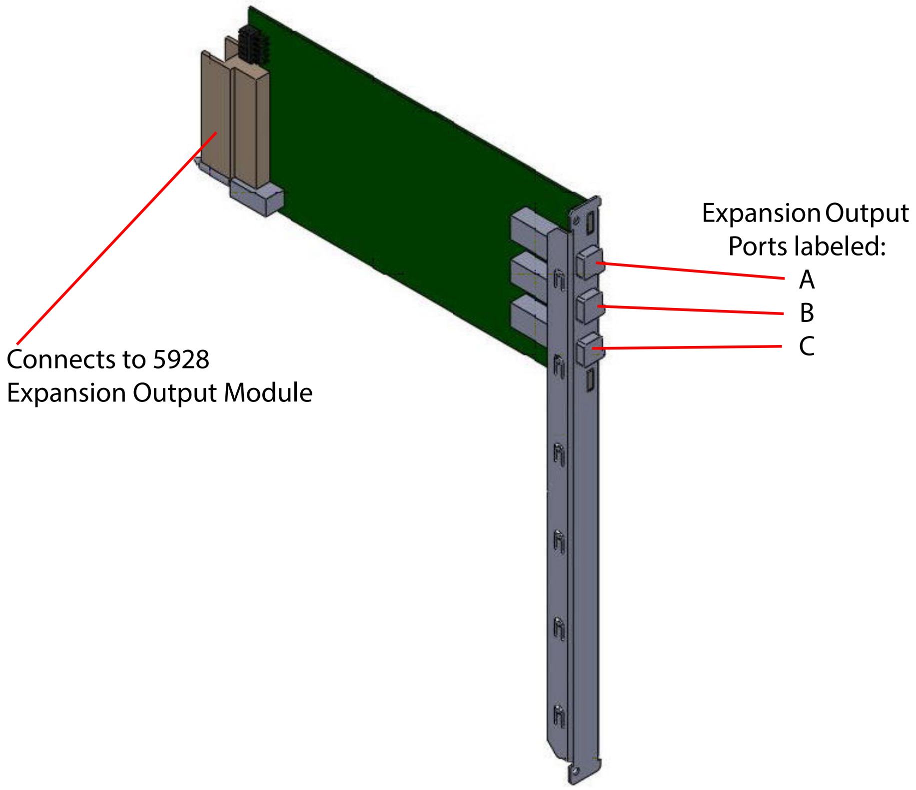


Figure 175 1290 Expansion Output Rear Panel

A video input signal passes through the 5928 expansion output module and out from the 1290 expansion rear panel to an output (577 to 1152) in the second frame.

Output from a frame to the expanded frame is via three expansion cables per 1290 expansion output rear panel. The three expansion cables must be purchased separately from Grass Valley. The cable order code for one cable is:

- 1 x 6 meter (19 Feet) expansion cable,
  Grass Valley order code: FGAEY WDS6THIN

Each 1290 rear panel must be connected to the expansion inputs of the corresponding output module in the second Sirius 850 frame, i.e. slot 1 to slot 1, slot 2 to slot 2, etc. The expansion input connectors are located below the output module rear panel connectors (1 to 24) and are marked a, b and c. The connections on the 1290 rear panel are marked A, B and C. The expansion cables connect A to a, B to b and C to c. See section 10.2 for further information.

Note:

- It is not possible to mix the 1290/1365 and 1366/1293 Output Rear Panels in a frame.
- 1365 and 1290 rear panels can be mixed if required.

10.6.1 1290 DS-Link Connections

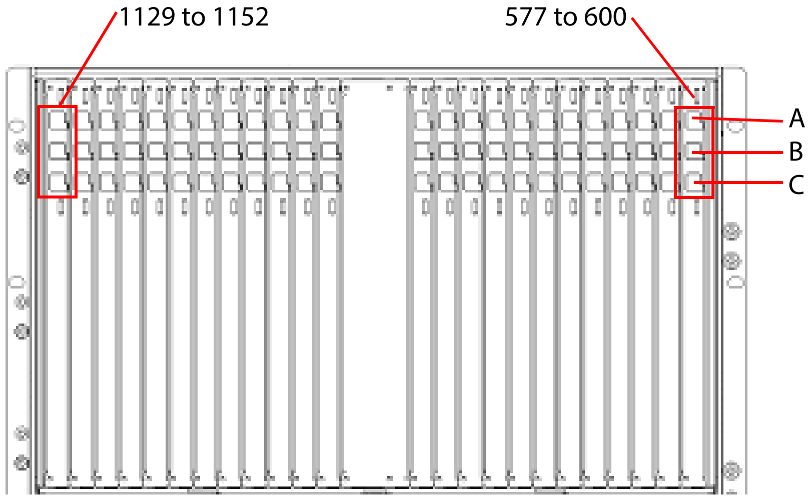


Figure 176 Sirius 850 Expansion 1290 Output Rear Panel

10.7 1365 Sirius 850 DS-Link In DS-Link Out Expansion Rear Panel

The 1365 Sirius 850 DS-Link In DS-Link Out Expansion Rear Panel DS-Link expansion outputs are used to connect 24 output signals to a second Sirius 850 expansion router, driving destinations 577 to 1152.

The DS-Link expansion input connectors are used when expanding a Sirius 850 system above 1152^2 (future enhancement).

CAUTION:

The 55928 front module (see section 10.5) with 11365/11366 rear panel are designed to be functional replacements for the 5928 (see section 10.4) with 1365/1366 rears.

However, the modules are *not* mechanically identical and require specific rear panels:

- Use **55928** with a **11365 or 11366** rear panel only.
  It is *not* compatible with 1365 nor 1366 rears.
- Use **5928** with a **1365 or 1366** rear panels only.
  It is *not* compatible with 11365 nor 11366 rears.

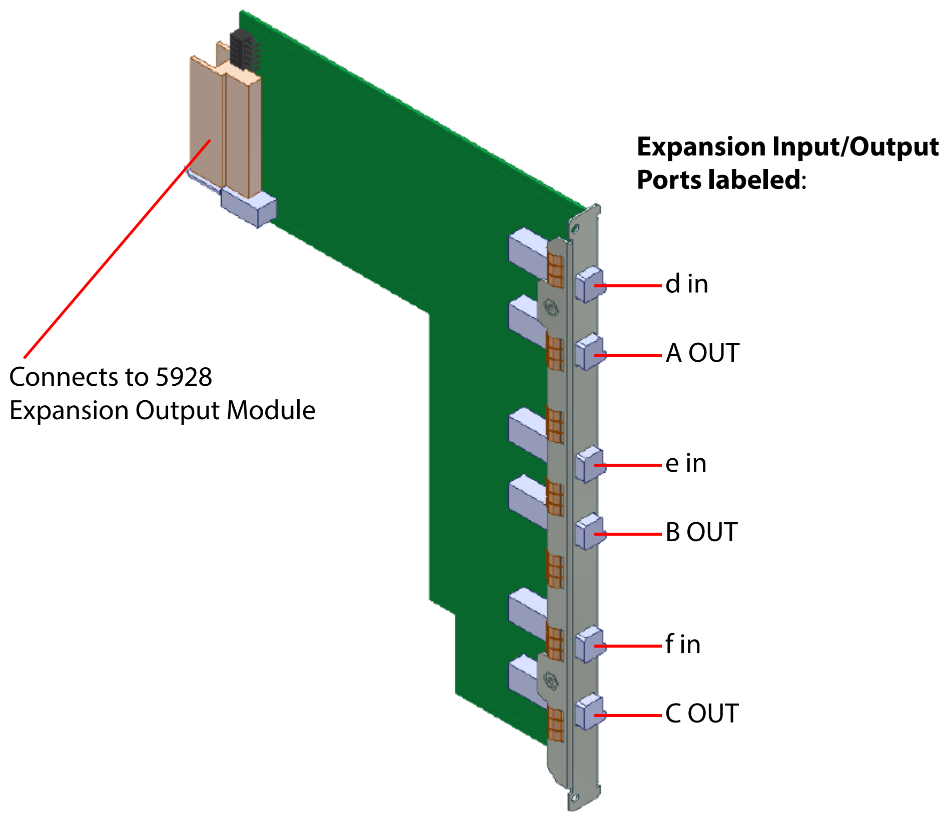


Figure 177   1365 Sirius 850 1365 DS-Link In DS-Link Out Expansion Rear Panel

A video input signal passes through the 5928 expansion output module and out from the 1365 expansion rear panel to an output (577 to 1152) in the second frame.

Output from a frame to the expanded frame is via three expansion cables per 1365 expansion output rear panel. The three expansion cables must be purchased separately from Grass Valley. The order code for a single cable is:

- 1 x 6 meter (19 Feet) expansion cable Grass Valley order code: FGAEY WDS6THIN

Each 1365 rear panel must be connected to the expansion inputs of the corresponding output module in the second Sirius 850 frame, i.e. slot 1 to slot 1, slot 2 to slot 2, etc. The expansion input connectors are located below the output module rear panel connectors (1 to 24) and are marked a, b and c. The connections on the 1365 rear panel are marked A, B and C. The expansion cables connect A OUT to a, B OUT to b and C OUT to c. See section 10.2 for further information.

Note:

- It is not possible to mix the 1365/1290 and 1366/1293 Output Rear Panels in a frame.
- 1365 and 1290 rear panels can be mixed if required.

10.7.1 1365 DS-Link Connections

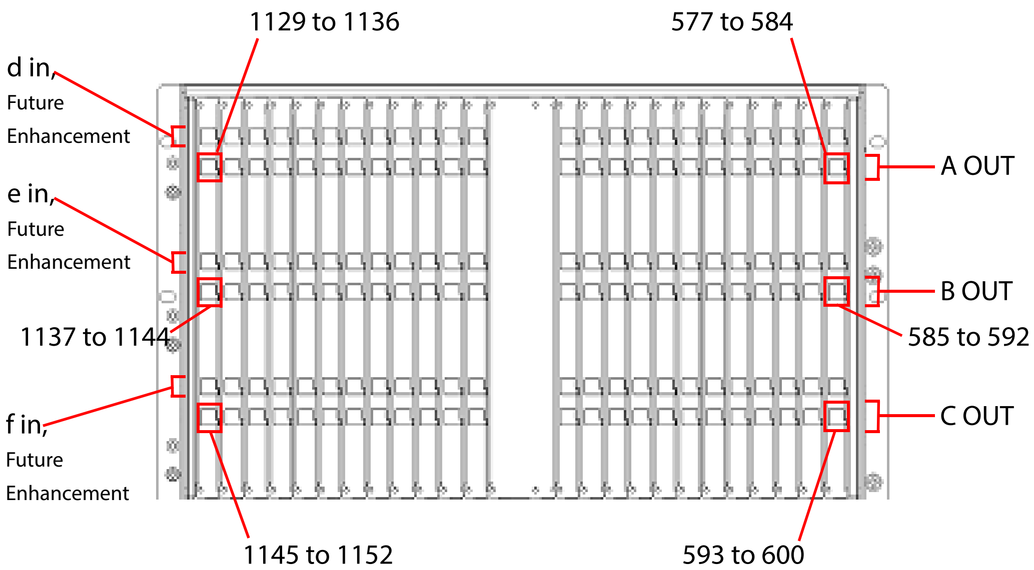


Figure 178 Sirius 850 Expansion 1365 Output Rear Panel

10.8 1366 Sirius 850 Video HD BNC Output Rear Panel

The 1366 Sirius 850 Video HD BNC Output rear panel has 24 x HD BNC connectors.

Note:

- Earlier Sirius 850 routers used the 1293 video DIN 1.0/2.3 output rear panel, see appendix C.7.1.
- The 1366 Sirius 850 video HD BNC output rear panel is not a direct replacement for the 1293 because the 1366 is fitted with HD BNC connectors. The 1293 is fitted with DIN 1.0/2.3 connectors.
- The 1293 rear panel is no longer supplied with new systems but is available as a spares replacement if required.

The output from the 5928 expansion output module is via the 1366 24 Channel Expansion Output Rear Panel. When 1366 cards are fitted to a Sirius 850 it is then a single frame 576 x 1152 router with no further expansion capability.

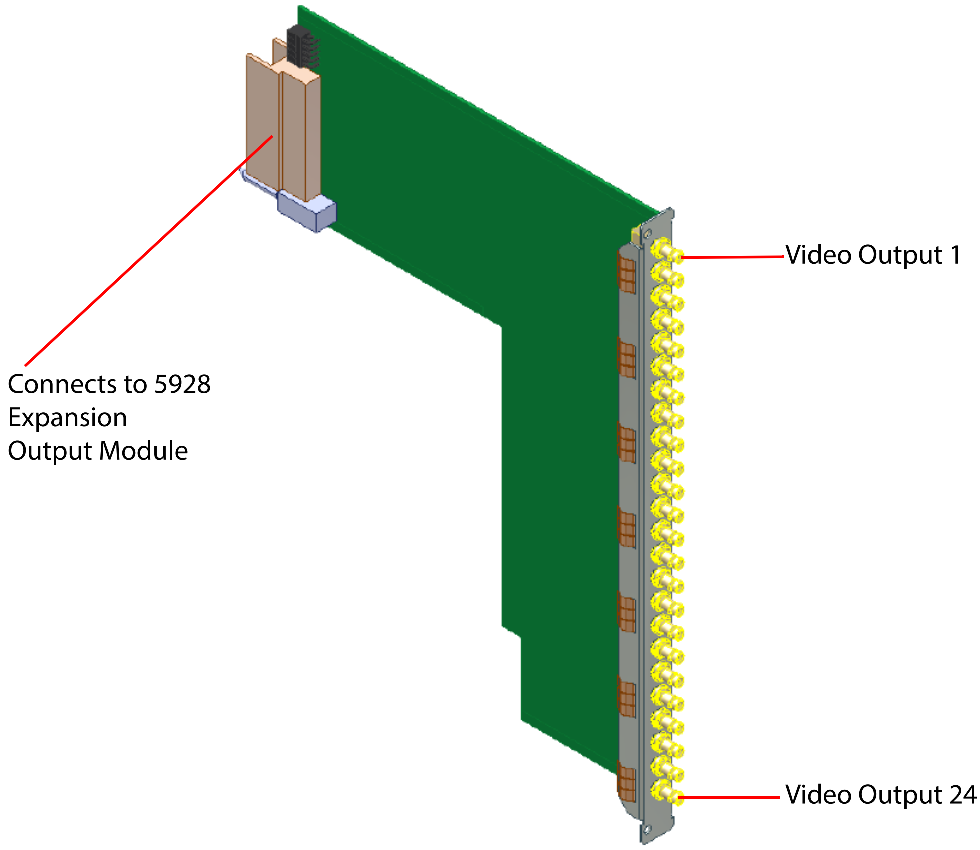


Figure 179 1366 24 Channel Expansion Output Rear Panel

Note:

- It is not possible to mix the 1365/1290 and 1366/1293 Output Rear Panels in a frame.
- 1366 and 1293 rear panels can be mixed if required.
- It is not possible to monitor the 1366 expansion outputs.
- The 1366 expansion output rear panels are not fitted with Catsii LEDs.
- A second Sirius 850 frame cannot be used if one or more 1366 Output Rear Panels are fitted in a frame.
- If a second Sirius 850 frame is required at a future date all 1366 rear panels must be removed and replaced with 1365 expansion rear panels.

10.9 11365 Sirius 850 DS-Link In DS-Link Out Expansion Rear Panel

The 11365 Sirius 850 DS-Link In DS-Link Out Expansion Rear Panel DS-Link expansion outputs are used to connect 24 output signals to a second Sirius 850 expansion router, driving destinations 577 to 1152.

The DS-Link expansion input connectors are used when expanding a Sirius 850 system above 1152^2 (future enhancement).

CAUTION:

The 55928 front module (see section 10.5) with 11365/11366 rear panel are designed to be functional replacements for the 5928 (see section 10.4) with 1365/1366 rears.

However, the modules are *not* mechanically identical and require specific rear panels:

- Use 55928 with a 11365 or 11366 rear panel only.
  It is *not* compatible with 1365 nor 1366 rears.
- Use 5928 with a 1365 or 1366 rear panels only.
  It is *not* compatible with 11365 nor 11366 rears.

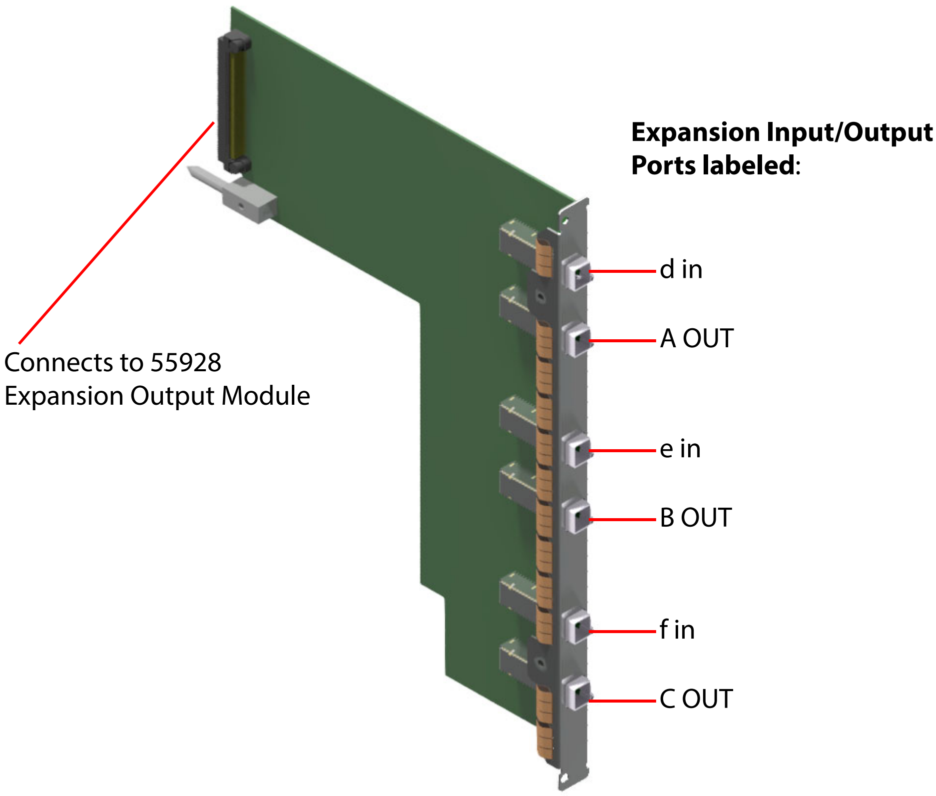


Figure 180 11365 Sirius 850 11365 DS-Link In DS-Link Out Expansion Rear Panel

A video input signal passes through the 55928 expansion output module and out from the 11365 expansion rear panel to an output (577 to 1152) in the second frame.

Output from a frame to the expanded frame is via three expansion cables per 11365 expansion output rear panel. The three expansion cables must be purchased separately from Grass Valley. The order code for a single cable is:

- 1 x 6 meter (19 Feet) expansion cable Grass Valley order code: FGAEY WDS6THIN

Each 11365 rear panel must be connected to the expansion inputs of the corresponding output module in the second Sirius 850 frame, i.e. slot 1 to slot 1, slot 2 to slot 2, etc. The expansion input connectors are located below the output module rear panel connectors (1 to 24) and are marked a, b and c. The connections on the 11365 rear panel are marked A, B and C. The expansion cables connect A OUT to a, B OUT to b and C OUT to c. See section 10.2 for further information.

Note:
- It is not possible to mix the 11365/1290 and 11366/1293 Output Rear Panels in a frame.

10.9.1 11365 DS-Link Connections

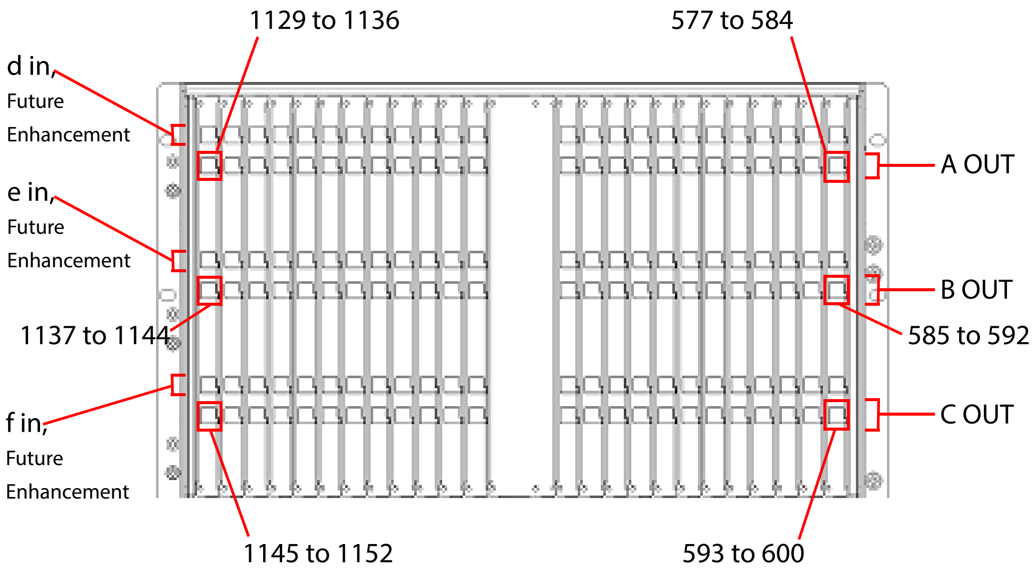


Figure 181   Sirius 850 Expansion 11365 Output Rear Panel

10.10 11366 Sirius 850 Video HD BNC Output Rear Panel

The 11366 Sirius 850 Video HD BNC Output rear panel has 24 x HD BNC connectors.

The output from the 55928 expansion output module is via the 11366 24 Channel Expansion Output Rear Panel. When 11366 cards are fitted to a Sirius 850 it is then a single frame 576 x 1152 router with no further expansion capability.

CAUTION:

The 55928 front module (see section 10.5) with 11365/11366 rear panel are designed to be functional replacements for the 5928 (see section 10.4) with 1365/1366 rears.

However, the modules are *not* mechanically identical and require specific rear panels:

- Use **55928** with a **11365 or 11366** rear panel only.
  It is *not* compatible with 1365 nor 1366 rears.
- Use **5928** with a **1365 or 1366** rear panels only.
  It is *not* compatible with 11365 nor 11366 rears.

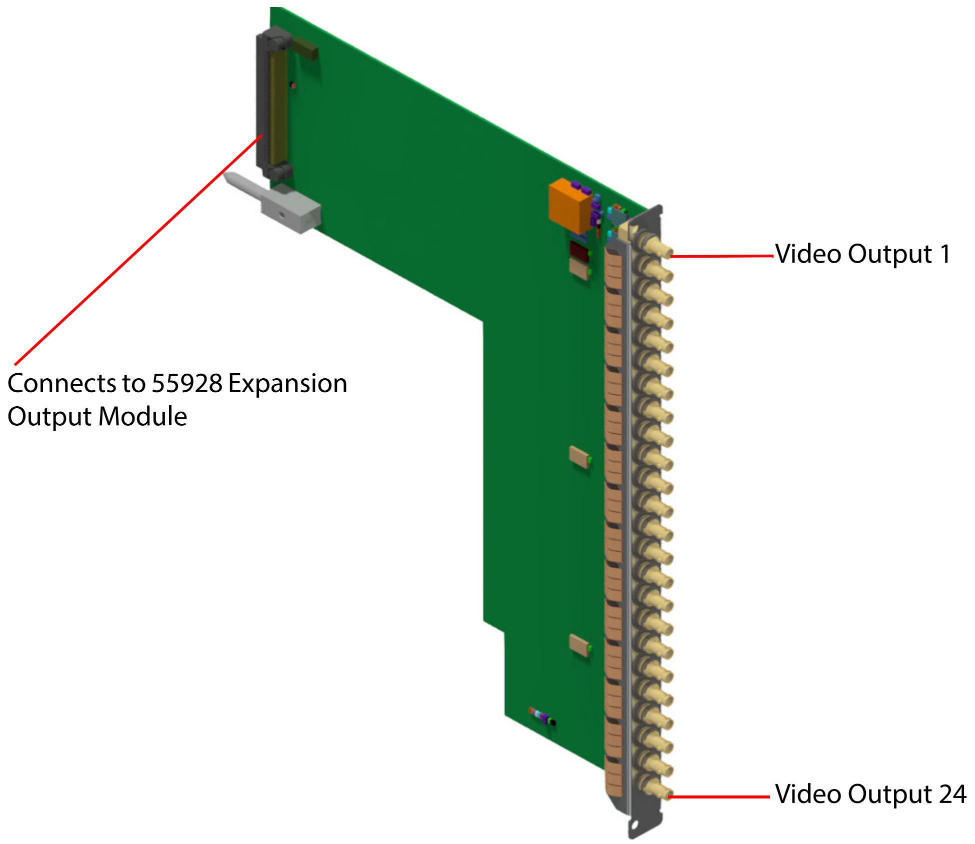


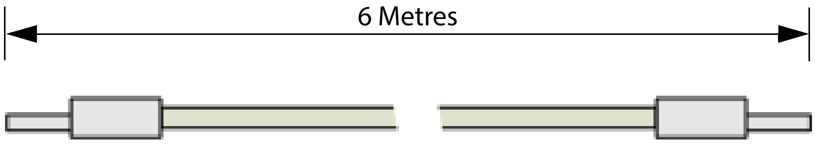
Figure 182 11366 24 Channel Expansion Output Rear Panel

Note:

- It is not possible to mix the 11365/1290 and 11366/1293 Output Rear Panels in a frame.
- It is not possible to monitor the 11366 expansion outputs.
- The 11366 expansion output rear panels are not fitted with Catsii LEDs.
- A second Sirius 850 frame cannot be used if one or more 11366 Output Rear Panels are fitted in a frame.
- If a second Sirius 850 frame is required at a future date all 11366 rear panels must be removed and replaced with 11365 expansion rear panels.

10.11 Audio Input Expansion in a Two Frame System

When two Sirius 850 routers are connected together (See section 10.2) audio inputs can be transmitted from an AHP input card in one router to an AHP input card in the second router and the audio inputs can be routed through the audio crosspoints in both routers if required. The connecting cable is bi-directional meaning that the reverse is also true.



1 x 6 metre expansion cable Grass Valley order code: FGAEY WDS6THIN

Figure 183 Bi-directional DS-Link Audio Input Expansion Cable

This feature is available with both the 4915 (audio input module) and the 5919/5915 (audio capable video input module). Audio routing can be expanded up to a maximum of 36864^2 if both routers are fully loaded with AHP input cards.

The DS-Link sockets on the rear panels of 4915 and 5919/5915 input modules pass their multiplexed audio transport streams to the other router frame via a bi-directional DS-Link expansion cable (see Figure 183 & Figure 184). Once the expansion audio transport stream arrives at the input card in the other router frame it is passed, along with the input cards own audio transport stream, to the audio crosspoint card in that router in the usual way and is routed by the local controller as normal.

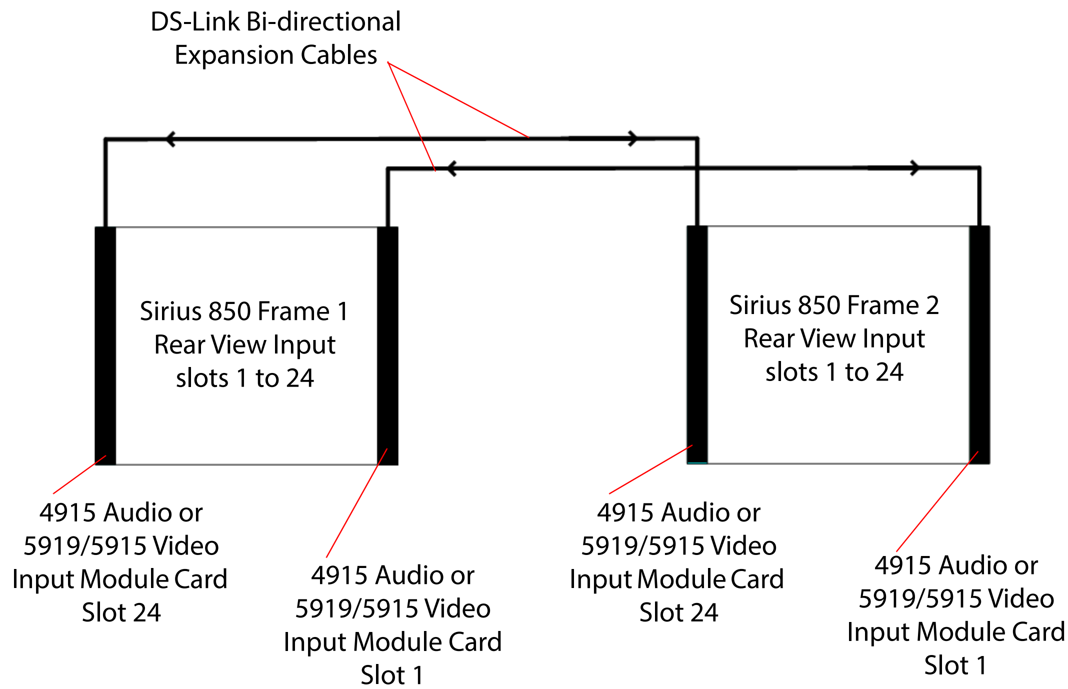


Figure 184 Audio Expansion in a two Frame System

Note:

- Each pair of expansion input cards must be AHP cards (see Figure 184).
- Each pair of expansion input cards must be in the same card slot position in each router (see Figure 184).
- The same number of AHP input cards must be fitted in both frames and must be in the same card slot positions in each router.

11 Multiviewer and Input/Output Monitoring Modules

Chapter contains:

Multiviewer and Input/Output Monitoring Modules

11.1 Monitoring and Multiviewer Overview

The Sirius 800 series can be configured to have:

- Monitors Outputs.
- External Multiviewer SDI Outputs.
- Integrated Multiviewers.

11.1.1 Monitor Outputs

The Sirius 800 routers have four independently-selectable SDI monitor outputs. The four SDI monitor outputs can be selected from any of the video/audio inputs or outputs in the local router frame.

Monitoring SDI outputs are not available on the Sirius 830 when it is equipped with external multiviewer SDI outputs.

11.1.2 External Multiviewer SDI Outputs

Sirius 800 routers can be equipped to provide extra SDI outputs for connecting to external multiviewers. The extra SDI outputs provide monitoring of any router SDI input.
See Figure 185.

Note:

- The monitor and multiviewer do not have any redundancy.
- **Sirius 830**: Input/Output Monitoring is not available on the Sirius 830 when it is equipped with multiviewer outputs.
- **Sirius 840/850**: If Input pre-processing is monitored using the monitor outputs then multiviewer outputs should not be routed from inputs 1, 3, 5 and 7 of any video input module as they will display duplicates of the four monitoring outputs.

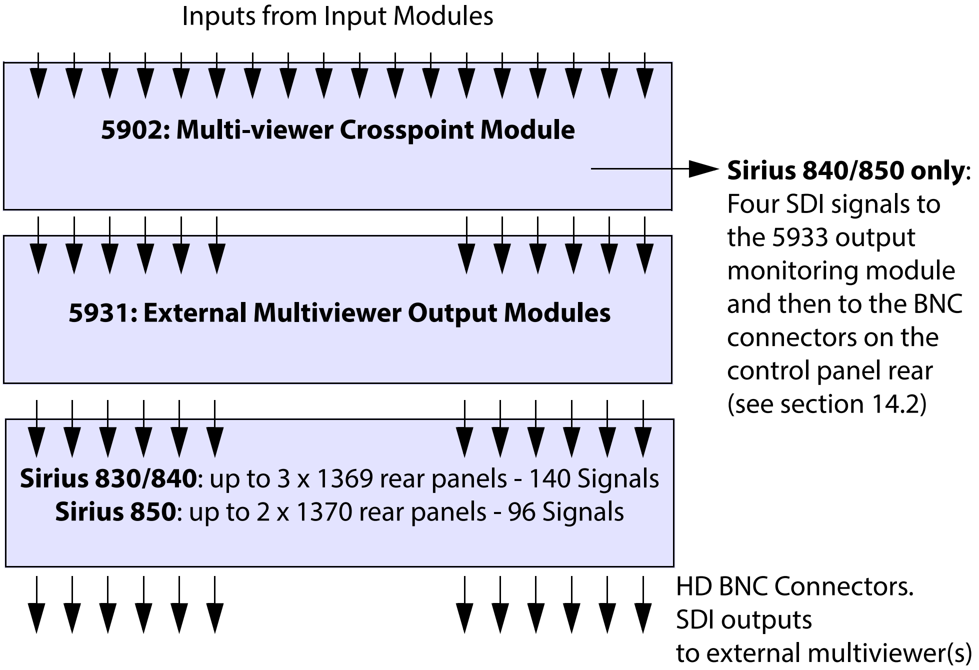


Figure 185 Monitoring and External Multiviewer SDI Outputs

A multiviewer crosspoint module, used with a external multiviewer output module or an integrated multiviewer module, does not take any routing capability away from the main crosspoint matrix. the multiviewer output module takes a copy of each input signal, and sends out up to 140 (Sirius 850 - up to 96) outputs to HD BNC connectors.

11.1.3 Integrated Multiviewers

Sirius 800 routers can also be equipped with integrated multiviewers. These can monitor any router SDI input or monitor SDI outputs; they provide multiviewer video wall display outputs at the rear of the Sirius frame, on HD-BNC or Fiber connectors via SFPs.

The Sirius 800 integrated multiviewer modules and associated rear panels include:

- **MV-800:**
  MV-800 Integrated Multiviewer and MV-800-RP MV800 Rear Panel.
  Monitors any router input. See Figure 186.
- **MV-850:**
  MV-850 Integrated Multiviewer and MV-850-RP MV-850 Rear Panel.
  Dual output module, provides standard-video outputs with an integrated multiviewer.
  Fits Sirius 840 and 850 router output module slots.
  Monitors selected router outputs. See Figure 187.

See the respective, separate Integrated Multiviewer User Manuals for more information.

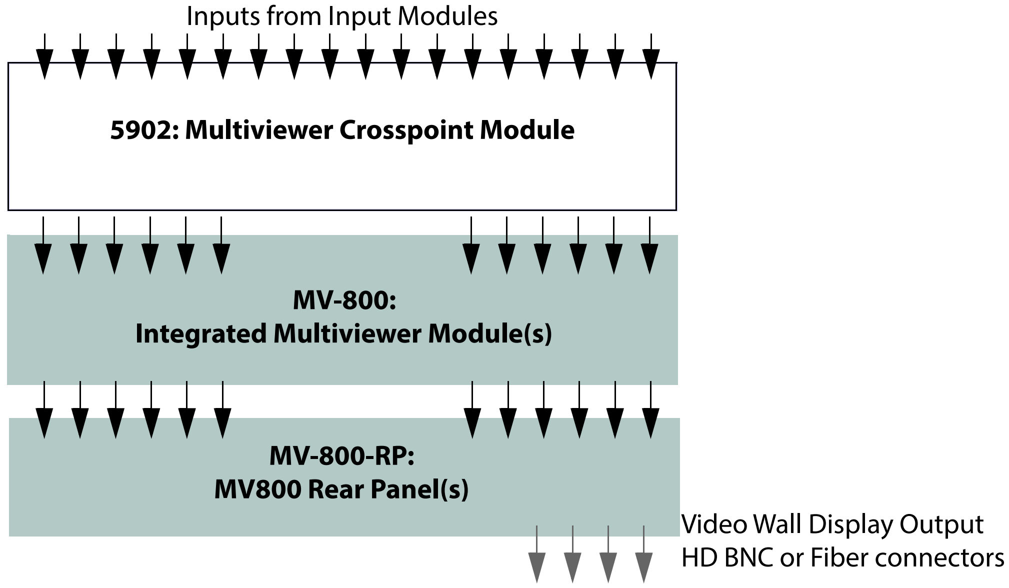


Figure 186 MV-800 Integrated Multiviewer - Multiviewer-Monitoring of Inputs

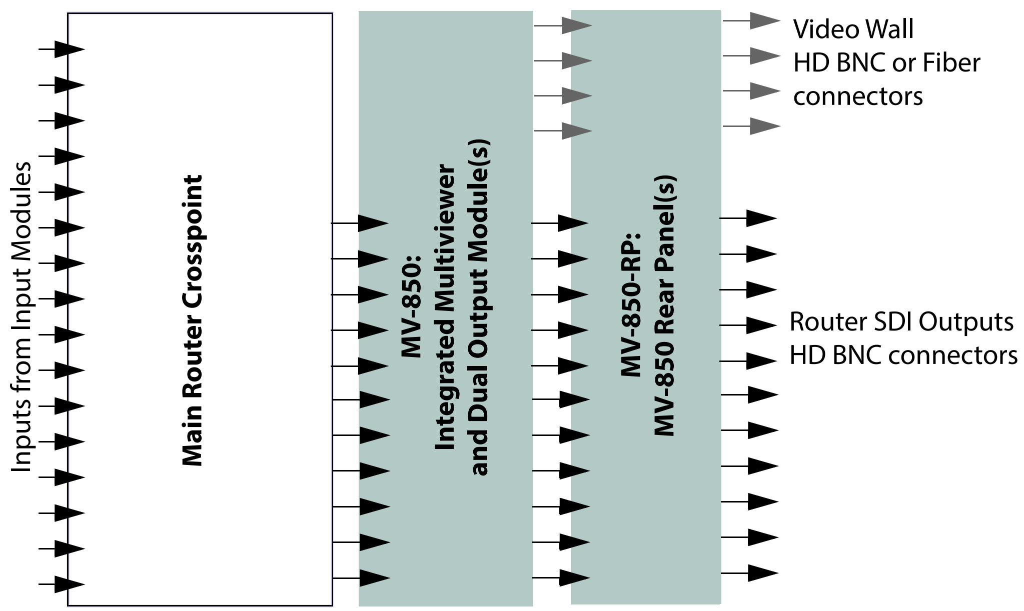


Figure 187 Sirius 840/850 MV-850 Integrated - Multiviewer-Monitoring of Outputs

Monitor Outputs and External Multiviewer Outputs:

Each monitor output port must be configured to match the type of signal it will be monitoring when the router is in use (see Table 79). This configuration is carried out in Workbench, see the Workbench manual for information.

Table 79 Monitor Output Port Configuration

Signal Type Monitored	Monitor Output Port Configuration Required
Discrete MADI or AES Audio 4915, 4929 and 4925 modules	Configure Monitor Output Port to Matrix 2 (Audio)
Video 55917, 5917, 5919, 55926, 5926, 55938, 5938, 55949, 5949, 5913, 5914, 5915, 5916, 5923, 5924, 5925 and 5937 modules	Configure Monitor Output to Matrix 1 (Video) Embedded audio is passed with the video signal

The monitor output ports only output mono signals. If an AES left or right channel is routed to a monitor output the relevant AES pair will be output as a combined mono signal.

Multiviewer Crosspoint:

A 5902 Multiviewer Crosspoint module is required by the External Multiviewer option and by the MV-800 Integrated Multiviewer option.

11.2 Sirius 830 Monitoring and Multiviewer

11.2.1 Sirius 830: Multiviewer Outputs Only (no monitoring)

- Sirius 830 frame must have the Blue fan option.
- 5902 (qty 1) Multiviewer Crosspoint Module.
- 5931 (qty 1-3) External Multiviewer Output Module(s).
- 1369 rear panel (qty 1-3) External Multiviewer HD BNC Rear panel(s).
- MV-800 (qty 1-2) Integrated Multiviewer (1- to 2-off in lower two upper slots in frame).
- MV-800-RP (qty 1-2) MV-800 Rear Panel.

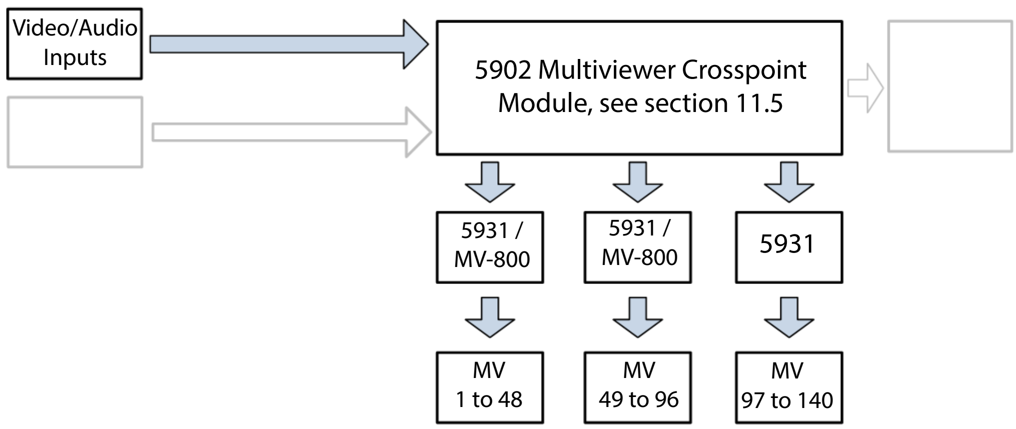
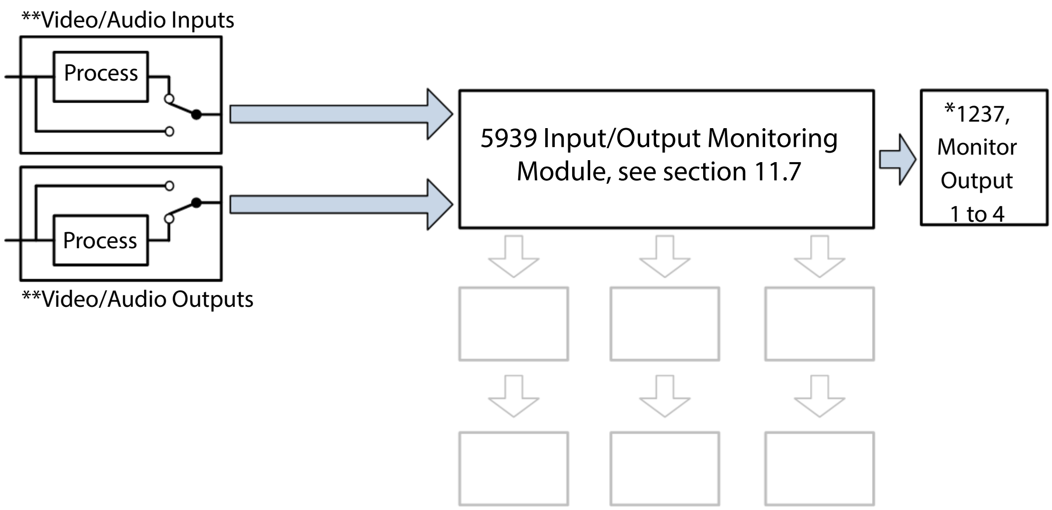


Figure 188 Multiviewer Outputs Only (No Monitoring) Option (Sirius 830)

11.2.2 Sirius 830: Input/output Monitoring Only (no multiviewer outputs)

- Sirius 830 frame must have the Blue fan option.
- 5939 (qty 1) Input/Output Monitoring Card
- 1237 (qty 1) Input/Output Monitoring Rear Panel



*For details of the "Monitor 1 to 4" BNC connections see section 11.8.

**Input/Output Monitoring selected from either the input or the output of the module (pre- or post-processing). See section 3.6.2 for details on how to configure this using the router Door PC.

Figure 189 Input/Output Monitoring Only (No Multiviewer Outputs) Option (Sirius 830)

11.3 Sirius 840 Monitoring and Multiviewer

11.3.1 Sirius 840: Multiviewer Outputs Only (no monitoring)

- Sirius 840 frame must have the Blue fan option.
- 5902 (qty 1) Multiviewer Crosspoint module
- 5931 (qty 1-3) External Multiviewer Output module(s)
- 1369 (qty 1-3) External Multiviewer HD BNC Rear panel(s)
- MV-800 (qty 1-3) MV-800 Integrated Multiviewer
- MV-800-RP (qty 1-3) MV-800 Rear Panel

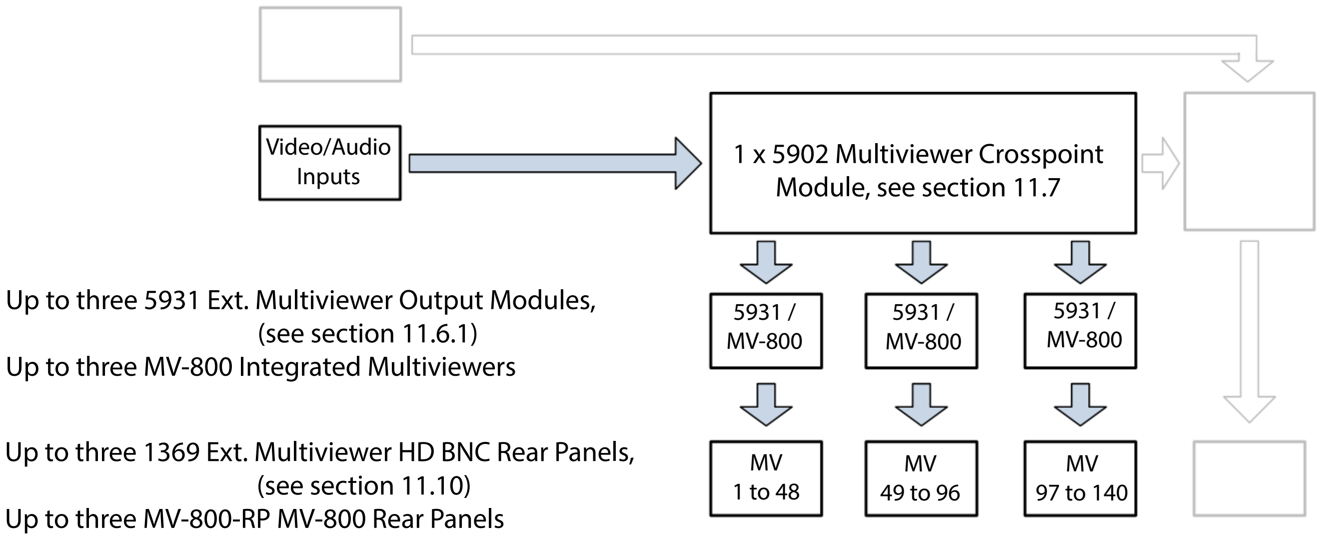
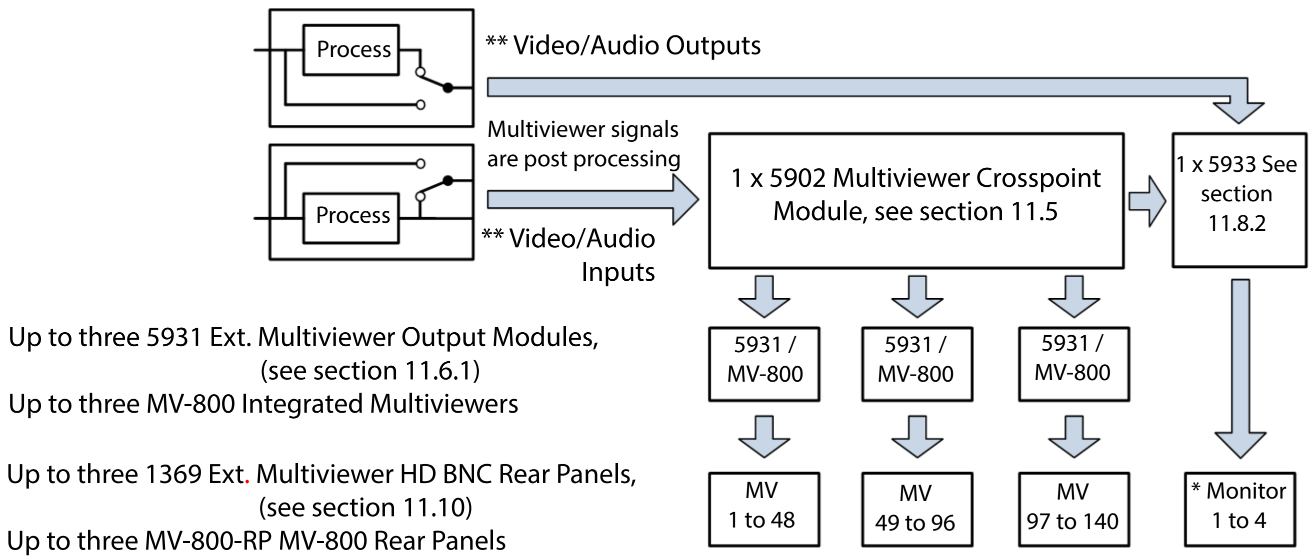


Figure 190 Multiviewer Outputs Only (No Monitoring) Option (Sirius 840)

11.3.2 Sirius 840: Multiviewer Outputs and Input/Output Monitoring

- Sirius 840 frame must have the Blue fan option.
- 5902 (qty 1) Multiviewer Crosspoint module
- 5931 (qty 1 to 3) External Multiviewer Output module(s)
- 1369 (qty 1 to 3) External Multiviewer HD BNC Rear panel(s)
- 5933 (qty 1) Output Monitor module
- MV-800 (qty 1-3) MV-800 Integrated Multiviewer
- MV-800-RP (qty 1-3) MV-800 Rear Panel



* For details of the "*Monitor 1 to 4*" BNC connections see section 14.2.

** Input/Output Monitoring is selected from either the input or the output of the module (pre- or post-processing).
See section 3.6.2 for details on how to configure this using the router Door PC.

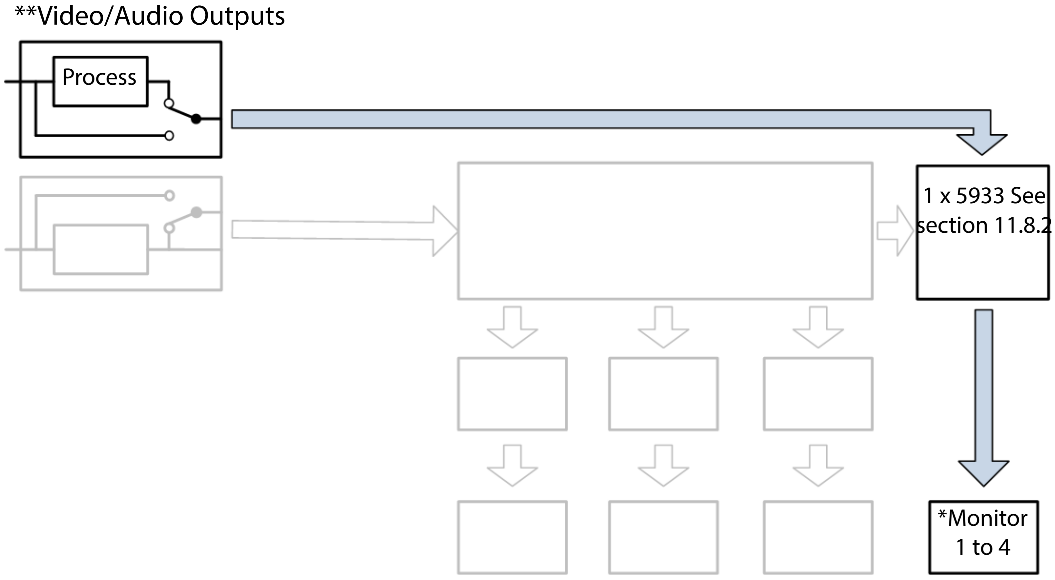
Note: Multiviewer signals are always post-processing.

Figure 191 Multiviewer Outputs and Input/Output Monitoring Option (Sirius 840)

Note:	If Input pre-processing is monitored using the monitor outputs then external multiviewer outputs should not be routed from inputs 1, 3, 5 and 7 of any video input module as they will display duplicates of the four monitoring outputs.

11.3.3 Sirius 840: Output Monitoring Only (no multiviewer outputs)

- 5933 (qty 1) Output Monitor module



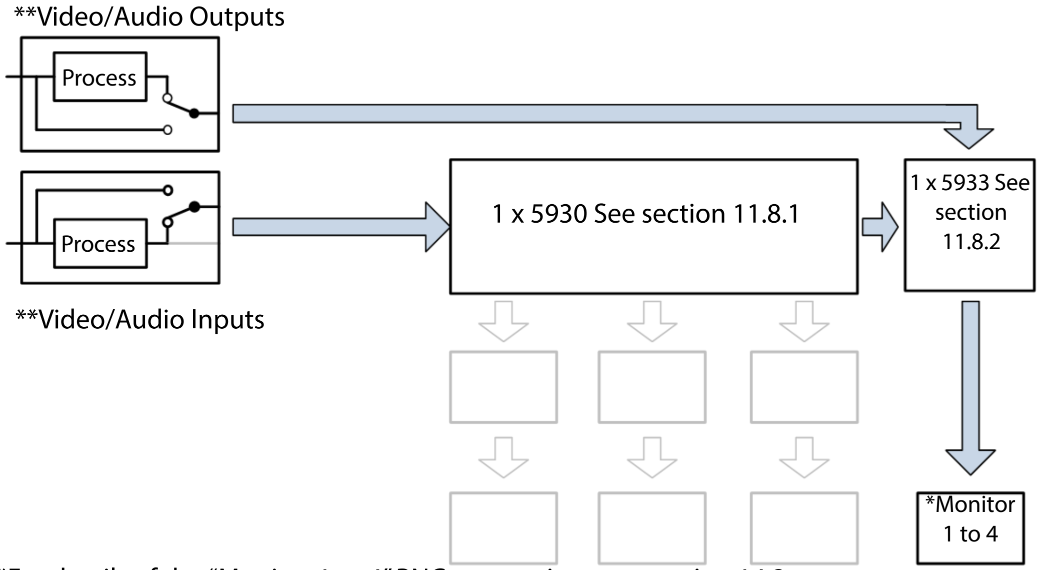
*For details of the “Monitor 1 to 4” BNC connections see section 14.2.

**Output Monitoring selected from either the input or the output of the module (pre- or post-processing). See section 3.6.2 for details on how to configure this using the router Door PC.

Figure 192 Output Monitoring Only (No Multiviewer outputs) Option (Sirius 840/850)

11.3.4 Sirius 840: Input/Output Monitoring Only (no multiviewer outputs)

- 5930 (qty 1) Input Monitor module
- 5933 (qty 1) Output Monitor module



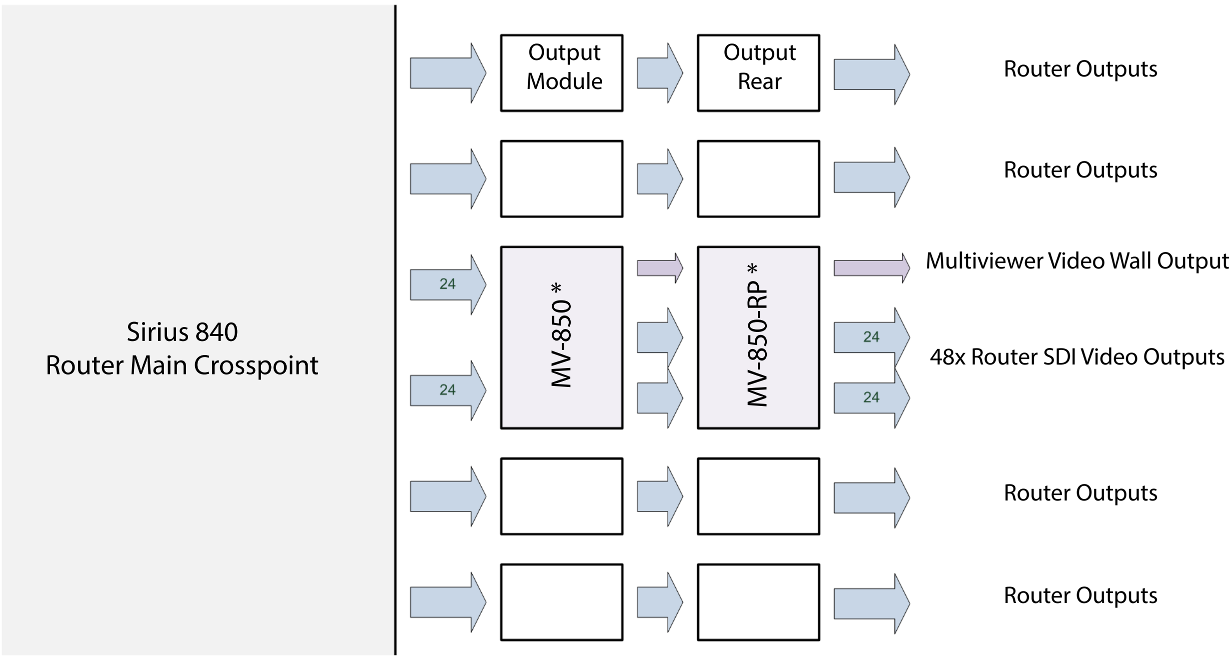
*For details of the “Monitor 1 to 4” BNC connections see section 14.2.

**Input/Output Monitoring selected from either the input or the output of the module (pre- or post-processing). See section 3.6.2 for details on how to configure this using the router Door PC.

Figure 193 Input/Output Monitoring Only Option (Sirius 840/850)

11.3.5 Sirius 840: Router Outputs with Multiviewer

- Sirius 840 frame must have the Blue fan option.
- Up to 24-off Sirius Router Output modules and rear panels. See Section 9 "Output Modules and Output Rear Panels".
- Up to 12-off MV-850 Integrated Multiviewer with MV-850-RP Rear Panel.



Up to 24 Router Output Modules and Rear Panels,
Up to 12 MV-850 Integrated Multiviewers (MV-850 + MV-850-RP)

* MV-850 and MV-850-RP can be fitted to any pair of adjacent router output module slots.

Figure 194 MV-850 Multiviewer Monitoring Sirius 840 Router Outputs

11.4 Sirius 850 Monitoring and Multiviewer

11.4.1 Sirius 850: Multiviewer Outputs Only (no monitoring)

- Sirius 850 frame must have the Blue fan option.
- 5902 (qty 1) Multiviewer Crosspoint module
- 5931 (qty 1 to 2) External Multiviewer Output module(s)
- 1370 (qty 1 to 2) External Multiviewer HD BNC Rear panel(s)
- MV-800 (qty 1-2) Integrated Multiviewer
- MV-800-RP (qty 1-2) MV-800 Rear Panel

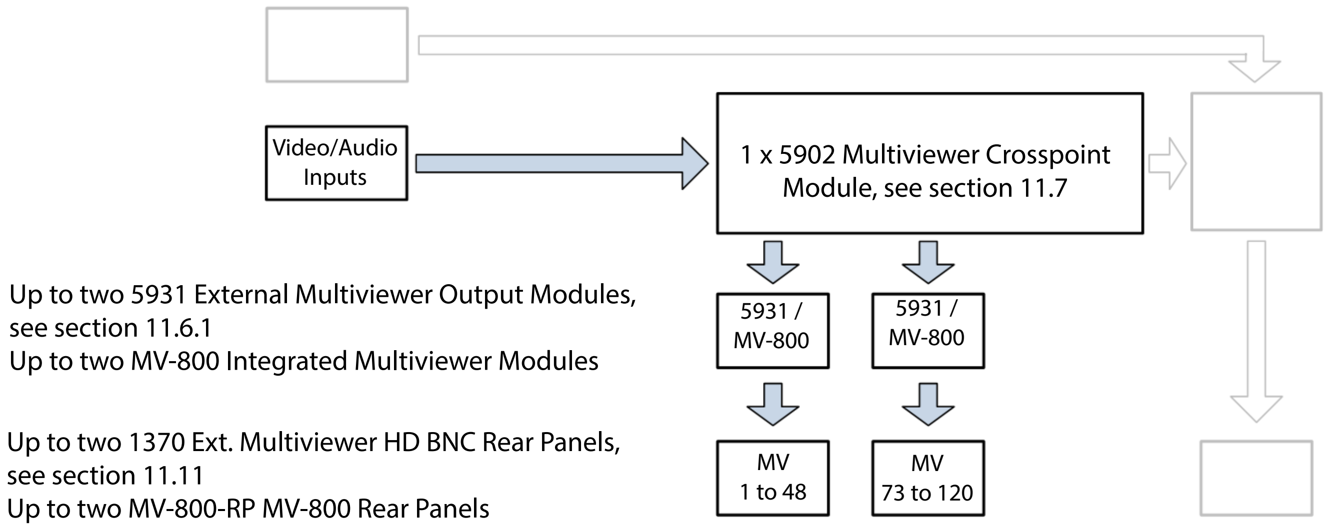


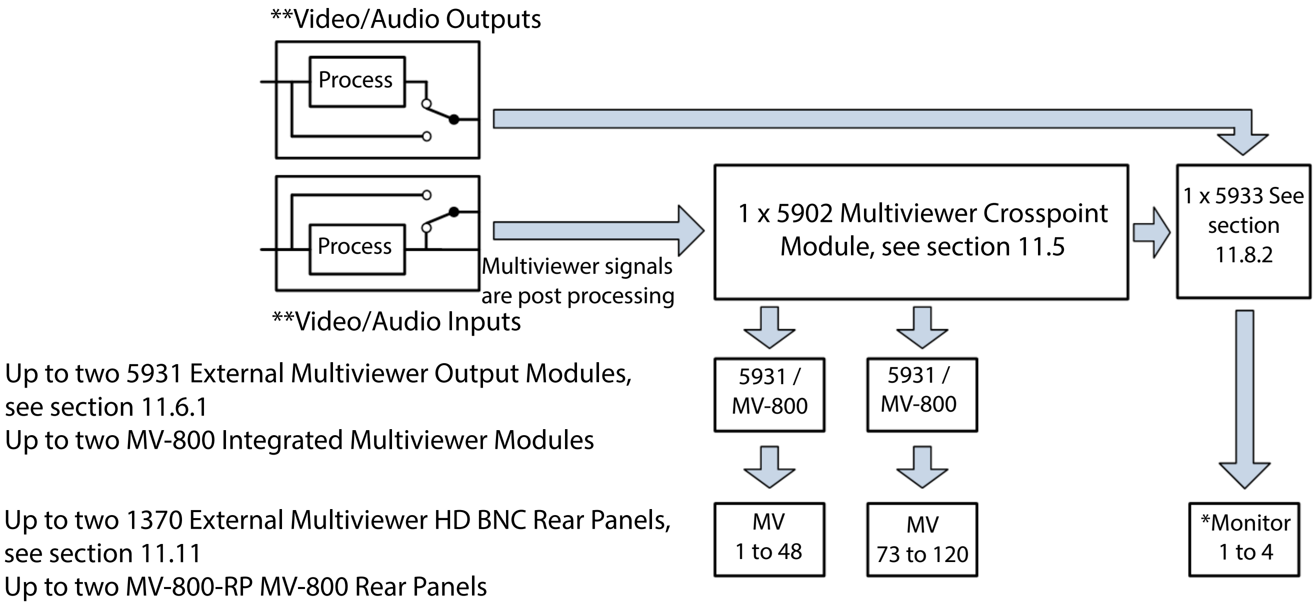
Figure 195 Multiviewer Outputs Only (No Monitoring) Option (Sirius 850)

Note:

- Earlier Sirius 850 systems were sometimes fitted with 5932 multiviewer output module(s) and either 1291 multiviewer coax rear panel(s) or 1292 MV-Link rear panel(s).
- The 1292 MV-Link rear enabled up to 140 multiviewer outputs to be connected to a Miranda KaleidoX multiviewer, see sections C.6.3 and C.6.4 for details.
- 5932 modules and 1292 rear panels are no longer available and are shown here for users that already have them fitted.

11.4.2 Sirius 850: Multiviewer Outputs and Input/Output Monitoring

- Sirius 850 frame must have the Blue fan option.
- 5902 (qty 1) Multiviewer Crosspoint module
- 5931 (qty 1 to 2) External Multiviewer Output module(s)
- 1370 (qty 1 to 2) External Multiviewer HD BNC Rear panel(s)
- 5933 (qty 1) Output Monitor module
- MV-800 (qty 1-2) Integrated Multiviewer
- MV-800-RP (qty 1-2) MV-800 Rear Panel



*For details of the "Monitor 1 to 4" BNC connections see section 14.2.

**Input/Output Monitoring selected from either the input or the output of the module
(pre- or post-processing). See section 3.6.2 for details on how to configure this using the router Door PC.

Multiviewer signals are always post processing.

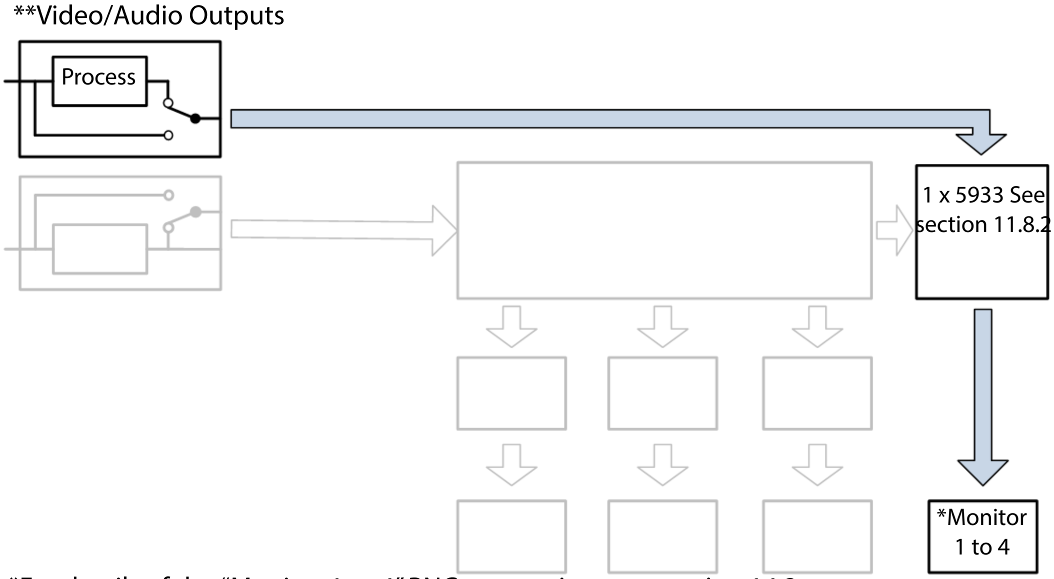
Figure 196 Multiviewer Outputs and Input/Output Monitoring Option (Sirius 850)

Note:

- If Input pre-processing is monitored using the monitor outputs then multiviewer outputs should not be routed from inputs 1, 3, 5 and 7 of any video input module as they will display duplicates of the four monitoring outputs.
- Earlier Sirius 850 systems were sometimes fitted with 5932 external multiviewer output module(s) and either 1291 multiviewer coax rear panel(s) or 1292 MV-Link rear panel(s).
- The 1292 MV-Link rear enabled up to 140 external multiviewer outputs to be connected to a Miranda KaleidoX multiviewer, see sections C.6.3 and C.6.4 for details.
- 5932 modules and 1292 rear panels are no longer available and are shown here for users that already have them fitted.

11.4.3 Sirius 850: Output Monitoring Only (no multiviewer outputs)

- 5933 (qty 1) Output Monitor module



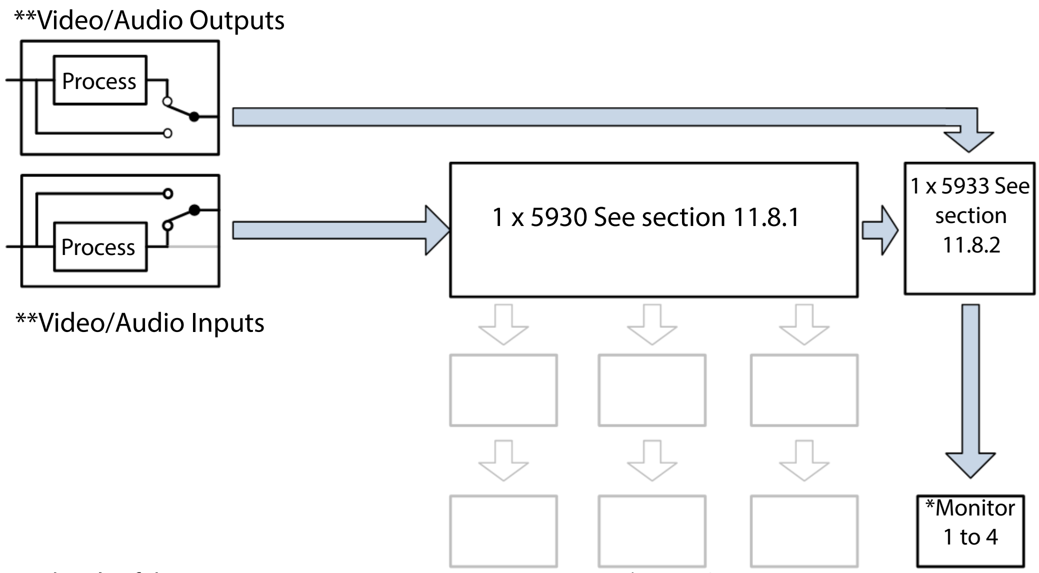
*For details of the “Monitor 1 to 4” BNC connections see section 14.2.

**Output Monitoring selected from either the input or the output of the module (pre- or post-processing). See section 3.6.2 for details on how to configure this using the router Door PC.

Figure 197 Output Monitoring Only (No Multiviewer outputs) Option (Sirius 840/850)

11.4.4 Sirius 850: Input/Output Monitoring Only (no multiviewer outputs)

- 5930 (qty 1) Input Monitor module
- 5933 (qty 1) Output Monitor module



*For details of the “Monitor 1 to 4” BNC connections see section 14.2.

**Input/Output Monitoring selected from either the input or the output of the module (pre- or post-processing). See section 3.6.2 for details on how to configure this using the router Door PC.

Figure 198 Input/Output Monitoring Only Option (Sirius 840/850)

11.4.5 Sirius 850: Router Outputs with Multiviewer

- Sirius 850 frame must have the Blue fan option.
- Up to 24-off Sirius Router Output modules and rear panels. See Section 9 "Output Modules and Output Rear Panels".
- Up to 12-off MV-850 Integrated Multiviewer with MV-850-RP Rear Panel.

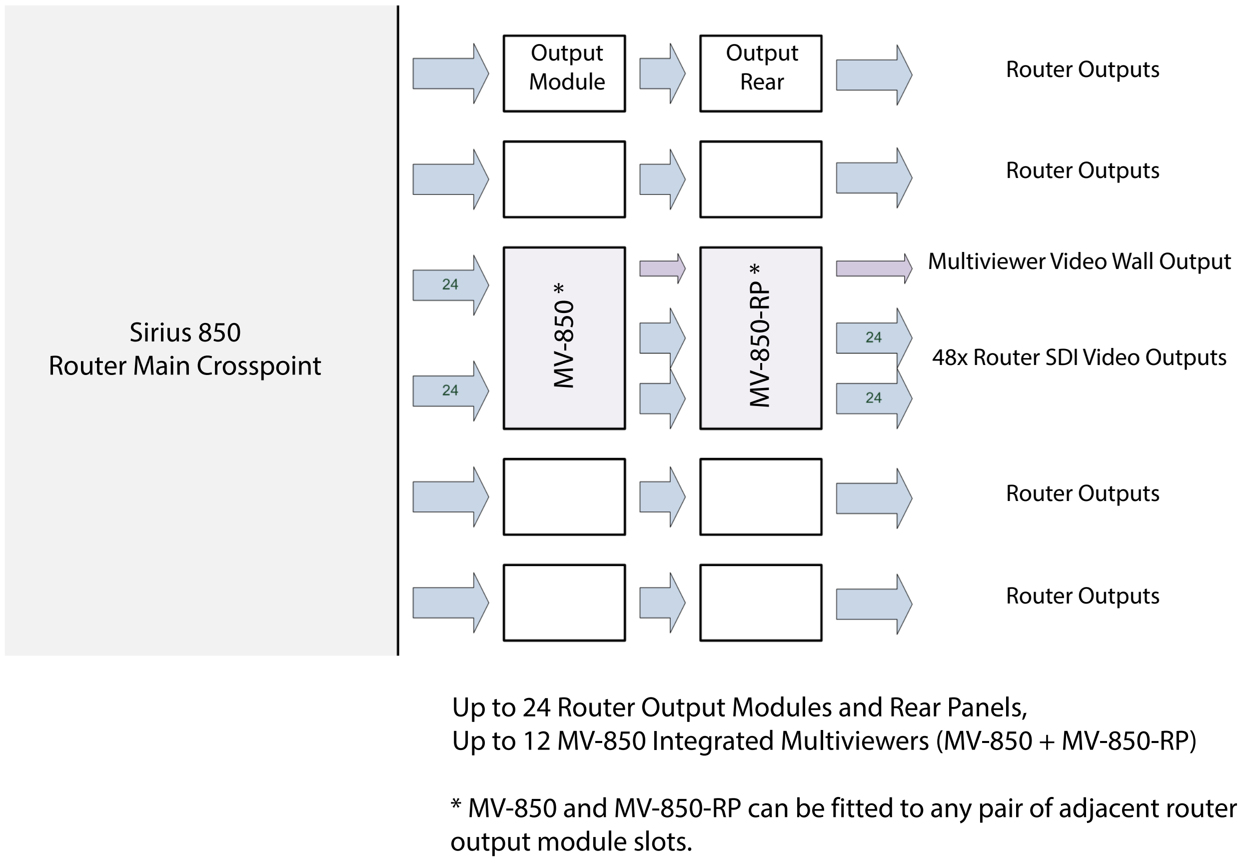


Figure 199 MV-850 Multiviewer Monitoring Sirius 850 Router Outputs

11.5 5902 Sirius 800 Series Multiviewer Crosspoint Module

The 5902 Sirius 800 series multiviewer crosspoint module is a 576x144 crosspoint, taking all the input signals and routing them to a multiviewer output module.

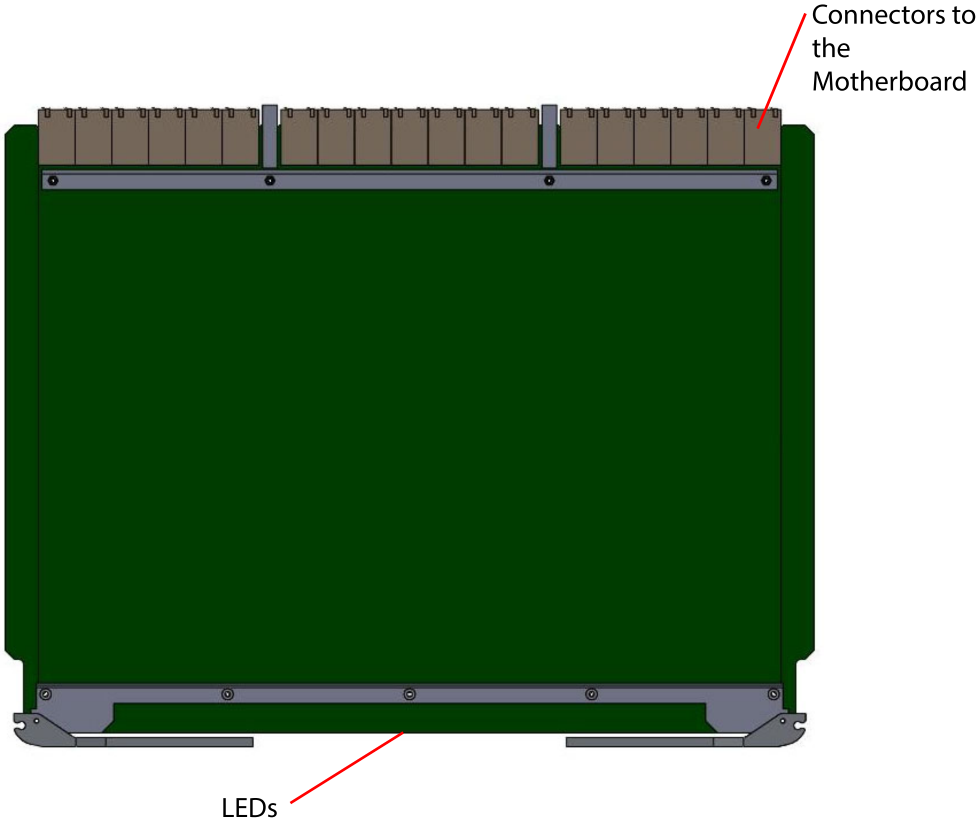


Figure 200 5902 Sirius 800 Series Multiviewer Crosspoint Module

Note:

- There is no crosspoint redundancy protection.
- **Sirius 830**: Output Monitoring is not available on the Sirius 830 when it is equipped with multiviewer outputs.
- **Sirius 840/850**: If Input pre-processing is monitored using the monitor outputs then multiviewer outputs should not be routed from inputs 1, 3, 5 and 7 of any video input module as they will display duplicates of the four monitoring outputs.

The multiviewer output of the 5902 is connected to up to three 5931 (Sirius 850 up to two) external multiviewer output modules, see section 11.6 for details.

11.5.1 Sirius 840/850 only

The 5902 Sirius 800 series multiviewer crosspoint module provides up to four signals for input monitoring to the 5933 output monitor module (see section 11.8.2). The 5933 output monitor module passes the signals onto the BNC monitor connectors on the control panel rear (see section 14.2).

11.5.2 5902 Sirius 800 Multiviewer Crosspoint Module LED Information

Table 80 shows the LED color code on the 5902 Multiviewer Crosspoint Module, and Figure 201 shows the front edge of the module.

Table 80   5902Sirius 800 Series Multiviewer Crosspoint Module LED Information

LED Color	Function	Detail	Normal Working Status
Green	Power OK	Power to the module	**On Solid** - working correctly
Yellow	Command OK	Command from the Control module	**Flashing** - receiving information and working correctly
Red	Command Error	Error with command from the Control module	**Off** - normal state **Flashing** - the command message from the router controller is corrupt or hasn't been received. Contact Grass Valley Customer Support (see "Grass Valley Technical Support" on page 476 for contact details).
Yellow	Switch	Flashes on a take signal when switching a route	**Off** - normal state **Flashes** - each time a route is set
Green	PAL OK	Flashes and signals that the FPGA is working correctly	**Flashing** - the FPGA is working correctly
Red	Xpt Error	Displays if there is a problem with any crosspoints	**Off** - normal state **On solid** - problem with one or more crosspoints on the module. **Flashing** - Crosspoint module overheating, make sure the fan assemblies are all closed and the fans are all operating correctly.

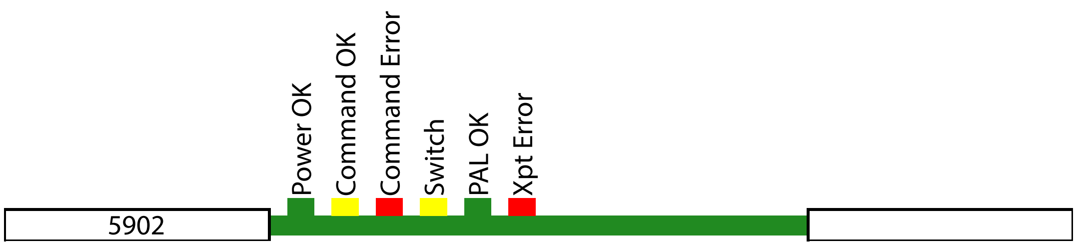


Figure 201   5902Sirius 800 Series Multiviewer Crosspoint Module LEDs

11.6 5931 Sirius 800 External Multiviewer Output Module

The 5931 Sirius 800 external multiviewer output module takes the 48 output signals from the 5902 multiviewer crosspoint module and passes each signal through a re-clocker. Each 5931 external multiviewer output module has 48 outputs.

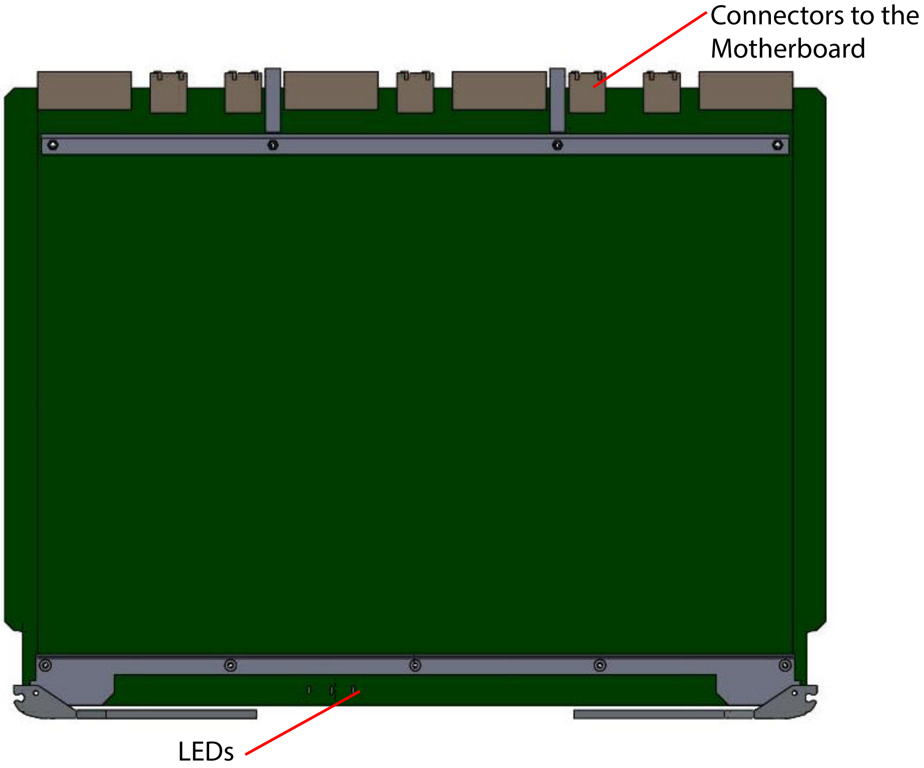


Figure 202 5931 Sirius 800 External Multiviewer Output Module

The external multiviewer output of the 5931 module is connected to one of two possible rear panels, for details see Table 81. One 5931 module is required for each rear panel fitted.

Table 81 5931 External Multiviewer Output Module - Possible Rear Panel Arrangements

Rear Panel	Connectors
Sirius 830/840: 1369 Rear Panel	Up to 3 rear panels with 48 HD BNC connectors per rear panel (up to 140 external multiviewer outputs).
Sirius 850: 1370 Rear Panel	Up to 2 rear panels with 48 HD BNC connectors per rear panel (up to 96 external multiviewer outputs).

Note:

- **Sirius 830**: Output Monitoring is not available on the Sirius 830 when it is equipped with multiviewer outputs.
- **Sirius 840/850**: If Input pre-processing is monitored using the monitor outputs then external multiviewer outputs should not be routed from inputs 1, 3, 5 and 7 of any video input module as they will display duplicates of the four monitoring outputs.

11.6.1 5931 Sirius 800 External Multiviewer Output Module LED Information

Table 82 shows the LED color code on the 5931 external multiviewer output module, and Figure 203 shows the front edge of the module.

Table 82 5931 Sirius 800 External Multiviewer Output Module LED Information

LED Color	Function	Detail	Normal Working Status
Green	Power OK	Power to the module	**On Solid** - working correctly
Yellow	Command OK	Command from the Control module	**Flashing** - receiving information and working correctly
Red	Command Error	Error with command from the Control module	**Off** - normal state **Flashing** - the command message from the router controller is corrupt or hasn't been received. If all of the external multiviewer output modules indicate a Command Error, check that the router controller is operating correctly. If only one of the modules indicates the error contact Grass Valley Customer Support (see "Grass Valley Technical Support" on page 476 for contact details).

Figure 203 5931 Sirius 800 External Multiviewer Output Module LEDs

11.7 5939 Sirius 830 Video & Audio, Input & Output Monitoring Module

The 5939 Sirius 830 video & audio, input & output monitoring module is compatible with the 1237 rear panel (see section 11.9).

Note:

- The 5939 Input/Output module must be configured in Workbench before it can be used. The 5939 module is configured from the **Local Router Hardware** tab, **Advanced Configuration**, **Edit Module Configurations...** See the Workbench user manual for module configuration details.
- The **Modules Present** screen of the Door PC can be used to check that the Input/Output Monitoring module is correctly configured, see section 3.2.2.

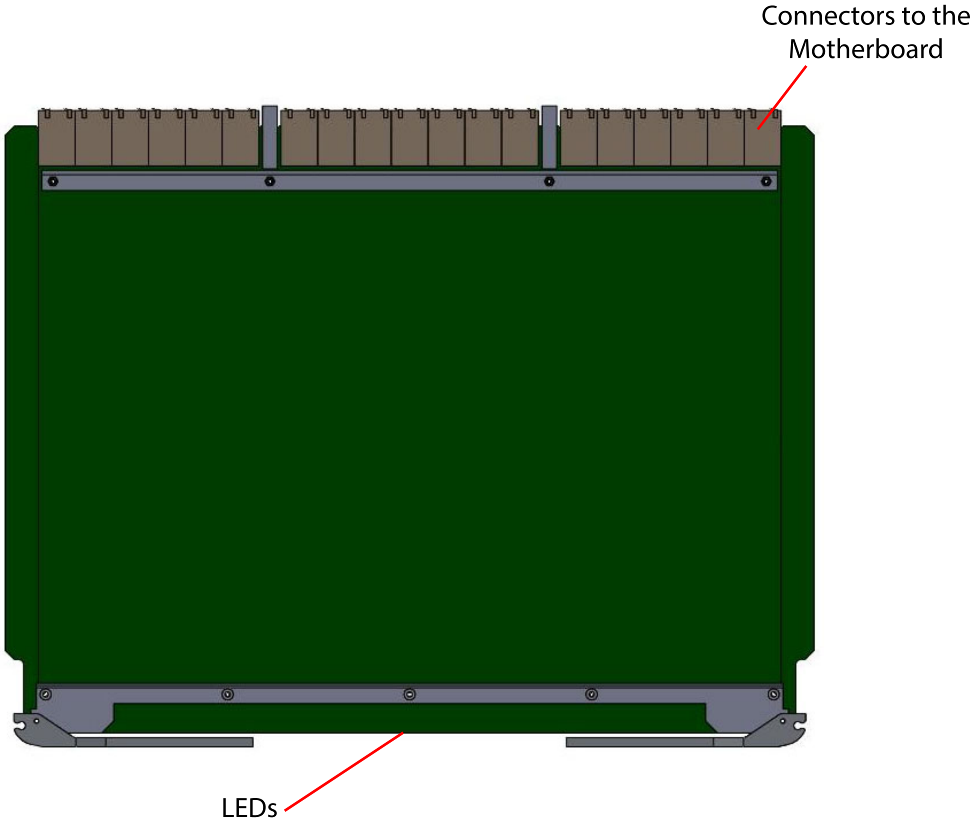


Figure 204 5939 Sirius 830 Video & Audio, Input & Output Monitoring Module

11.7.1 5939 Sirius 830 Video & Audio, Input & Output Monitoring Module LEDs

Table 84 shows the LED color code on the 5939 Input/Output Monitoring Module, and Figure 207 shows the front edge of the module.

Table 83 5939Sirius 830 Video & Audio, Input & Output Monitoring Module

LED Color	Function	Detail	Normal Working Status
Green	Power OK	Power to the module	**On Solid** - working correctly
Yellow	Command OK	Command from the Control module	**Flashing** - receiving information and working correctly
Red	Command Error	Error with command from the Control module	**Off** - normal state **Flashing** - the command message from the router controller is corrupt or hasn't been received. Contact Grass Valley Customer Support (see "Grass Valley Technical Support" on page 476 for contact details).
Yellow	Switch	Flashes on a take signal when switching a route	**Off** - normal state **Flashes** - each time a route is set
Green	PAL OK	Flashes and signals that the FPGA is working correctly	**Flashing** - the FPGA is working correctly

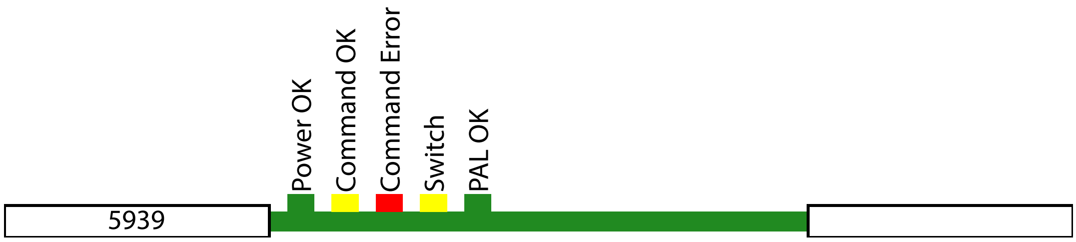


Figure 205 5939 Sirius 830 Video & Audio, Input & Output Monitoring Module LEDs

11.8 5930 Sirius 840/850 Input and 5933 Output Monitoring Modules

Monitoring can only be used if a 5933 output monitor module is present. This module enables the four monitor outputs on the Control Rear Panel (see section 14.2) to be routed from any of the 576 main router outputs or from any input via a 5902 Multiviewer Crosspoint Module or 5930 input monitoring crosspoint module.

11.8.1 5930 Sirius 840/850 Input Monitoring Crosspoint Module

Note:

- The 5930 Sirius 840/850 input monitoring crosspoint module must be configured in Workbench before it can be used. The 5930 module is configured from the **Local Router Hardware** tab, **Advanced Configuration**, **Edit Module Configurations...** See the Workbench user manual for module configuration details.
- The **Modules Present** screen of the Door PC can be used to check that the 5930 module is correctly configured, see section 3.2.2.

Figure 206 5930 Sirius 840/850 Input Monitoring Crosspoint Module

11.8.1.1 5930 Sirius 840/850 Input Monitoring Crosspoint Module LEDs

Table 84 shows the LED color code on the 5930 input monitoring crosspoint module, and Figure 207 shows the front edge of the module.

Table 84 5930 Sirius 840/850 Input Monitoring Crosspoint Module LEDs

LED Color	Function	Detail	Normal Working Status
Green	Power OK	Power to the module	**On Solid** - working correctly
Yellow	Command OK	Command from the Control module	**Flashing** - receiving information and working correctly
Red	Command Error	Error with command from the Control module	**Off** - normal state **Flashing** - the command message from the router controller is corrupt or hasn't been received. Contact Grass Valley Customer Support (see "Grass Valley Technical Support" on page 476 for contact details).
Yellow	Switch	Flashes on a take signal when switching a route	**Off** - normal state **Flashes** - each time a route is set
Green	PAL OK	Flashes and signals that the FPGA is working correctly	**Flashing** the FPGA is working correctly

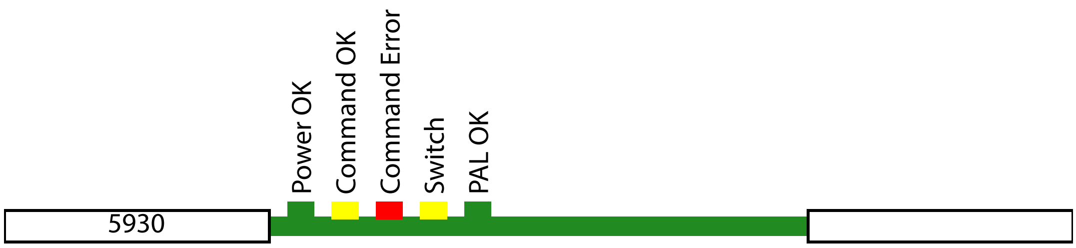


Figure 207 5930 Input Monitoring Module LEDs

11.8.2 5933 Sirius 840/850 Output Monitoring Module

Note: The 5933 does not have any way of determining signal format, so there are only a limited number of options the Catsii LED's on the control rear panel BNC monitor outputs can display, see Table 85

Table 85 Control Panel Catsii Signal Status Colors (Sirius 840/850)

Signal	Monitor Output Catsii Color	Default
Monitor port not enabled	Off	Off
No signal	Current configured setting for “No valid signal”	Red
SD or DVB-ASI	Current configured setting for “Valid SD signal”	Yellow
Any HD or 3G signal	Current configured setting for “Valid 1080i signal”	Green
AES audio signal (via 4915/4929/4925 modules)	Current configured setting for “No valid signal”	Red

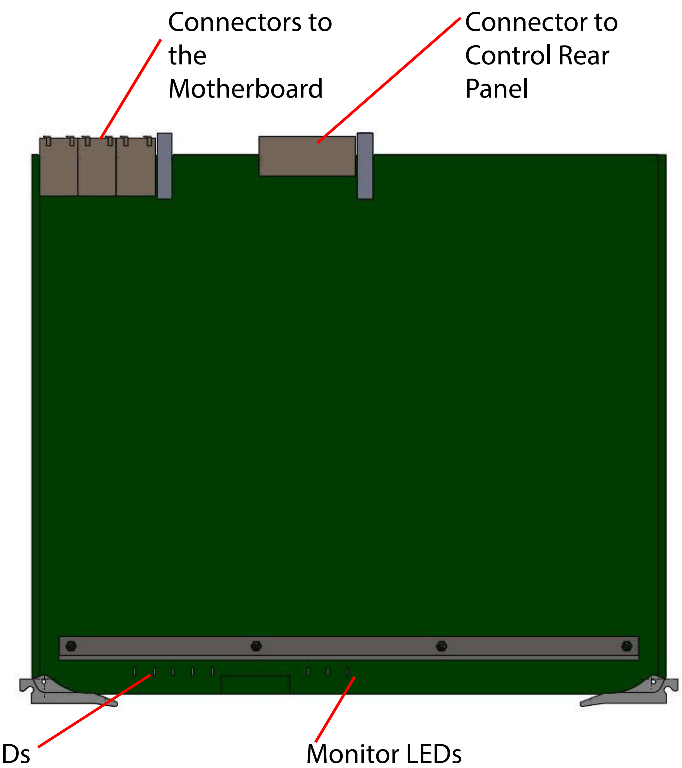


Figure 208 5933 Sirius 840/850 Output Monitoring Module

11.8.2.1 5933 Sirius 840/850 Output Monitoring Module LEDs

Table 86 shows the LED color code on the 5933 output monitoring module, and Figure 209 shows the front edge of the module.

Table 86 5933 Sirius 840/850 Output Monitoring Module LEDs

LED Color	Function	Detail	Normal Working Status
Green	Power OK	Power to the module	**On Solid** - working correctly
Yellow	Command OK	Command from the Control module	**Flashing** - receiving information and working correctly
Red	Command Error	Error with command from the Control module	**Off** - normal state **Flashing** - the command message from the router controller is corrupt or hasn't been received. Contact Grass Valley Customer Support (see "Grass Valley Technical Support" on page 476 for contact details).
Yellow	Ethernet	For Future Use	**Off** - normal state

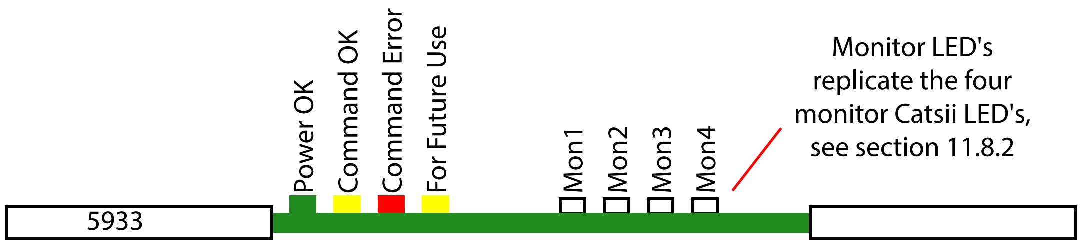


Figure 209 5933 Sirius 840/850 Output Monitoring Module LEDs

11.9 1237 Sirius 830 Monitoring Rear Panel

The 1237 Sirius 830 monitoring rear panel is compatible with the 5939 input/output monitoring module. The 1237 monitoring rear panel is a purchasable option and is shown in Figure 210

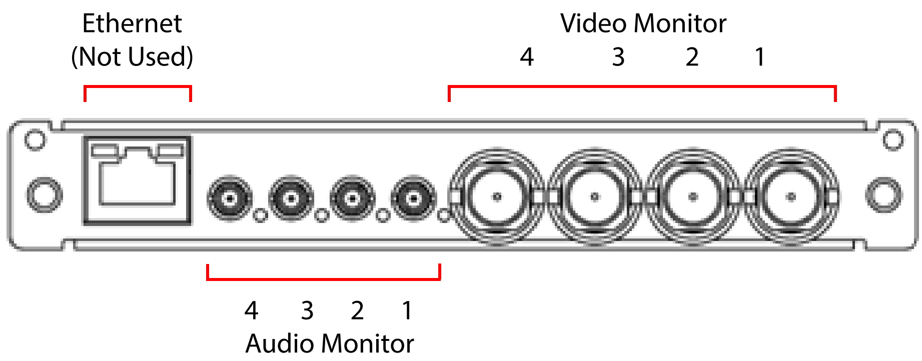


Figure 210 1237 Sirius 830 Monitoring Rear Panel

The output of audio monitors 1 to 4 is a copy of the output of video monitors 1 to 4. The BNC video outputs are optimized for video signals (impedance and data rates) and the DIN 1.0/2.3 audio monitor outputs are optimized for audio outputs (impedance and data rates). Audio Monitor outputs 1 to 4 output AES audio signals on DIN 1.0/2.3 connectors.

The four monitor output signals are generated by the Input/Output Monitoring module. Each monitor output port must be configured to match the type of signal it will be monitoring when the router is in use (see Table 79). This configuration is carried out in Workbench, see the Workbench manual for information.

Table 87 Monitor Output Port Configuration

Signal Type Monitored	Monitor Output Port Configuration Required
Discrete MADI or AES Audio 4915, 4929 and 4925 modules	Configure Monitor Output Port to Matrix 2 (Audio)
Video 55917, 5917, 5919, 55926, 5926, 55949, 5949, 55938, 5915, 5916, 5925 and 5937 modules	Configure Monitor Output to Matrix 1 (Video) Embedded audio is passed with the video signal

If an AES left or right channel is routed to a monitor output the relevant AES pair will be output.

Note: The 5939 does not have any way of determining signal format, so there are only a limited number of options the Catsii LED's on the 1237 input/output rear panel BNC and DIN monitor outputs can display, see Table 88

Table 88 1237 Control Panel Catsii Signal Status Colors

Signal	Monitor Output Catsii Color	Default
Monitor port not enabled	Off	Off
No signal	Current configured setting for “No valid signal”	Red
SD or DVB-ASI	Current configured setting for “Valid SD signal”	Yellow
Any HD or 3G signal	Current configured setting for “Valid 1080i signal”	Green
AES audio signal (via 4915/4929/4925 modules)	Current configured setting for “No valid signal”	Red

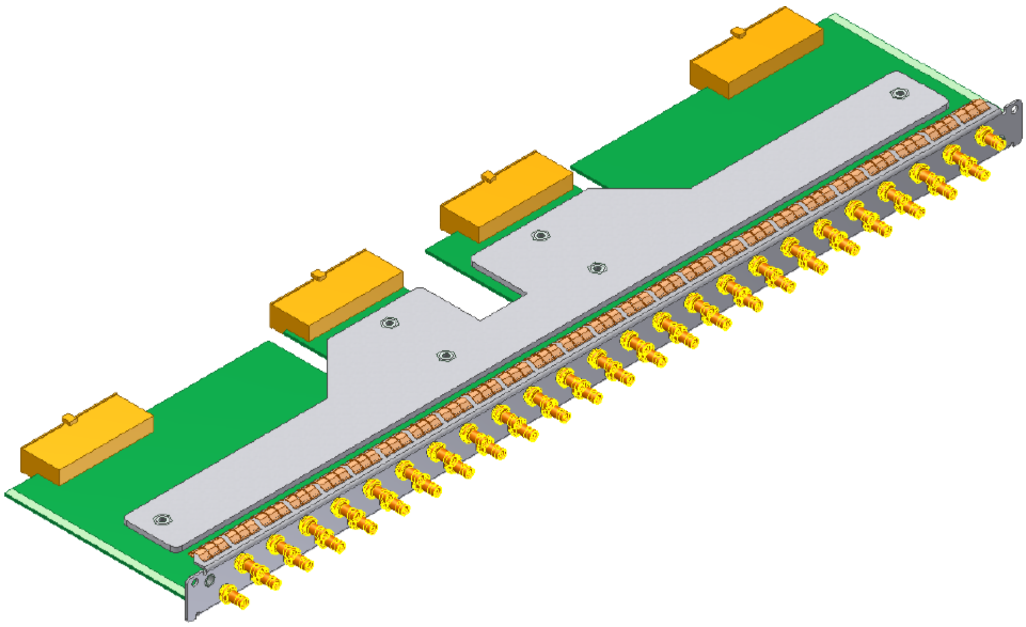
11.10 1369 Sirius 830/840 External Multiviewer HD BNC Rear Panel

The 1369 Sirius 830/840 External Multiviewer HD BNC rear panel has 48 HD BNC connectors.

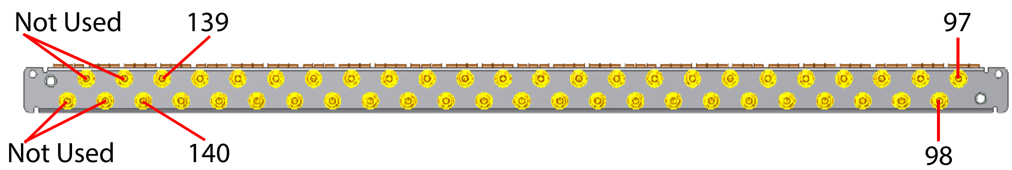
Note:

- Earlier Sirius 830 and 840 routers used the 1309 Sirius 830/840 external multiviewer coax rear panel, see appendix C.6.1.
- The 1369 Sirius 830/840 External Multiviewer HD BNC rear panel is not a direct replacement for the 1309 because the 1369 is fitted with HD BNC connectors. The 1309 is fitted with DIN 1.0/2.3 connectors.
- The 1309 rear panel is no longer supplied with new systems but is available as a spares replacement if required.

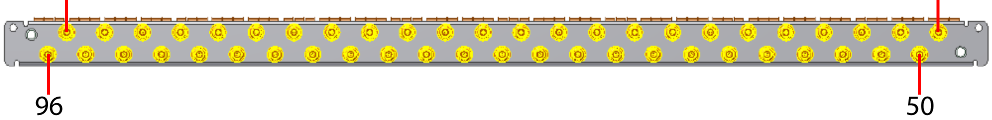
The 1369 rear panel is compatible with the 5931 external multiviewer output module (see section 11.6). One 5931 is module required to drive each of the 1369 48 channel rear panels. Up to three 1369 rear panels can be fitted to the Sirius 830 or Sirius 840 router frames.



If three 1369 rear panels are used then the third rear panel is fitted in the top external multiviewer output slot and numbered as follows:



If two 1369 rear panels are used then the second rear panel is fitted in the middle ext. multiviewer o/p slot and numbered as follows:



If one 1369 rear panel is used it is fitted in the bottom external multiviewer output slot and numbered as follows:

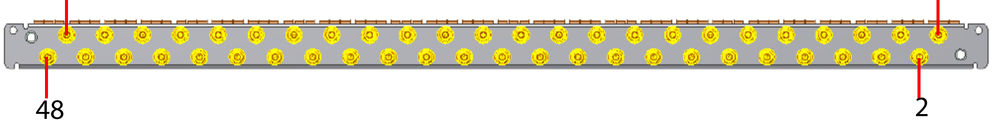


Figure 211 1369 Sirius 830/840 External Multiviewer Output HD BNC Rear Panel

11.11 1370 Sirius 850 External Multiviewer HD BNC Rear Panel

The 1370 Sirius 850 External Multiviewer HD BNC rear panel has 48 HD BNC connectors.

Note:

- Earlier Sirius 850 routers used the 1291 multiviewer coax rear panel, see appendix C.6.2.
- The 1370 Sirius 850 External Multiviewer HD BNC rear panel is not a direct replacement for the 1291 because the 1370 is fitted with HD BNC connectors. The 1291 is fitted with DIN 1.0/2.3 connectors.
- The 1291 rear panel is no longer supplied with new systems but is available as a spares replacement if required.

The 1370 rear panel is compatible with the 5931 external multiviewer output module (see section 11.6). One 5931 is module required to drive each of the 1370 48 channel rear panels. Up to two 1370 rear panels can be fitted to the Sirius 850 router frame.

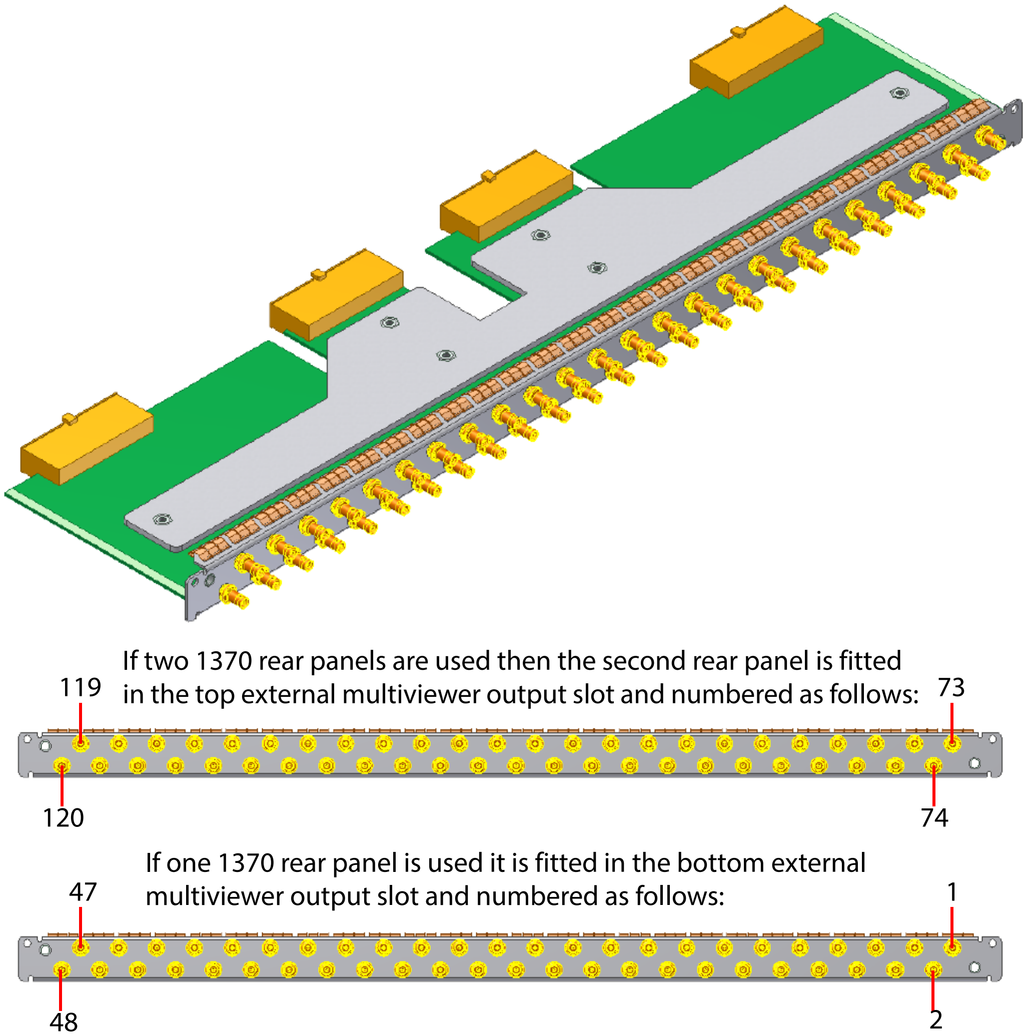


Figure 212 1370 Sirius 850 External Multiviewer Output HD BNC Rear Panel

12 Nucleus Router Control Modules

Chapter contains:

Nucleus Router Control Modules

The Nucleus router control modules are real-time router control cards which perform the following functions:

- Interface to all the external devices (control system, panels and so on), through Ethernet and serial port connections.
- Provides redundant control connections on RS422/485 and Ethernet.
- Store the local configuration of the router.
- Contain all circuitry to manage multiple reference inputs.
- Set video and audio crosspoints in response to external commands and responds with tally information (audio crosspoints - Nucleus2 controllers only)
- Monitor the status of the system components and reports this to the door PC and the external systems as required.
- Logical controller - capable of controlling other router devices.

Up to two router controllers can be fitted to the router in a main and backup configuration. When two controllers are fitted the controller in the left slot is the main controller and will be active when the router is powered up. This is the default power up setting but this setting can be changed from Workbench if required. See the Workbench manual for details. The controller mounted in the left slot is Controller A and the controller in the right slot is Controller B.

Note: 2464 and 2463 controllers:

- Earlier Sirius 800 AHP routers were fitted with Nucleus2 2462 router controllers. Now, the Nucleus2 2464 router controller is fitted to new Sirius 800 AHP routers and is a direct replacement for the Nucleus2 2462 router controller.
- When two controllers are fitted in the router
  they must both be the same type and be running the same software version.
  For example: either 2 x 2464 controllers should be fitted.
- When two controllers are fitted in the router
  they must both have a network connection (Ethernet A and Ethernet B);
  for connection details see section 14.2, Table 103.

12.1 Workbench

The Grass Valley Workbench software uses a database to store router and system configuration details. The database can be created from scratch, custom built by Grass Valley (chargeable) or based on one of the supplied sample/default databases. See section 1.2 for further details.

The router is supplied with Workbench, LiveRunner and a sample database installed on the Door PC. The installed sample database is either video only or AHP depending on the input/output modules fitted.

If one or more LiveRunner clients are to be installed on computers, other than the Door PC, the database shipped on the Door PC must be moved to a separate Workbench server or client/server. This does not apply to Workbench clients used for configuration or to RollCall clients connected to the controller(s).

Although Workbench configuration can be carried out using the Door PC (if a USB mouse and keyboard are connected) this is not recommend as the screen resolution on the door screen is relatively low. The Workbench software is supplied with the router and this can be used to install a Workbench client on a separate computer which can then be used to configure the router.

12.1.1 Initial Connection and Configuration Steps

The following outlines the basic steps required for a new router to be connected to Workbench. This process is described in more detail in the Sirius Installation and Quick Start manual.

1. Connect the router controller module(s), Door PC and Workbench computer to a network.
2. Install Workbench.
3. Associate Workbench with a database using one of the following methods:
    a Create a new Workbench database.
    b Associate Workbench with an existing Workbench database.
    c Move the Workbench database from the Door PC to a Workbench server or client/server.
4. Add the router control module(s) to Workbench, only required if the Workbench database doesn’t already contain the controller details.
5. Configure or edit the router control module(s).
    - Push the configuration to the router control module(s).

12.2 Nucleus Router Controller Compatibility

Three versions of the Nucleus router control module are available for the Sirius 800 router.

- The 2464 and 2463 Nucleus2 router control modules support both audio and video routing.
- The 2450 Nucleus router control modules only supports video routing and cannot be used if any audio signals need to be routed.

Table 89 lists the compatibility between the Sirius 800 modules and Nucleus controllers.

Table 89 Nucleus2 Router Control Module Compatibility Table.

Modules	2464/2463 Nucleus2 Controller Compatibility	2450 Nucleus Controller Compatibility
Input Modules:		
5913 - Sirius 840/850 Standard Video BNC Input module	Yes	Yes
5914 - Sirius 840/850 Standard Video Fiber input module	Yes	Yes
5915 - Sirius 800 Video AHP input module	Yes	**No**
5916 - Sirius 830 Standard Video BNC/Fiber input module	Yes	Yes
5917 - Sirius 800 Standard Video BNC/Fiber input module	Yes	Yes
55917 - Sirius 800 Standard Video BNC/Fiber input module	Yes	Yes
5919 - Sirius 800 Video AHP input module with delay and sync capability	Yes	**No**
5960 - Sirius 800 Video IP input module.	Yes	**No**
4915 - Sirius 800 AES/MADI input module - 120 AES Pairs and up to 3 MADI inputs or **4915** - Sirius 800 AES/MADI input module - 12 MADI (Main & Redundant)	Yes	**No**
Output Modules:		
5923 - Sirius 840/850 Standard Video BNC output module	Yes	Yes
5924 - Sirius 840/850 Standard Video Fiber output module	Yes	Yes
5925 - Sirius 800 Video AHP output module	Yes	**No**
5926 - Sirius 800 Standard Video output module (non-expandable)	Yes	Yes
55926 - Sirius 800 Standard Video output module (non-expandable)	Yes	Yes
5937 - Sirius 830 Standard Video BNC/Fiber output module	Yes	Yes
5938 - Sirius 850 Standard Video output module (expandable) Only fitted if expansion is required between two Sirius 850 frames	Yes	Yes

Table 89 Nucleus2 Router Control Module Compatibility Table. (Continued)

Modules	2464/2463 Nucleus2 Controller Compatibility	2450 Nucleus Controller Compatibility
55938 - Sirius 850 Standard Video output module (expandable) Only fitted if expansion is required between two Sirius 850 frames	Yes	Yes
5949 - Sirius 800 Video embedding & AHP output module with delay and sync capability	Yes	**No**
55949 - Sirius 800 Video embedding & AHP output module with delay and sync capability	Yes	**No**
5970 - Sirius 800 Video IP output module.	Yes	**No**
4925 - Sirius 800 AES/MADI output module (no audio delay) - 120 AES Pairs and up to 3 MADI outputs or **4925** - Sirius 800 AES/MADI output module (no audio delay) - 12 MADI (Main & Redundant)	Yes	**No**
4929 - Sirius 800 AES / MADI output module with audio delay - 120 AES Pairs and up to 3 MADI outputs or **4929** - Sirius 800 AES / MADI output module with audio delay - 12 MADI (Main & Redundant)	Yes	**No**
Crosspoint Modules:		
5901/5905 - Sirius 800 Series Video crosspoint module	Yes	Yes
5903 - Sirius 800 Audio crosspoint module	Yes	**No**
Control/Fan Interface Module:		
2453 - Control/Fan interface module (Sirius 830)	Yes	Yes
2455 - Control/Fan interface module (Sirius 830)	Yes	**No**
2457 - Control/Fan interface module (Sirius 830)	Yes	**No**
2452 - Control/Fan interface module (Sirius 840/850)	Yes	Yes
2456 - Control/Fan interface module (Sirius 840/850)	Yes	**No**
2458 - Control/Fan interface module (Sirius 840/850)	Yes	**No**

12.3 Single Active IP Address on Dual Redundant Controllers (Optional)

12.3.1 Overview

Default Workbench Controller IP Address Configuration

When two Nucleus control Modules are fitted in a router the default configuration is that each controller has its own IP address and these IP addresses stay the same whether the controller is active or idle. Workbench and RollCall work with controllers when they are setup in this configuration and they detect which controller is active and which is idle.

Single Active/Idle Controller IP Address Configuration

In some situations, such as when a third party control system is used, the third party control system can only communicate with a single IP address on the router it is controlling. In this case the Nucleus control Modules can be configured so that the active controller is always IP address X and the idle controller is always IP address Y. Where X and Y represent valid network addresses for the controllers.

In practice this means if a controller fails or changes over from being active to idle its IP address will change from the active address to the idle address and vice versa. This allows the third party control system to continue to use the same IP address (X) no matter which controller is active.

This configuration is intended for use with third party control systems and cannot be used with Workbench, RollCall systems or control panels connected over IP.

Supported Nucleus Controller Cards

- Nucleus2 2464 router control module (all versions)
- Nucleus2 2463 router control module (version 3.0.2 or later)
- Nucleus 2450 router control module (version 3.0.2 or later)

12.3.2 Single Active/Idle IP Address Operation

Controller A and B are configured with the same active IP address of X and idle IP address of Y (X and Y represent valid network addresses)

When the Router is powered on:

1. When the router is powered on both controllers will boot simultaneously with controller A booting as active and controller B booting as idle.
2. Controller A checks its active/idle state and detects that it is active and so configures itself with the active IP address X.
3. Controller B checks its active/idle state and detects that it is idle and so configures itself with the idle IP address Y.
4. The control system will talk to the active controller using IP address X or the idle controller using IP address Y.

If Controller A (the active controller) is reset:

1. Controller B will detect the loss of controller A, will automatically switch to run as the active controller and configure itself with the active IP address X.
2. The control system will detect a momentary loss of connection to IP address X as controller A resets and will then re-establish its connection to IP address X (now controller B which is active).
3. Controller A will reboot after the reset, check its active/idle status, detect that it is idle and configure itself with the idle IP address Y.

Note: If controller B was active and then reset the same process would happen but controller A would go active and configure itself with the active IP address X.

If Controller A (the active controller) fails:

1. Controller B will detect the loss of controller A, will automatically switch to run as the active controller and configure itself with the active IP address X.
2. The control system will detect a momentary loss of connection to IP address X as controller A fails and will then re-establish its connection to IP address X (now controller B which is active).
3. In this instance as controller A has failed it will not start back up and controller redundancy will be lost. Controller A must be replaced with a working controller running with the same settings as the failed controller.

Note: If controller B was active and then failed the same process would happen but controller A would go active and configure itself with the active IP address X.

12.3.3 Nucleus2 2464/2463 Single Active/Idle IP Address Configuration

1. The IP address settings are stored in the controller Config.XML file. They are shown as highlighted text in the Config.xml extract below). The existing controller Config.xml file must be edited using an XML editor. The same Config.xml file should be used on both controllers.

```
<Config>
      <IP>
          <Adapter>
               <Number>0</Number>
               <DHCP>false</DHCP>
               <Address>172.31.9.30</Address>
               <SubNetMask>255.255.224.30</SubNetMask>
               <DefaultGateway>0.0.0.0</DefaultGateway>
               <Speed>0</Speed>
               <UseRepAddressWhenIdle>true</UseRepAddressWhenIdle>
          </Adapter>
      </IP>
      <Replication>
          <Address>172.31.9.31</Address>
      </Replication>
      <FeatureFlags>
          <AutoChangeOverIfNoNetworkTime>2</AutoChangeOverIfNoNetworkTime>
      </FeatureFlags>
```

   a <Config/IP/Adapter/Address>
   Configures the active IP address.

   b <Config/IP/Adapter/UseRepAddressWhenIdle>
   Configures replication address usage
   True - Address used as the idle IP address and as the data replication address
   False - Address used for controller data replication (treated as **False** if not defined).

   c <Config/Replication/Address>
   Configures the idle/replication IP address depending on the true/false setting above.

   d <Config/FeatureFlags/AutoChangeOverIfNoNetworkTime>
   Configures the time, in seconds, that active controller will stay active after it loses its Ethernet connection. When this time has elapsed the active controller will go idle and the idle controller will go active. A setting of -1 will disable the feature but this is not recommended.

2. See the Sirius 800 Maintenance & Upgrade manual for details on updating the Config.xml file using a USB memory stick.
   (Advanced Controller Functions, Controller Housekeeping, Updating Config.xml file.)

In this example:

- The active address is set to 172.31.9.30
- The idle and replication IP addresses are both set to 172.31.9.31
  The replication address is the address of the second controller in the main and redundant pair. The active controller uses this address to replicate (synchronize) data such as; crosspoint status, module configuration and port configuration to the idle controller so that both controllers have the same information in the event of controller changeover or failure.

12.3.4 Grass Valley Control Panel(s) over IP:

When control panels are connected over IP to router controllers that are configured with a single active IP address it is important that the control panels are configured to connect to the single active IP address of the Nucleus control Modules and that no secondary control system IP address is set. The following Snell control panel settings are recommended:

- Control System IP address #1: 172.31.9.30 (assuming this is the Active IP Address)
- Control System IP address #2: Blank

Note: These parameters are called Router Connection Primary IP Address and Router Connection Secondary IP Address on some control panel types.

The configuration procedure varies depending on the control panel type being configured. See the appropriate control panel manual for configuration details.

In this example:

- The control panel is only configured with the active IP address. If the Nucleus control Module fails or is manually reset the previously idle router controller will failover and go active. At this point the control panel will connect to the now active router controller using the active IP address.

12.4 2464/2463 Nucleus2 Router Control Module

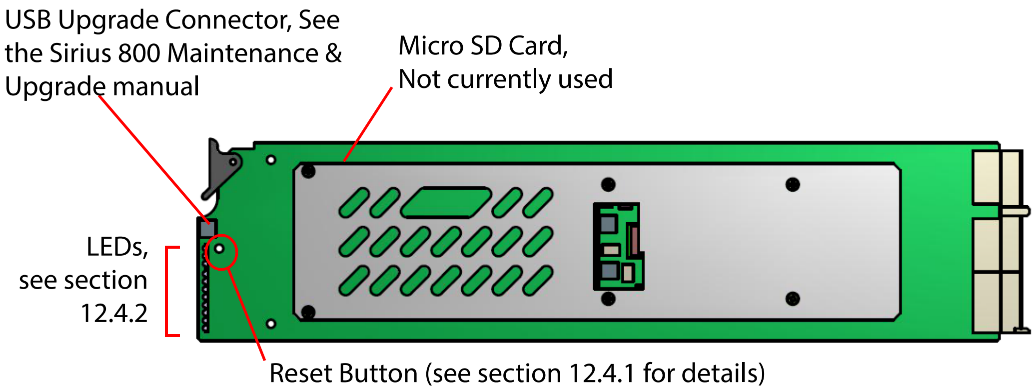


Figure 213 Nucleus2 Router Control Module

Refer to the Workbench manual for details on configuring the Nucleus2 Router Control Module.

Note: The Nucleus2 router control module has a default database, use Workbench to configure the modules in the Sirius 800. Modules are configured from the **Local Router hardware** tab **`| Advanced Configuration | Edit Module Configurations...`** in Workbench. See the Workbench manual for full details.

12.4.1 Reset Button

The Reset button resets the Nucleus2 router control module and will also failover control to the second router control module in a dual-redundant controller system. See Figure 213above for reset button location details.

Nucleus2 Router control modules can be reset remotely using Workbench or a third party control system.

After fitting a replacement controller, the active controller synchronizes persistence (AHP audio settings) and crosspoint tally table files with it. This process (replication) is indicated on the idle controller by LED 5 flashing orange. When replication is complete, LED 5 will flash green. Failing over to the idle controller before data synchronization is complete may corrupt the data files being synchronized and affect the operation of the router.

Important:

Dual-Redundant Nucleus2 **Router Control Modules**:

- Do not fail-over to the idle controller if LED 5 on the idle controller is flashing orange (data synchronization in progress). Failing over to the idle controller before data synchronization is complete may corrupt the data files being synchronized and affect the operation of the router. When LED 5 on the idle controller flashes green (data synchronization complete) it is safe to fail over the controller.
- If resetting the Nucleus2 router control module remotely check the value of OID 2.5.6 for the active controller.
  True = Replication is complete (Safe to Reset)
  False = Replication is not complete (Do Not Reset)
- Grass Valley do not recommend resetting both Nucleus2 router control modules at the same time as all communication with them will be lost during the reset. Because of this the crosspoints cannot be switched and tallies are not reported during this process. Video and audio processing is unaffected.
  There is also a risk that data files will be corrupted during the reset process.

Single Nucleus2 **Router Control Module**:

- All communication with the Nucleus2 router control module will be lost during a reset. Because of this the crosspoints cannot be switched and tallies are not reported during this process. Video and audio processing is unaffected.

12.4.2 Nucleus2 Router Control Module LEDs

The LEDs on the Nucleus2 router control module are shown in Figure 214 and Table 90 lists the Nucleus2 Controller LED functions.

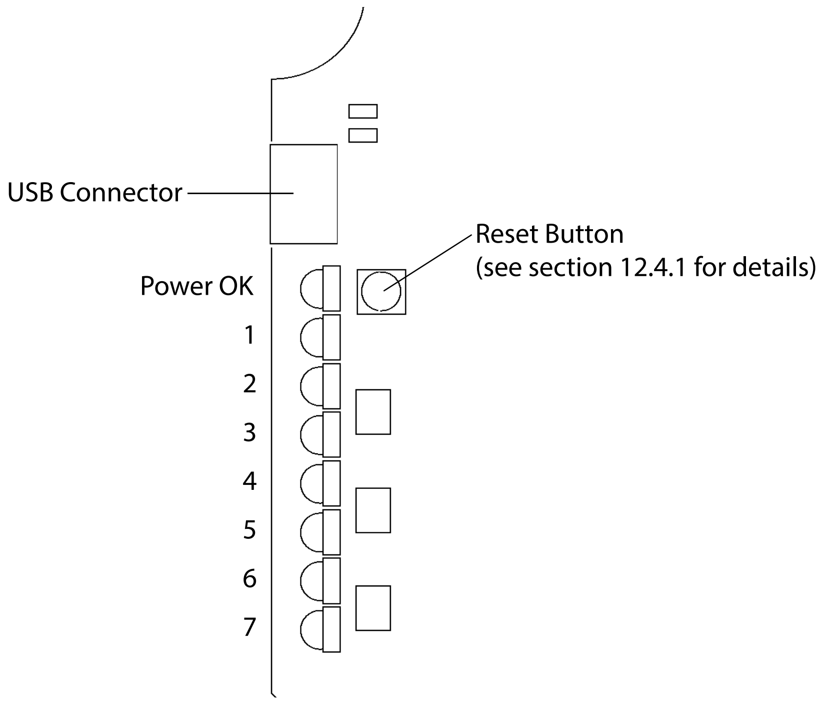


Figure 214 Nucleus2 Router Control Module LEDs

Table 90 Nucleus2 Router Control Module LEDs

LED	Description
Power OK	**Power OK** • Green = Power is connected and okay • Off = Power not connected or not okay
1	**Active/Idle** • Flashing Green = Active • Flashing Blue = Idle
2	**Master/Slave** • Green = Master Controller • Blue = Slave Controller
3	**Watchdog Status** • Flashing Green = Watchdog enabled and running • Flashing Orange = Watchdog disabled

Table 90 Nucleus2 Router Control Module LEDs

<table>
<tr><th>LED</th><th>Description</th></tr>
<tr><td>4</td><td>Serial Link Between Controllers

Displays the status of the serial link between the active and idle controllers. See LED 5 for further information.
• Blue pulsing Green = Link okay, data is being transferred.
• Green pulsing Blue = Link okay, no data is being transferred.
• Magenta pulsing Blue = Link error, no connection with the other controller. Indicates; the other controller is not present/not running or the serial link is not working.
• Orange Pulses = Error, received data for unconfigured device
Indicates; the other controller is configured differently from the controller receiving the data or it has no configuration.
• Red Pulses = Error, received data with invalid format.
Check both controllers are running the same version of CentraController.rtb software. Workbench can be used to check the controller software versions loaded.</td></tr>
<tr><td>5</td><td>Serial Data Replication (Local Router Device)

The Serial Link is used to replicate LocalRouter device data between the active and idle controllers. Replicated data includes; crosspoint status, module configuration and port configuration.
• Off = Active Controller
• Flashing Green = Idle controller, receiving background update data.
• Flashing Orange = Idle controller, data synchronization with Active controller in progress.

Note: Do not fail-over to the idle controller until data synchronization is complete and the LED is flashing green on the idle controller as there is a risk that data will become corrupted and affect the operation of the router.</td></tr>
<tr><td>6</td><td>Not used</td></tr>
<tr><td>7</td><td>Not used</td></tr>
</table>

12.4.3 Nucleus2 Router Control Module LEDs at Startup/Reset

When the controller starts up or is reset the Power OK LED will illuminate first and then LEDs 1 to 6 will start to flash as the controller goes through its boot process. They will reach the state shown in Table 91 when the first part of the boot process is complete. The controller will be ready to communicate with the control system and control the router up to two minutes after this. This will be indicated by the Grass Valley control system connected to the router.

Table 91 Nucleus2 Router Control Module LED Sequence Startup/Reset

	Dual Controllers			Single Controller
LED	**Active Controller**	**Inactive Controller**		**Active Controller**
Power OK	Solid Green	Solid Green		Solid Green
1 - Active/Idle	Flashing Green	Flashing Blue		Flashing Green
2 - Master/Slave	Solid Green	Solid Blue		Solid Green
3 - Watchdog Status	Flashing Green	Flashing Green		Flashing Green
4 - Serial Link Between Controllers	Blue Pulsing Green	Blue Pulsing Green		Magenta Pulsing Blue
5 - Serial Data Replication	Off	Flashing Green		Off
6 - Not Used	Off	Off		Off
7 - Not Used	Off	Off		Off

12.4.4 Nucleus2 Router Control Module LEDs on Database Push

When a Workbench database is pushed to a controller in a frame with two controllers it should be pushed to the inactive controller first. This means that route changes and processing can be controlled while the inactive controller is being updated. The inactive controller can then be made active for the user to test the database. If the test is successful the database is then pushed to the other (now inactive) controller so that the databases in both controllers matches.

In a frame with a single controller this is not possible and the database must be pushed to the single active controller. All communication with the router controller will be lost during the database push of the configuration changes and subsequent reset. Because of this the crosspoints cannot be switched and tallies are not reported during this process. Video and audio processing is unaffected.

The following description assumes that the controllers are set to automatically reset after a database push. This can be checked and changed by using the Workbench Online Editor. In a dual controller system remember to check that both controllers are set the same:

Nucleus2 Router Control Module Navigate to:
`ConfigurationItems | MiscellaneousFeatures | ResetControllerAfterConfigurationPush`

- Reset after database push enabled = `True`
- Reset after database push disabled = `False`

While the database is being pushed the LEDs will operate as normal, see Table 91 Pushing a large database can take up to 5 minutes. Once the push is complete the controller will automatically reset and the LEDs will operate as they do during a normal reset (described in section 12.4.3). The exception to this is when the database is pushed to the first controller of a pair. In this case the database will not match the database in the active controller and so LED 4 will be Pulsing Orange showing there is a mismatch between the databases in the two controllers. The mismatch will be corrected as soon as the database is pushed to the other controller in the pair.

12.4.5 Nucleus2: Sirius 800 Input and Output Port Mapping

Note:
- The information in this section is only correct if the Sirius 800 router is fitted with Nucleus2 router controllers with the default database. Databases can be modified including the mapping information.
- If the router is shipped with a custom database the mapping may vary but can be checked and edited using the Workbench software, see the Workbench User Manual for details.

12.4.5.1 Sirius 830: Input and Output Port Mapping

Table 92 shows the Sirius 830 crosspoint address mapping:

Table 92 Sirius 830 Input and Output Port Mapping

	Input/Output Range	Addresses
Video Inputs	1 to 288	Source 0 to 287
Main Video Outputs	1 to 288	Destination 0 to 287
Multiviewer Outputs	1 to 140	Destination 1152 to 1291
Monitoring Outputs	1 to 4	Destination 16370 to 16373
Video Destinations 289 to 1152 are not used and do not respond to any control		
Audio Inputs (Nucleus2 only)	1 to 9216	Source 0 to 9215
Audio Outputs (Nucleus2 only)	1 to 9216	Destination 0 to 9215

12.4.5.2 Sirius 840: Input and Output Port Mapping

Frame ID Switch set to 3 - see section 14.3.1.

Table 93 shows the Sirius 840 crosspoint address mapping:

Table 93 Sirius 840 Input and Output Port Mapping

	Input/Output Range	Addresses
Video Inputs	1 to 576	Source 0 to 575
Main Video Outputs	1 to 576	Destination 0 to 575
Multiviewer Outputs	1 to 140	Destination 1152 to 1291
Monitoring Outputs	1 to 4	Destination 16370 to 16373
Video Destinations 577 to 1152 are not used and do not respond to any control		
Audio Inputs (Nucleus2 only)	1 to 18432	Source 0 to 18431
Audio Outputs (Nucleus2 only)	1 to 18432	Destination 0 to 18431

12.4.5.3 Sirius 850: Input and Output Port Mapping

Sirius 850 Single Frame: Frame 1 of 1 (Frame ID Switch set to 0 - see section 14.3.1)

Table 94 shows the Sirius 850 crosspoint address mapping for Frame 1 of 1:

Table 94 Sirius 850 Input and Output Port Mapping (Frame 1 of 1)

	Input/Output Range	Addresses
Video Inputs	1 to 576	Source 0 to 575
Main Video Outputs	1 to 576	Destination 0 to 575
Expansion Video Outputs (using 5928 expansion modules & 1366 expansion output rear panels)	577 to 1152	576 to 1151
*Multiviewer Outputs (using two 1291 multiviewer rear panels)	1 to 96	Destination 1152 to 1199 & Destination 1224 to 1271
*Multiviewer Outputs: 1152 to 1291 only if two 1292 multiviewer MV-Link rear panels are fitted - (no longer supplied)		
Monitoring Outputs	1 to 4	Destination 16370 to 16373
Audio Inputs (Nucleus2 only)	1 to 18432	Source 0 to 18431
Audio Outputs (Nucleus2 only)	1 to 18432	Destination 0 to 18431

Sirius 850 Dual Frames: Frame 1 of 2 (Frame ID Switch set to 1 - see section 14.3.1)

Table 95 shows the Sirius 850 crosspoint address mapping for Frame 1 of 2:

Table 95 Sirius 850 Input and Output Port Mapping (Frame 1 of 2)

	Input/Output Range	Addresses
Video Inputs	1 to 1152	Source 0 to 1151
Main Video Outputs (using 5928 expansion modules & 1365/1290 expansion output rear panels)	1 to 576	Destination 0 to 575
*Multiviewer Outputs (using two 1291 multiviewer rear panels)	1 to 96	Destination 1152 to 1199 & Destination 1224 to 1271
Destinations 577 to 1152 are not used and do not respond to any control		
*Multiviewer Outputs: 1152 to 1291 only if two 1292 multiviewer MV-Link rear panels are fitted - (no longer supplied)		
Monitoring Outputs	1 to 4	Destination 16370 to 16373
Audio Inputs (Nucleus2 only)	1 to 18432	Source 0 to 18431
Audio Outputs (Nucleus2 only)	1 to 18432	Destination 0 to 18431

Sirius 850 Dual Frames: Frame 2 of 2 (Frame ID Switch set to 2 - see section 14.3.1)

Table 96 shows the Sirius 850 crosspoint address mapping for Frame 2 of 2:

Table 96 Sirius 850 Input and Output Port Mapping (Frame 2 of 2)

	Input/Output Range	Addresses
Video Inputs	1 to 1152	Source 0 to 1151
Main Video Outputs (using 5928 expansion modules & 1365/1290 expansion output rear panels)	577 to 1152	Destination 576 to 1151
*Multiviewer Outputs (using two 1291 multiviewer rear panels)	1 to 96	Destination 1292 to 1339 & Destination 1364 to 1411
Destinations 1 to 576 are not used and do not respond to any control		
*Multiviewer Outputs: 1292 to 1431 only if two 1292 multiviewer MV-Link rear panels are fitted - (no longer supplied)		
Monitoring Outputs	1 to 4	Destination 16370 to 16373
Audio Inputs (Nucleus2 only)	1 to 18432	Source 0 to 18431
Audio Outputs (Nucleus2 only)	1 to 18432	Destination 0 to 18431

12.4.6 Configuring Nucleus2 Controller Replication

When two Nucleus2 router controllers are fitted in a Sirius 800 router they work as a main and redundant pair. The active controller in the pair sends the inactive controller data such as; crosspoint status, module configuration and port configuration. This means if the active controller fails the other controller in the pair has the latest information available to it at all times.

To enable this function each controller must be configured with the details of the other. The replication address can be configured by using Workbench or RollCall.

Using Workbench

Nucleus2 Router Control Module Navigate to:
`ConfigurationItems | ReplicatedPeer`

- `Name` = enter the name of the controller that will be the replicated peer as shown on the Workbench configuration screen
- `IPAddress` = enter the IP address of the controller that will be the replicated peer as shown on the Workbench configuration screen
- `IPPort` = if blank then the network port will be the default value which is 2007
- `ConnectionState` = True or False - this is a status and is read only
- `Active` = True or False - this is a status and is read only

Note:

- Changes will not take effect until the controller has been reset.

Using RollCall

Note:

- If RollCall does not connect to the router controller check that the controller is enabled for RollCall, see section 12.4.9 for details.

Use the RollCall application or the RollCall web applet to connect to the router. Double click on the controller in the network tree and select the **Comms Setup** screen.

Available Settings:

- Redundant Peer IP Address: enter the IP address of the controller that will be the redundant peer (replicated peer)
- Redundant Peer DCCP Port: if blank then the network port will be the default value which is 2007

Note:

- The changes will not take effect until the controller has been restarted. Click on the **Restart Unit** button to restart the Nucleus2 router control module.

12.4.7 Changing the IP Address of a Nucleus2 Controller

If the current IP Address of the Nucleus2 controller is known then that IP address can be changed by using the Workbench online editor or RollCall.

If the controller IP address is not available a new one can be set using a USB memory stick (see the Sirius 800 Maintenance & Upgrade manual for details).

Using Workbench

Nucleus2 Router Control Module Navigate to:
`ConfigurationItems | IP | IP[1]`

- `Number =` 0
- `DHCP` = False - set to false for a fixed IP address
- `Address` = set the IP address of the controller
- `Port` = if blank then the network port will be the default value which is 2007
- `SubnetMask` = set to match the network
- `DefaultGateway` = if unknown or not required enter 0.0.0.0
- `Speed = NWK_AUTO` - (Default setting) - Configures the controller to negotiate its communication speed with the network switch. This setting should always be used unless the network switch is set to force a specific speed in which case one of the following settings should be used to match the network switch setting.
  `NWK_10_BASE` - Forces the controller to 10 Mbps
  `NWK_100_BASE` - Forces the controller to 100 Mbps
  `NWK_1000_BASE` - Not Available

Note:

- Changes will not take effect until the Nucleus2 controller has been reset. This forces it to read the new IP Address from its config.xml file.
- Having changed the controller IP address remember to use its new IP address to connect to it.
- If the controller is one of a pair in the router the other controller's replication address details must be changed to match the new IP address details set (see section 12.4.6 for details).

Using RollCall

Note:
- If RollCall does not connect to the router controller check that the controller is enabled for RollCall, see section 12.4.9 for details.

Use the RollCall application or the RollCall web applet to connect to the router. Double click on the controller in the network tree and select the **Comms Setup** screen.

Available Settings:

- Unit IP Address: set the IP address of the controller
- Subnet Mask: set to match the network
- Default Gateway Address: if unknown or not required enter 0.0.0.0
- DCCP Port: if blank then the network port will be the default value which is 2007

Note:
- The changes will not take effect until the controller has been restarted. Click on the **Restart Unit** button to restart the Nucleus2 router control module.
- Having changed the controller IP address remember to use its new IP address to connect to it.
- If the controller is one of a pair in the router the other controller's replication address details must be changed to match the new IP address details set (see section 12.4.6 for details).

12.4.8 Setting the Network Communication Speed of a Nucleus2 Controller

The Nucleus2 network communication speed is set using the Workbench Online Editor in the IP address configuration section, see section 12.4.7 for details.

12.4.9 Enable/Disable RollCall on a Nucleus2 Controller Using the Online Editor

RollCall is enabled on the controller by default. If RollCall needs to be disabled then this is done using the Workbench Generic Online Editor.

The RollCall Command Set Files must be present on the controller to connect using RollCall (see the Sirius 800 Maintenance & Upgrade manual for details on installing these files if they are not present).

Nucleus2 Router Control Module Navigate to:
`ConfigurationItems | RollCall`

- `Enabled =` - set to True to enable RollCall and False to disable RollCall. The other settings are shown with their default values and they need not be changed unless instructed to do so by Grass Valley Support.
- `StartupDelay` = 5
- `SharePort` = 2050
- `BridgePort` = 2600
- `BridgeRemoteAddress` = 128.1.1.1
- `BridgeAutoConnect` = False
- `Name` = Router
- `Information1` = Info1
- `Information2` = Info2
- `NetNibbles` = 1000
- `UseLongNames` = False

Note:
- Changes will not take effect until the controller has been reset.
- If two Nucleus2 controllers are fitted in a router then the second one must also be enabled for RollCall.

Connect to the RollCall web applet by typing the controller IP address into the address bar of your web browser. When the Nucleus2 web page is displayed click on the **RollCall Control** tab and the RollCall web applet will start.

12.4.10 Enable/Disable Auto Change Over of Controller Ethernet Connection

If a Nucleus2 controller looses its Ethernet connection the system will auto change over to the second Nucleus2 controller (if a second controller is fitted and auto change over is enabled). The auto change over function is set using the Generic Online Editor. Auto change over is disabled by default.

Nucleus2 Router Control Module Navigate to:
`ConfigurationItems | MiscellaneousFeatures`

- `AutoChangeoverIfNoNetworkTime =` -1 (see below for details)

Auto change over can be enabled by setting the parameter to a number greater than or equal to Zero, This number is the time, in seconds, that the controller will wait after loosing network connection before changing over to the second controller.

Note:

- The default Auto Change Over Time is -1 = disabled.
- Changes will not take effect until the controller has been reset.
- If two Nucleus2 controllers are fitted in a router then the second one must also be configured with the same auto changeover settings.
- The `AutoChangeOverIfNoNetworkTime` setting under the Features node is not used.

12.4.11 Further Information

The Sirius 800 Maintenance & Upgrade manual contains details on;

- Updating the controller software/firmware

12.5 Multi-Drop Panel Communications Protocol (SW-P-06)

This protocol is designed to communicate between a Grass Valley router control system and serially controlled router Control Panels. Up to sixteen devices may be daisy chained onto one multi-drop control port, each device requires a unique address, identified using an address switch. The control system database must hold configuration data for all devices.

The full specification for this protocol is available from the Customer Support section of the Grass Valley web site, see “Grass Valley Technical Support” on page 476.

12.6 General Switcher Protocol (SW-P-02)

The General Switcher Communication Protocol can be used to control Grass Valley routers. It uses numbers in the range 0 to 16383 (when in extended mode) to set, acknowledge and poll crosspoints via a single Nucleus control module. Master router ports must be configured for this protocol if the router is to be controlled by a Centra or Aurora control system.

A Sirius 800 system can support SW-P-02 over both serial interfaces and IP networks.

If the system is a multi-level router, and configured as such in it’s database, all levels may be controlled using a destination offset appropriate to its level position in the Nucleus database settings.

In order for Centra or Aurora (or any system using General Switcher protocol) to control a multi-level Nucleus system, the user must have knowledge of the local database in use, only then can the router control module direct the correct the data to the correct crosspoints.

The full specification for this protocol is available from the Customer Support section of the Grass Valley web site, see “Grass Valley Technical Support” on page 476.

12.6.1 SW-P-02 Routing, Monitoring O/Ps & MV Destination Control

Note:

- The information in this section is only correct if the Sirius 800 router is fitted with Nucleus 2450 router controllers with the default database. Databases can be modified including the SW-P-02 information. If this is the case please see the database configuration for details.
- When the Sirius 800 router is fitted with Nucleus2 router controllers using the default database the number scheme will be different. Please see the database configuration for details.

Extended commands - Interrogate (65), Connect (66), Tally (67), Connected (68). For all these commands the monitor rows are mapped onto destinations starting at 16370* (0x3FF2).

Note: All numbers with an Asterisk (*) against them are Base 0.

- Destination 16370* = Monitor row 1
- Destination 16371* = Monitor row 2
- Destination 16372* = Monitor row 3
- Destination 16373* = Monitor row 4

Alternatively use the New Monitor Row Interrogate or connect commands in SW-P-02 issue 32 and above. The sources are mapped the same way as the standard commands, however all of the inputs are now accessible.

> Note: **Monitor Row Source Numbering**
> Some older routers only had output monitoring which was addressed as sources 0 to 575*. When the input monitoring feature was added to routers the input monitoring sources had to be added on top of the existing range to maintain compatibility with the older routers and controllers.

12.6.1.1 Sirius 830

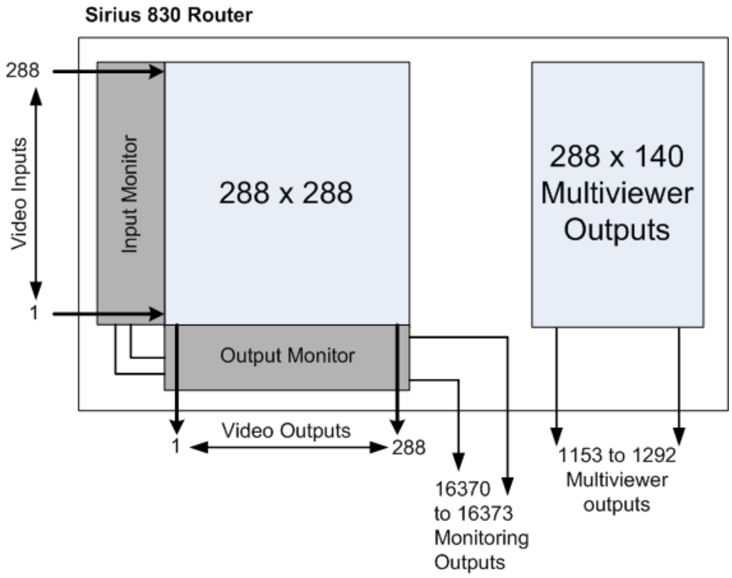


Figure 215 Sirius 830 Router Diagram

- Main video inputs and outputs are 1 - 288
- Outputs 16370* = Monitor row 1
- Outputs 16371* = Monitor row 2
- Outputs 16372* = Monitor row 3
- Outputs 16373* = Monitor row 4
    - Mon Row Sources 0 - 287* = outputs 0 - 287*
    - Mon Row Sources 576* - 863* = inputs 0 - 287*
- Outputs 1153 - 1292 are multiviewer outputs

> Note: All numbers with an Asterisk (*) against them are Base 0.

12.6.1.2 Sirius 840

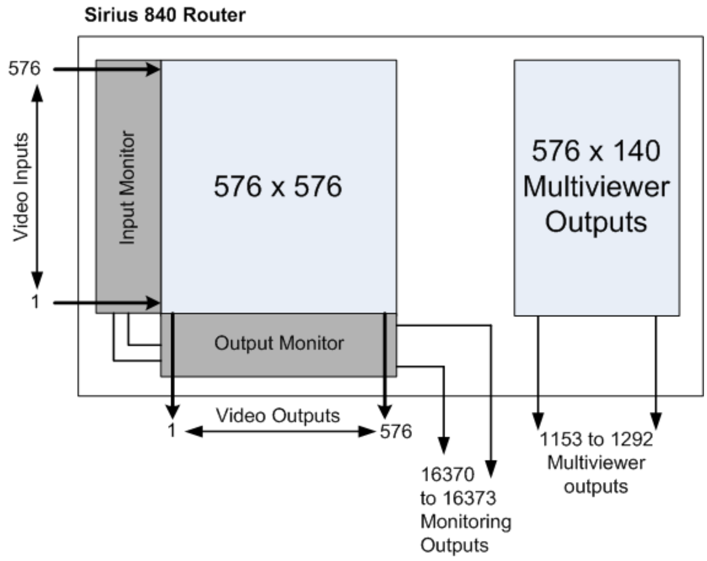


Figure 216 Sirius 840 Router Diagram

- Main video inputs and outputs are 1 - 576
- Outputs 16370* = Monitor row 1
- Outputs 16371* = Monitor row 2
- Outputs 16372* = Monitor row 3
- Outputs 16373* = Monitor row 4
    - Mon Row Sources 0 - 575* = outputs 0 - 575*
    - Mon Row Sources 576* - 1151* = inputs 0 - 575*
- Outputs 1153 - 1292 are multiviewer outputs

Note: All numbers with an Asterisk (*) against them are Base 0.

12.6.1.3 Sirius 850 (Single Frame with Optional Expansion Outputs)

Sirius 850 single router with optional expansion outputs:

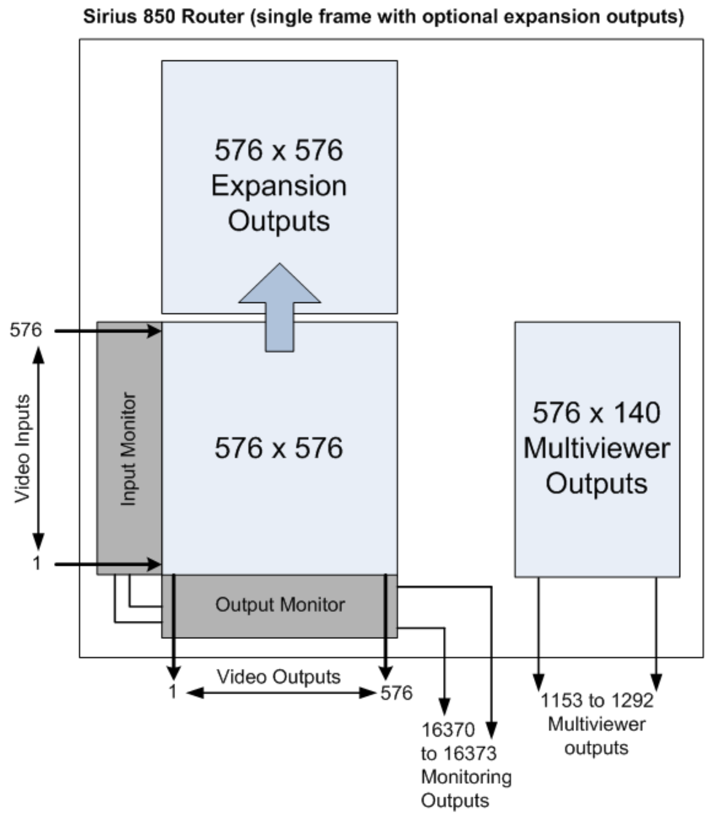


Figure 217 Sirius 850 Single Router Diagram

- **No expansion outputs used** - Main video inputs and outputs are 1 - 576
  Expansion outputs used - Main video inputs are 1 - 576 and outputs are 1 - 1152
- Outputs 16370* = Monitor row 1
- Outputs 16371* = Monitor row 2
- Outputs 16372* = Monitor row 3
- Outputs 16373* = Monitor row 4
  - \- **No expansion outputs used**
    \- Mon Row Sources 0 - 575* = outputs 0 - 575*
    \- Mon Row Sources 576 - 1151 = inputs 0 - 575*
  - \- **Expansion outputs used**
    \- Mon Row Sources 0 - 1151* = outputs 0 - 1151*
    \- Mon Row Sources 576 - 1151* = inputs 0 - 575*
- **Single frame** - Outputs 1153 - 1292 are multiviewer outputs

Note: All numbers with an Asterisk (*) against them are Base 0.

12.6.1.4 Sirius 850 (Dual Frame)

Sirius 850 dual routers connected together:

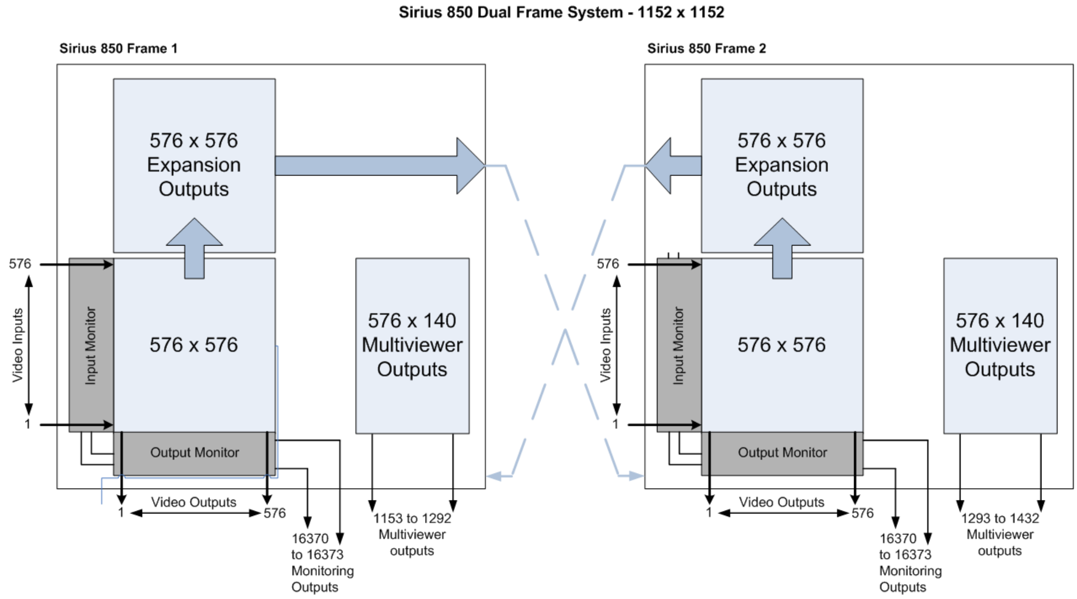


Figure 218 Sirius 850 Dual Router Diagram

- **Frame 1 of 2** - Main video inputs and outputs are 1 to 576
- **Frame 2 of 2** - Main video inputs and outputs are 577 - 1152
- Outputs 16370* = Monitor row 1
- Outputs 16371* = Monitor row 2
- Outputs 16372* = Monitor row 3
- Outputs 16373* = Monitor row 4
  - **Frame 1 of 2**
    - Mon Row Sources 0 - 575* = outputs 0 - 575*
    - Mon Row Sources 576 - 1151 = inputs 0 - 575*
  - **Frame 2 of 2**
    - Mon Row Sources 0 - 575* = outputs 0 - 575*
    - Mon Row Sources 576 - 1151 = inputs 0 - 575*
- **Frame 1 of 2** - Outputs 1153 - 1292 are multiviewer outputs
- **Frame 2 of 2** - Outputs 1293 - 1432 are multiviewer outputs

Note: All numbers with an Asterisk (*) against them are Base 0.

12.7 SW-P-08 Protocol

This Grass Valley SW-P-08 general remote control protocol can be used to control Grass Valley Sirius 800 routers. It supports router matrix/level control and router port names.

This protocol has been developed to provide a common and robust method of interfacing to Grass Valley control systems and is the standard method of interfacing to a Sirius 800 router controller from a remote device.

The philosophy of the protocol is that the router controller performs as a controlled device with respect to an external controlling computer - it receives commands to perform actions and to return status. The only action initiated across the link by the controller is the spontaneous issuing of status messages as appropriate.

There is a physical layer, a data link layer, and a message/application layer, providing a point-to-point communication link for reliable transfer of router command messages.

Contact Grass Valley for more information.

For the specification for the SW-P-08 protocol, contact Grass Valley customer support.

12.8 RollCall Interfaces

12.8.1 246x RollCall Interface

The 246x router controller modules can be configured via RollCall templates (configuration screens) using Grass Valley's RollCall Control Panel application. Various template screens may be selected to configure the controller module.

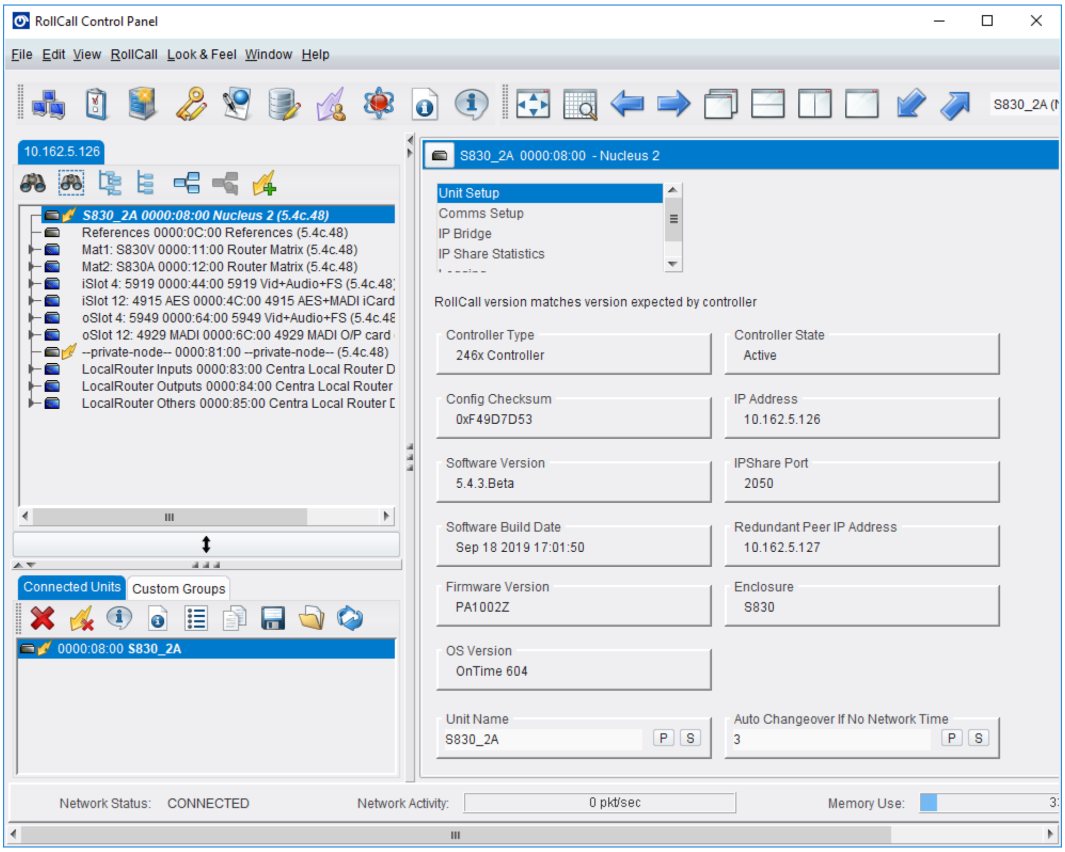


Figure 219 246x RollCall Template in RollCall Control Panel

12.8.2 Other Templates

Input and Output modules present in a Sirius 800 router frame also present RollCall templates for module configuration. For example, audio modules, MV-800 modules, MV-830 multiviewer I/O modules, MV-840/50 multiviewer O/p modules, and AHP I/O modules.

12.8.3 Routing Control Panels

Further, a Sirius 800 router also exposes a soft XY routing control panel for each routing matrix with Grass Valley's RollCall Control Panel application.

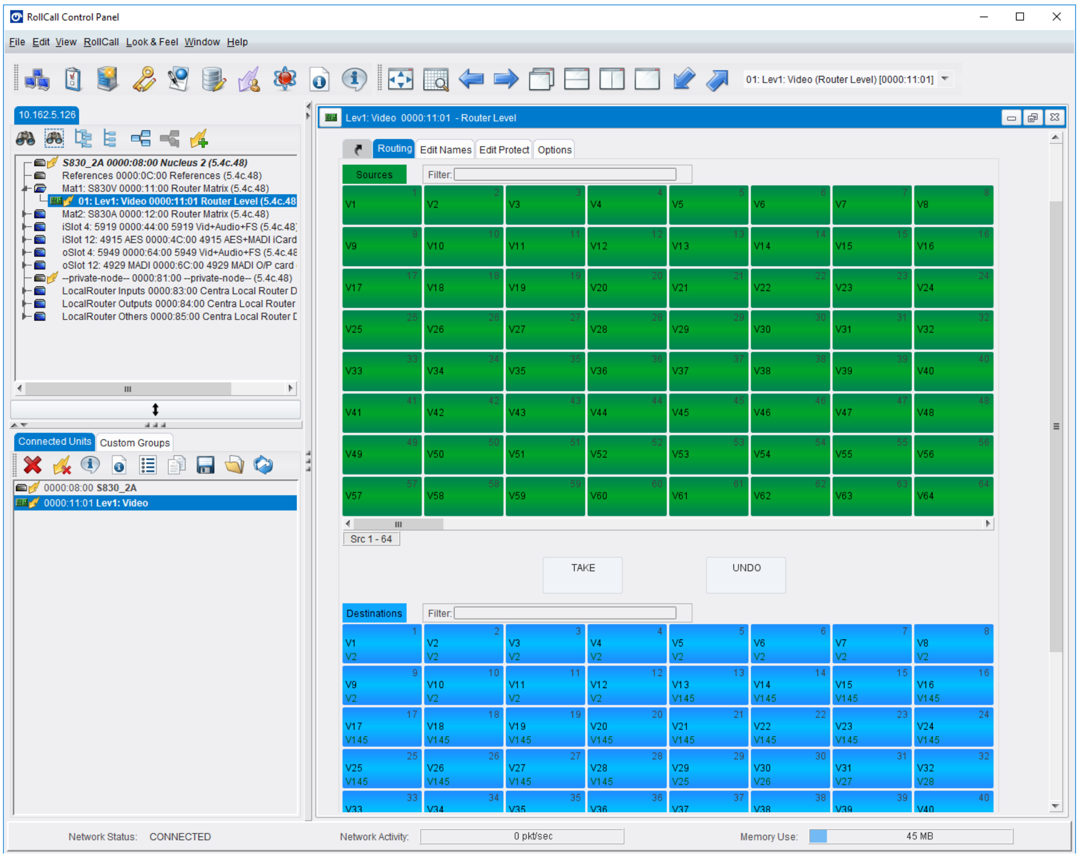


Figure 220 Sirius 800 Soft XY Routing Control in RollCall Control Panel

12.9 246x Web Interface

The 246x router controller modules serve up web pages at the IP address of the controller. The home web page (see Figure 221) offers:

- some engineering diagnostics information;
- a software upgrade facility for the router controller;
- a configuration import/export facility; and
- shows the end user license agreement (EULA).

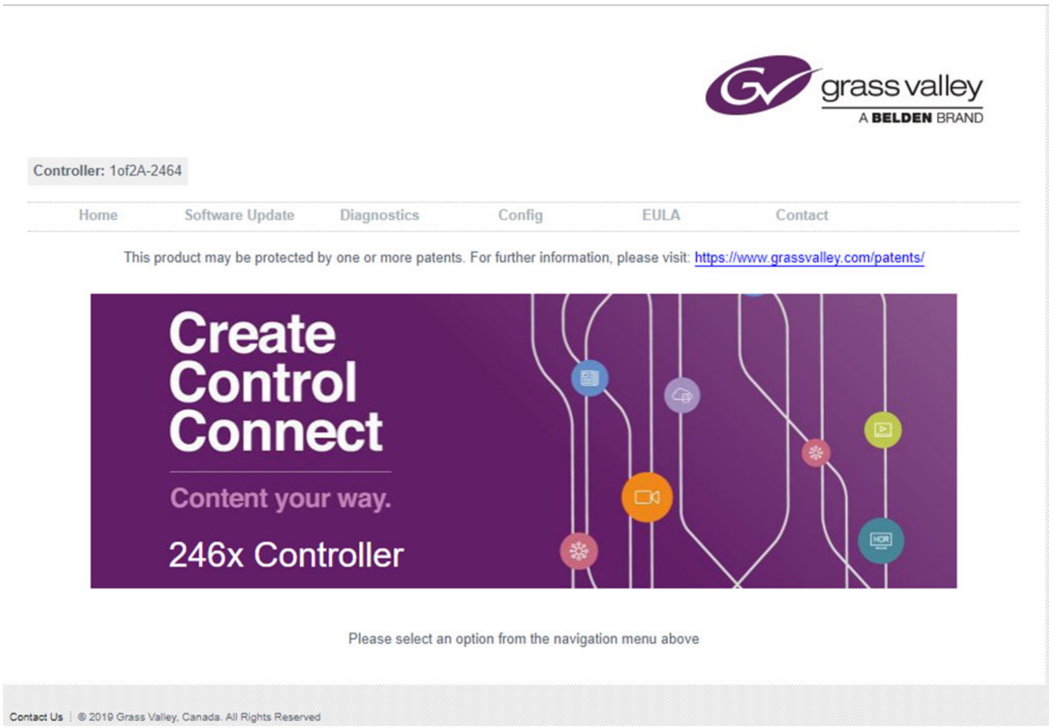


Figure 221 246X Home Web Page

To view the software license agreement, click on **EULA** on the home page. (Also see “End User License Agreement” on page 461.)

13 Control/Fan Interface Module

Chapter contains:

Control/Fan Interface Module

Two Control/fan interface modules are fitted in each router. The control/fan interface modules performs the following functions:

- Fanning-out of the control buses.
- Dual redundant fanning-out of control buses.
- Fanning-out of internal reference signals, and derived references for AHP module use.
- Drives Catsii functionality on frame Reference signal inputs.
- Router frame-to-frame communication (for the dual S850 system case only).
- Driving all the cooling fans.
- Fail-safe cooling fan operation in case of controller communications loss (maximum cooling performance until comms re-established).
- Dual redundant cooling fan power
- Collecting alarm signals from power supply shelves and cooling fans.
- Generating relay alarm outputs

In addition to the above functions, the module has the following secondary functions:

- Providing control to the Catsii LED's on the control rear panel
(Later fan control modules support Catsii 2, which supports 6G and 12G signals.)

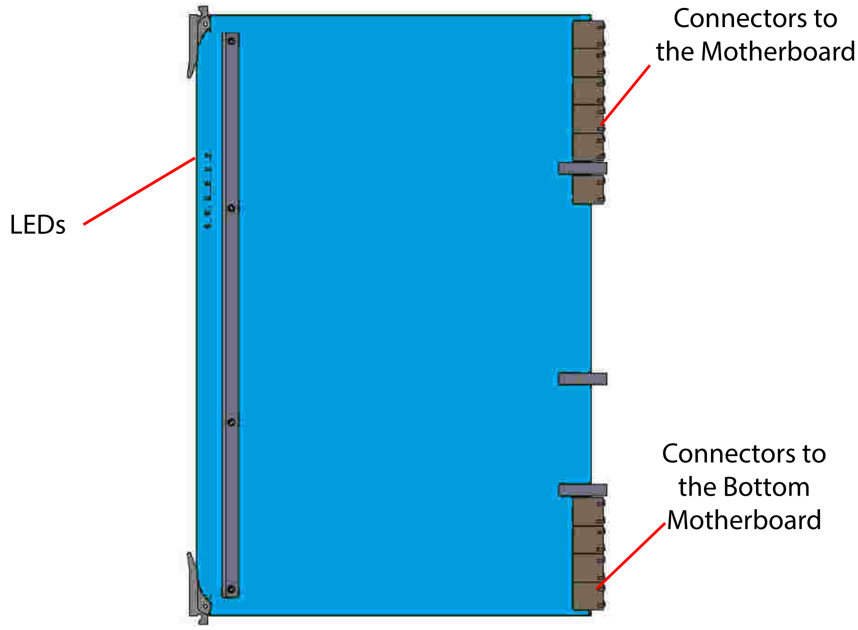


Figure 222 Control/Fan Interface Module - Video Processing Compatible Version Shown

Table 97 Fan Control Card Firmware Version Supporting Catsii 2

Fan Control Card	Firmware Version
2457	PA1103 version 2.02 and above
2458	PA1102 version 2.02 and above

13.1 Control/Fan Interface Module Compatibility

Three versions of the control/fan interface module exist for each of the Sirius 800 routers.

Sirius 830:

Table 98 Sirius 830 Control/Fan interface Compatibility

Control/Fan Interface Module	Supports
2457	Supports video/audio routing and video/audio processing. **Note:** This is the only version that supports frames with the Blue 48V fans. **CAUTION:** Using silver 12V fans will result is damage to the router.
2455	Supports video/audio routing and audio processing but cannot be used if any video signals need video processing.
2453	Supports video routing and cannot be used if any audio signals need to be routed.

Sirius 840/850:

Table 99 Sirius 840/850 Control/Fan interface Compatibility

Control/Fan Interface Module	Supports
2458	Supports video/audio routing and video/audio processing. **Note:** This is the only version that supports frames with the Blue 48V fans. **CAUTION:** Using silver 12V fans will result is damage to the router.
2456	Supports video/audio routing and audio processing but cannot be used if any video signals need video processing.
2452	Supports video routing and cannot be used if any audio signals need to be routed.

Important:

- When two control/fan interface modules are fitted in the router they must both be the same version. For the Sirius 840/850 for example: either 2 x 2452, 2 x 2456 or 2 x 2458 modules should be fitted.
- The 2452/2453 modules can only be fitted in original unmodified Sirius 800 routers, see Table 14 in section 1.14 for identification details.
- The 2457/2458 modules can only be fitted in Sirius 800 routers built or modified with blue fan casings, see section 1.14 for identification details.
- The 2455/2456 modules can only be fitted in Sirius 800 routers modified with silver fan casings stamped with "HF", see Table 14 in section 1.14 for identification details.

CAUTION:

- DO NOT fit Blue Control/Fan Interface modules (2457/2458) in a router equipped with fans with silver casings, as this will damage the router and the router will stop working.
- DO NOT fit Green Control/Fan Interface modules (2455/2456/2452/2453) in a router equipped with fans with Blue casings, as this will damage the router and the router will stop working.

Table 100 lists compatibility between the Sirius 800 modules and the control/fan interface modules.

Table 100 Control/Fan Interface Module Compatibility Table.

Modules	2457/2458 Control/Fan Interface Module Compatibility	2455/2456 Control/Fan Interface Module Compatibility	2452/2453 Control/Fan Interface Module Compatibility
Nucleus Controllers			
2450 - Nucleus Router Control Module	NO	NO	Yes
2464/2463 - Nucleus2 Router Control Module	Yes	Yes	Yes
Input Modules			
5913 - Sirius 840/850 Standard Video BNC Input module	Yes (not Sirius 830)	Yes (not Sirius 830)	Yes (not Sirius 830)
5914 - Sirius 840/850 Standard Video Fiber input module	Yes (not Sirius 830)	Yes (not Sirius 830)	Yes (not Sirius 830)
5915 - Sirius 800 Video AHP input module	Yes	Yes	NO
5916 - Sirius 830 Standard Video BNC/Fiber input module	Yes (not Sirius 840/850)	Yes (not Sirius 840/850)	Yes (not Sirius 840/850)
5917 - Sirius 800 Standard Video BNC/Fiber input module	Yes	Yes	Yes
5919 - Sirius 800 Video AHP input module with delay and sync capability	Yes	NO	NO
4915 - Sirius 800 AES/MADI input module - 120 AES Pairs and up to 3 MADI inputs or **4915** - Sirius 800 AES/MADI input module - 12 MADI (Main & Redundant)	Yes	Yes	NO
Output Modules			
5923 - Sirius 840/850 Standard Video BNC output module	Yes (not Sirius 830)	Yes (not Sirius 830)	Yes (not Sirius 830)
5924 - Sirius 840/850 Standard Video Fiber output module	Yes (not Sirius 830)	Yes (not Sirius 830)	Yes (not Sirius 830)
5925 - Sirius 800 Video AHP output module	Yes	Yes	NO
5926 - Sirius 800 Standard Video output module (non-expandable)	Yes	Yes	Yes
5937 - Sirius 830 Standard Video BNC/Fiber output module	Yes (not Sirius 840/850)	Yes (not Sirius 840/850)	Yes (not Sirius 840/850)
5938 - Sirius 850 Standard Video output module (expandable) Only fitted if expansion is required between two Sirius 850 frames	Yes (not Sirius 830)	Yes (not Sirius 830)	Yes (not Sirius 830)

Table 100 Control/Fan Interface Module Compatibility Table. (Continued)

Modules	2457/2458 Control/Fan Interface Module Compatibility	2455/2456 Control/Fan Interface Module Compatibility	2452/2453 Control/Fan Interface Module Compatibility
5949 - Sirius 800 Video embedding & AHP output module with delay and sync capability	Yes	NO	NO
4925 - Sirius 800 AES/MADI output module (no audio delay) - 120 AES Pairs and up to 3 MADI outputs or **4925** - Sirius 800 AES/MADI output module (no audio delay) - 12 MADI (Main & Redundant)	Yes	Yes	NO
4929 - Sirius 800 AES/MADI output module with audio delay - 120 AES Pairs and up to 3 MADI outputs or **4929** - Sirius 800 AES/MADI output module with audio delay - 12 MADI (Main & Redundant)	Yes	Yes	NO
Crosspoint Modules			
5901/5905 - Sirius 800 Series Video crosspoint module	Yes	Yes	Yes
5903 - Sirius 800 Audio crosspoint module	Yes	Yes	NO

13.1.1 Fan-Out

The control bus is fanned out to the router motherboard. The return signals from each module are combined together and sent back to the control modules. This functionality is copied making it dual-redundant. Only one of these modules can be active, so an active/inactive changeover is implemented similar to that on the controller itself.

13.1.2 Sirius 850: Control/Fan Interface Module in a Two Frame System

All the signals to the bottom motherboard are routed from the local controller.

In a single frame system the control signals are sent to all the modules in the frame.

In a two frame system control signals are distributed to the local and remote buses. If the control signals from the remote bus fail, the data to the expansion outputs and crosspoints is substituted by the local control.

In a single frame system the input module never illuminates the “Control Error” LED. In a two frame system the input module illuminates this “Control Error” LED if the remote bus fails.

13.1.3 Control/Fan Interface Module LEDs

Table 101 shows the LED color code on the control/fan interface module, and Figure 223 shows the module LEDs.

Table 101 Control/Fan Interface Module LED Indication

LED Color	Function	Detail	Normal Working Status
Green	Power OK	Power to the module	**On Solid** - working correctly
Yellow	Local Command OK	Receiving messages from local Nucleus control module	**Flashing** - receiving information and working correctly
Red	Local Error	Error with messages from local Nucleus control module	**Off** - normal state **Flashing** - the command message from the router controller is corrupt or hasn't been received. This communications error could be caused by a hardware failure although this is unlikely. Check that the module is inserted correctly. If the "Local Error" LED is flashing at the same time as the "Local Command OK" LED is flashing it suggests a mismatch in the configuration of the Nucleus controller.
Yellow	Remote Command OK (not 2453/ 2455/2457)	Receiving messages from remote Nucleus control module	**Sirius 830** - not fitted **Sirius 840/850** - (no expansion): **Off** - Expansion not used. **Sirius 850** (expanded to second frame): **Flashing** - receiving information and working correctly

Table 101 Control/Fan Interface Module LED Indication (Continued)

LED Color	Function	Detail	Normal Working Status
Red	Remote Error (not 2453/ 2455/2457)	Error with messages from remote Nucleus control module	**Sirius 830** - not fitted **Sirius 840/850** - (no expansion): **Off** - Expansion not used. **Sirius 850** (expanded to second frame): **Off** - normal state, **Flashing** - the command message from the remote router controller is corrupt or hasn't been received. This communications error could be caused by a hardware failure although this is unlikely. Check that the module is inserted correctly and the four RJ45 connections between the frames are fitted correctly (see section 10.2). If the "Remote Error" LED is flashing at the same time as the "Remote Command OK" LED is flashing it suggests a mismatch in the configuration of the Nucleus controller.
Green	Active	Card is active	**On Solid** - working correctly

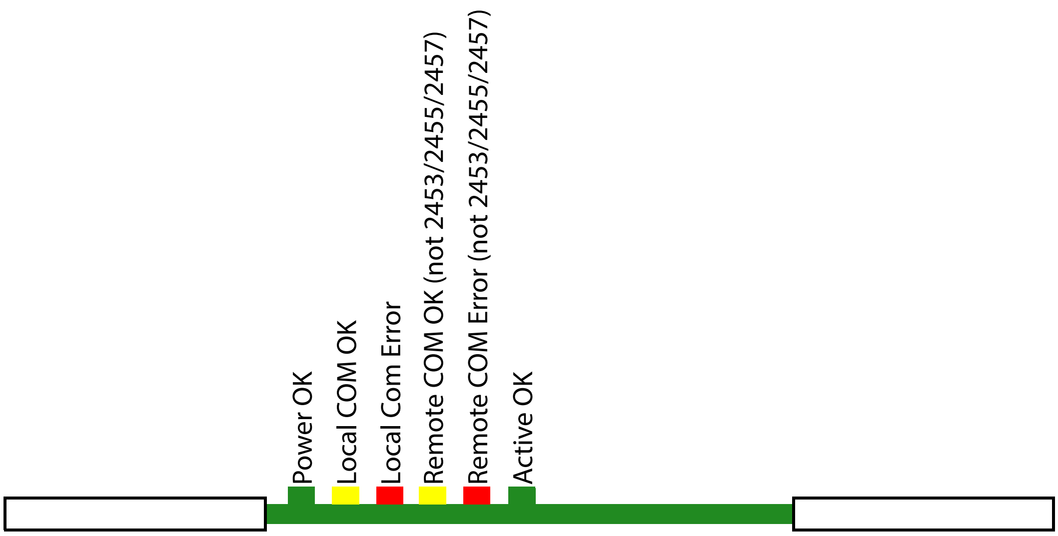


Figure 223 Control/Fan Interface Module LEDs

14 Control and Alarm Rear Panel Connections

Chapter contains:

Control and Alarm Rear Panel Connections

14.1 Sirius 830: Control Connections

The Sirius 830 control rear panel located in the middle of the frame, contains all the control connectors for the router.

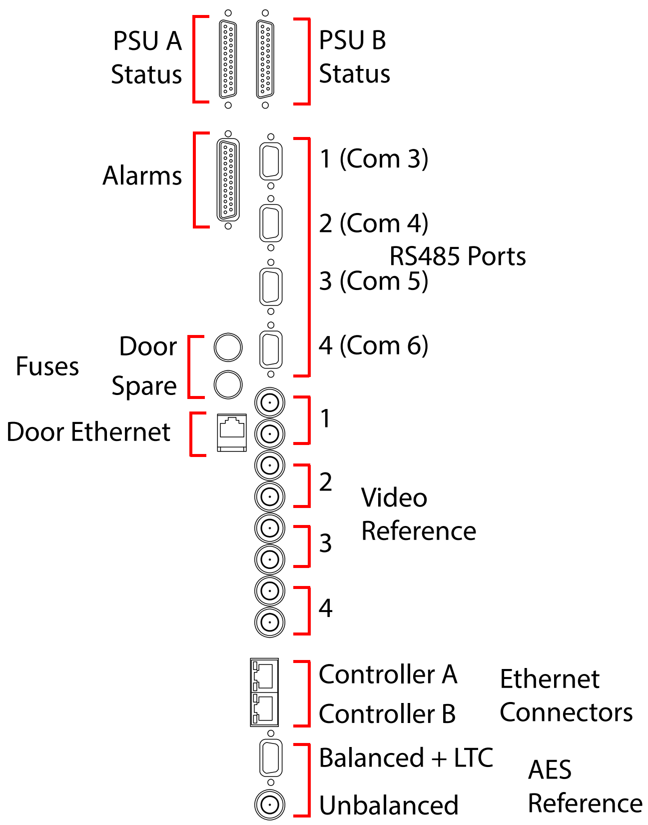


Figure 224 Sirius 830 Control Panel

Table 102 Sirius 830 Control Rear Panel

Connector	Function
PSUA Status and PSU B Status	25-Way D-Type socket - PSU Alarm Inputs, collect alarm signals from the PSUs, using the supplied cable(s)
ALARMS	25-Way D-Type socket - Alarm Outputs: Alarm outputs switch in the event of the following failures: Fan, Controller, PSU. For details on the output that switches for each failure see section 14.4.3.
Ethernet A, B	RJ45 x2 - Ethernet for Nucleus controller A and B If two Nucleus controllers are fitted both the Ethernet A and Ethernet B ports must be connected to the network.
Video Reference	BNC x 8 - Video reference (4 pairs, each with passive loop through) B+B, and Tri-level **Note**: No internal termination.
RS485 1 (COM 3) to 4 (COM 6)	Female 9 Pin D-Type socket x4 - Serial Control, these correspond to ports; COM 3 to COM 6 in Workbench.
Door Fuse & Spare Fuse	5 A Anti-Surge, Ceramic fuse (5 mm x 20 mm)
Door Ethernet	RJ45 Ethernet - connects the door PC to an external network
AES Reference	9 Pin D-Type socket - AES reference 110 Ω balanced termination and LTC input termination
Note: Physically only one AES reference (balanced or unbalanced) should be connected. Connecting both will stop the audio router module(s) functioning correctly	

14.2 Sirius 840/850: Control Connections

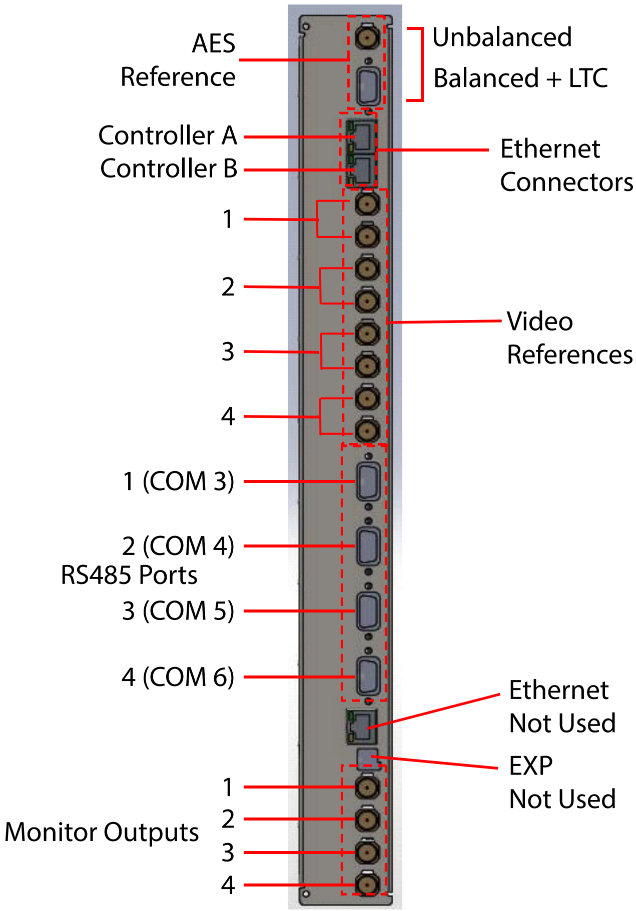


Figure 225 Sirius 840/850 Control Rear Panel

Table 103 Control Rear Panel (Sirius 840/850)

Connector	Function
Unbal	BNC - AES reference, 75 Ω termination
BAL + LTC	9 Pin D-Type socket - AES reference 110 Ω balanced termination and LTC input termination
Note: Physically only one AES reference (balanced or unbalanced) should be connected. Connecting both will stop the audio router module(s) functioning correctly.	
Ethernet A, B	RJ45 x2 - Ethernet for controller A and B. If two Nucleus controllers are fitted both the Ethernet A and Ethernet B ports must be connected to the network.
Video Ref	BNC x8 - Video reference (4 pairs, each with passive loop through) B+B, and Tri-level **Note**: No internal termination.
RS485 1 (COM 3) to 4 (COM 6)	9 Pin D-Type socket x4 - Serial Control, these correspond to ports; COM 3 to COM 6 in Workbench
Ethernet	Not Used
EXP	Not Used
Monitor Outputs 1 - 4	BNC x 4 - Supports 3G, SD, HD video and AES audio output monitoring (see section 11.7 for configuration requirements)

14.3 Sirius 840/850: Alarm Rear Panel Connections

The Alarm Rear Panel contains all the alarm control connectors for the Router.

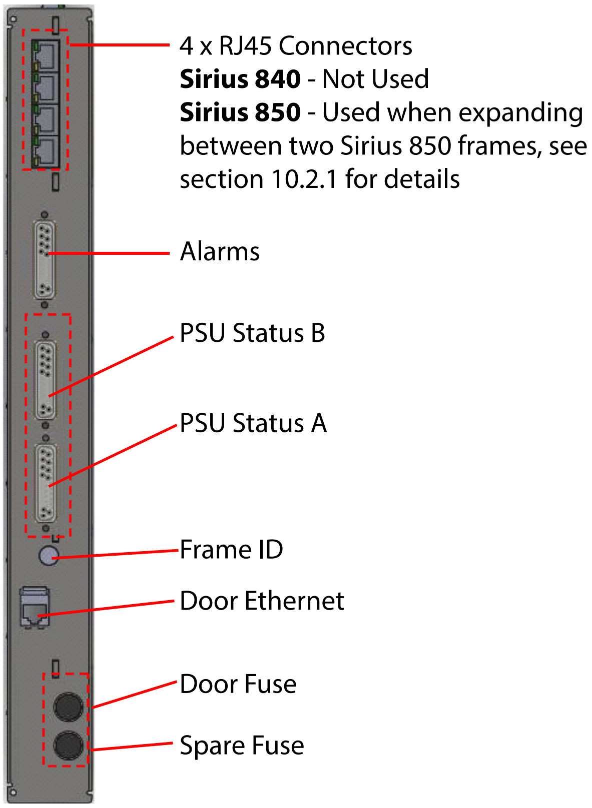


Figure 226 Alarm Rear Panel Connections

Table 104 Sirius Alarm Rear Panel Connections

Connector	Function
4 x RJ45 Connectors	**Sirius 840** - Not Used **Sirius 850** - Used when expanding between two Sirius 850 frames, 10.2 for details
Alarms	25-Way D-Type socket - Alarm Outputs: Alarm outputs switch in the event of the following failures: Fan, Controller, PSU. For details on the output that switches for each failure see section 14.4.3. For example the outputs can be used for warning lights in a panel or monitoring by an external control system.
PSU Status B PSU Status A	25 Way D-Type socket x 2 - PSU Alarm Inputs. Collects alarm signals from the PSU(s), using the supplied cable(s)
Frame ID	Rotary Switch - Frame identification switch (see section 14.3.1 for full details): **Sirius 840** - set to position 3 **Sirius 850**, single frame - set to position 0 **Sirius 850**, frame 1 of 2 - set to position 1 **Sirius 850** frame 2 of 2 - set to position 2
Door Ethernet	RJ45 Ethernet - Used to connect the door PC to an external network
Door Fuse & Spare Fuse	5 A Anti-Surge, Ceramic fuse (5 mm x 20 mm) **CAUTION:** Replacement fuses must be of the same rating and fuse type.

14.3.1 Sirius 840/850: Frame ID Rotary Switch (on Alarm Rear Panel)

Each Sirius 840/850 router frame contains a rotary decimal switch situated on the Alarm rear panel. This is the frame ID switch; it is used to identify the router system with a frame number.

The frame number is set using a 10 way rotary decimal switch on the rear of the router (see Table 104). This uniquely identifies the Sirius 850 router within a multiple frame expanded system.

The Frame ID switch on each router frame *must* be set according to the following table:

Table 105 Frame ID Numbering

Frame ID Switch Value	Sirius 800 Model	Sirius 800 Router System Description
0	**850**	The only frame in a single frame Sirius 850 system. (576 x 1152)
1	**850**	First frame in a two-frame Sirius 850 system, expanded to 1152^2. (Outputs 1-576)
2	**850**	Second frame in a two-frame Sirius 850 system, expanded to 1152^2. (Outputs 577-1152)
3	**840**	Sirius 840 system.
4 to 9	**-**	Reserved for future use.

CAUTION

Router Frame ID must be set according to Table 105, otherwise there can be unexpected system behavior.

Important:

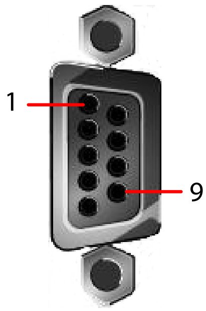
Modifying a Router System:

- If a Sirius 850 router installation is modified from a single-frame system to a two-frame system (or back to a single-frame system) the Frame ID will need to be changed on each Sirius 850.
- After changing AHP modules, a system needs to be re-powered.

14.4 Control I/O and Alarm Pin-outs

14.4.1 RS485 9 Way D-Type Socket

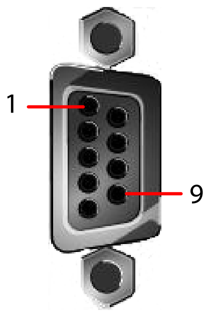
Table 106 RS485 9 Way D-Type Socket



Pins	Multi-drop	General Switcher and General Remote
1	Chassis	Chassis
2	Rx-	Tx-
3	Tx+	Rx+
4	0V	0V
5	N/C	N/C
6	0V	0V
7	Rx+	Tx+
8	Tx-	Rx-
9	Chassis	Chassis

14.4.2 LTC & AES Reference 9 Way D-Type Socket

Table 107 RS485 9 Way D-Type Socket

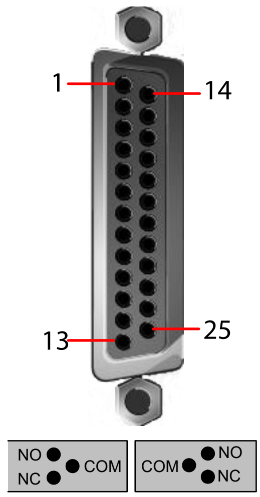


Pins	Function
1	GND
2	AES balanced +
3	Ground
4	LTC +
5	AES Unbalanced
6	GND
7	AES balanced -
8	Not connected
9	LTC -

Note: Physically only one AES reference (balanced or unbalanced) should be connected. Connecting both will stop the audio router module(s) functioning correctly.

14.4.3 Alarm Relay Output 25 Way D-Type Socket

Table 108 Alarm Relay Output 25 Way D-Type Socket



Pins	Function	Pins	Function
1	Alarm 1 Normally Open	14	Alarm1 Common
2	Alarm 1 Normally Closed	15	Alarm 2 Normally Open
3	Alarm 2 Common	16	Alarm 2 Normally Closed
4	Alarm 3 Normally Open	17	Alarm 3 Common
5	Alarm 3 Normally Closed	18	Alarm 4 Normally Open
6	Alarm 4 Common	19	Alarm 4 Normally Closed
7	Alarm 5 Normally Open	20	Alarm 5 Common
8	Alarm 5 Normally Closed	21	Alarm 6 Normally Open
9	Alarm 6 Common	22	Alarm 6 Normally Closed
10	Alarm 7 Normally Open	23	Alarm 7 Common
11	Alarm 7 Normally Closed	24	Alarm 8 Normally Open
12	Alarm 8 Common	25	Alarm 8 Normally Closed
13	Not Connected		

Table 109 Alarm Description

Alarm Number	Alarm Description
1	Fans - Front
2	Fans - Rear
3	Controller Failure (OK if both controllers are operational)
4	Spare (later this could be implemented as a General Purpose Fault)
5	Power Supply 1 (& PSU 5 if present)
6	Power Supply 2 (& PSU 6 if present)
7	Power Supply 3 (& PSU 7 if present)
8	Power Supply 4 (& PSU 8 if present)

Under normal operating conditions where everything is working correctly, the relay contacts are in their normally-closed (NC) position.

Appendix A Router and Power Supply Shelf Dimensions

Appendix contains:

Router and Power Supply Shelf Dimensions

A.1 Sirius 830 Frame Dimensions

Make sure that sufficient space is available for the Sirius 830. For ventilation purposes, there must be an additional 50 mm (2 inch) gap on the left and right sides.

The full height of the Sirius 830 is 668 mm (26.3 inches). Allow an additional 200 mm (8 inches) behind the unit for power, control and signal cables.

Dimensions are of full size system (without the power supplies)

Dimensions are in millimeters (inches).

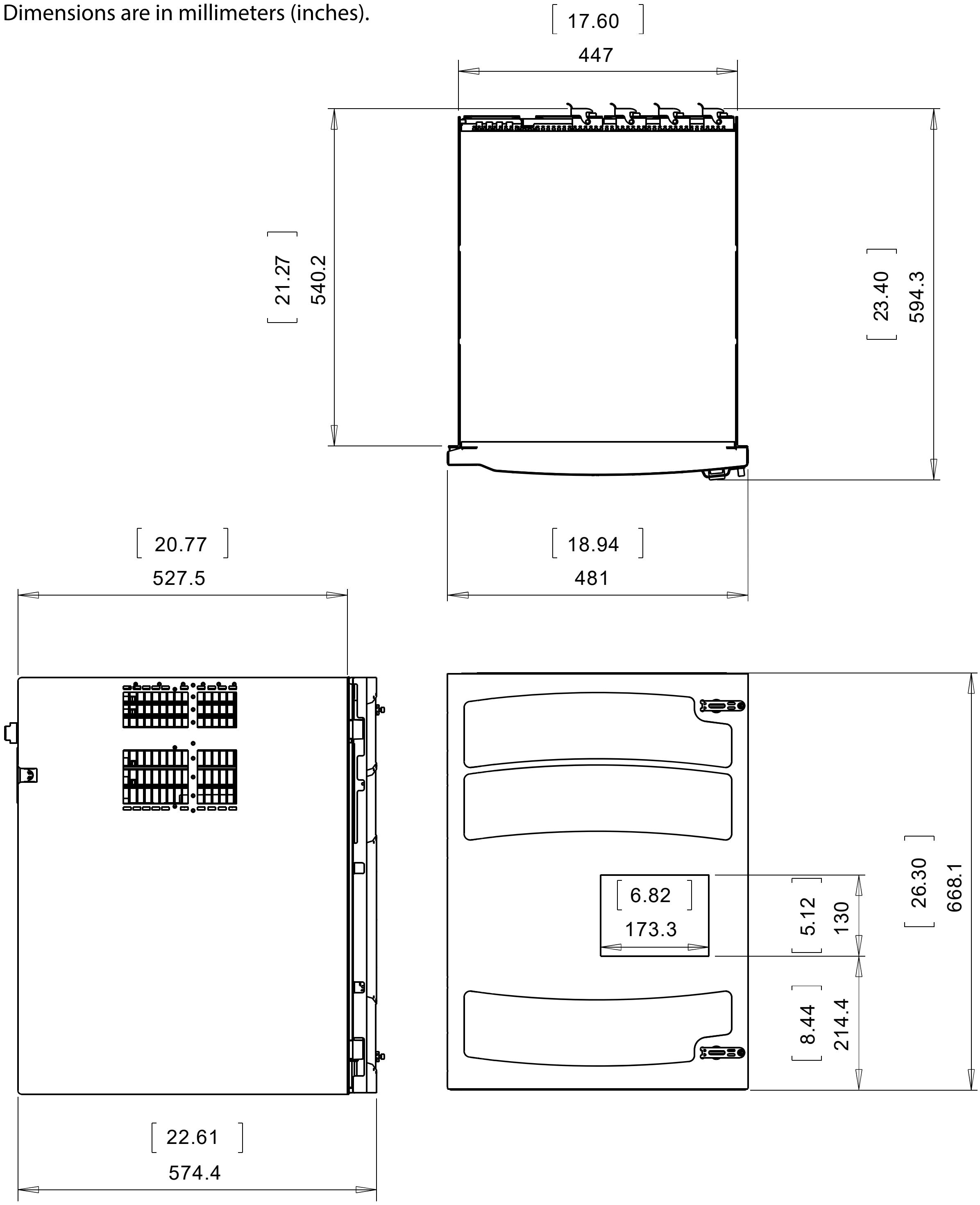


Figure 227 Sirius 830 Frame Dimensions

A.2 Sirius 840 Frame Dimensions

Make sure that sufficient space is available for the Sirius 840. For ventilation purposes, there must be an additional 50 mm (2 inch) gap on the left and right sides.

The full height of the Sirius 840 is 1198 mm (47.2 inches). Allow an additional 200 mm (8 inches) behind the unit for power, control and signal cables.

Dimensions are of full size system (without the power supplies)

Dimensions are in millimeters (inches).

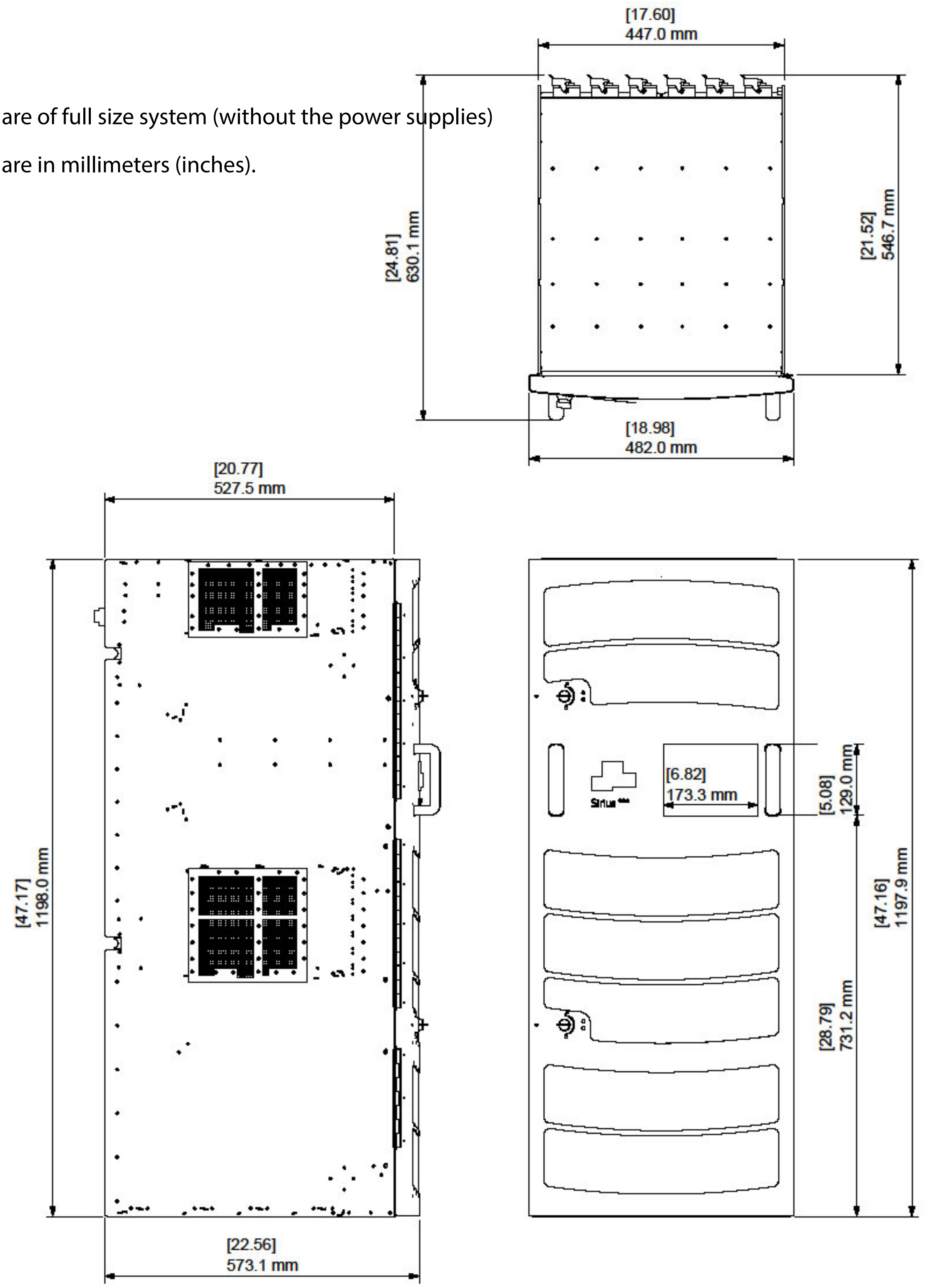


Figure 228 Sirius 840 Frame Dimensions

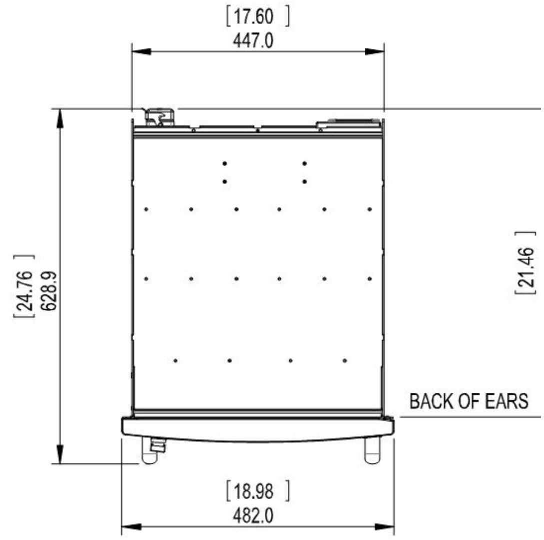
A.3 Sirius 850 Frame Dimensions

Make sure that sufficient space is available for the Sirius 850. For ventilation purposes, there must be an additional 50 mm (2 inch) gap on the left and right sides.

The full height of the Sirius 850 is 1511 mm (59.49 inches). Allow an additional 200 mm (8 inches) behind the unit for power, control and signal cables.

Dimensions are of full size system (without the power supplies)

Dimensions are in millimeters (inches).



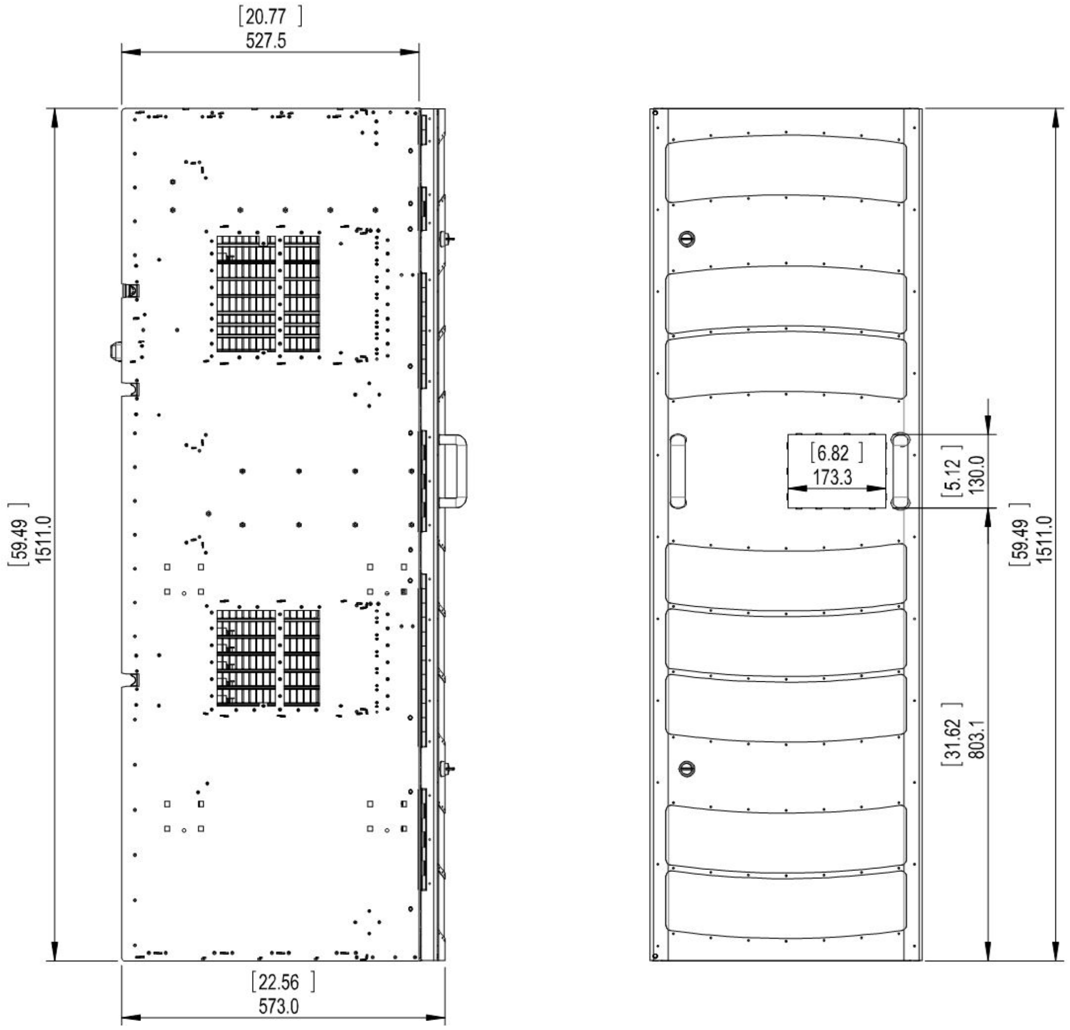


Figure 229 Sirius 850 Frame Dimensions

A.4 Power Supply Shelf Dimensions

The power supply shelf is a separate 2U assembly; Power Supply Shelves are rack mountable and can be placed above, below or remote from the Sirius Frame.

You must allow at least 250 mm (10 Inches) at the rear of the shelf for cables and connectors.

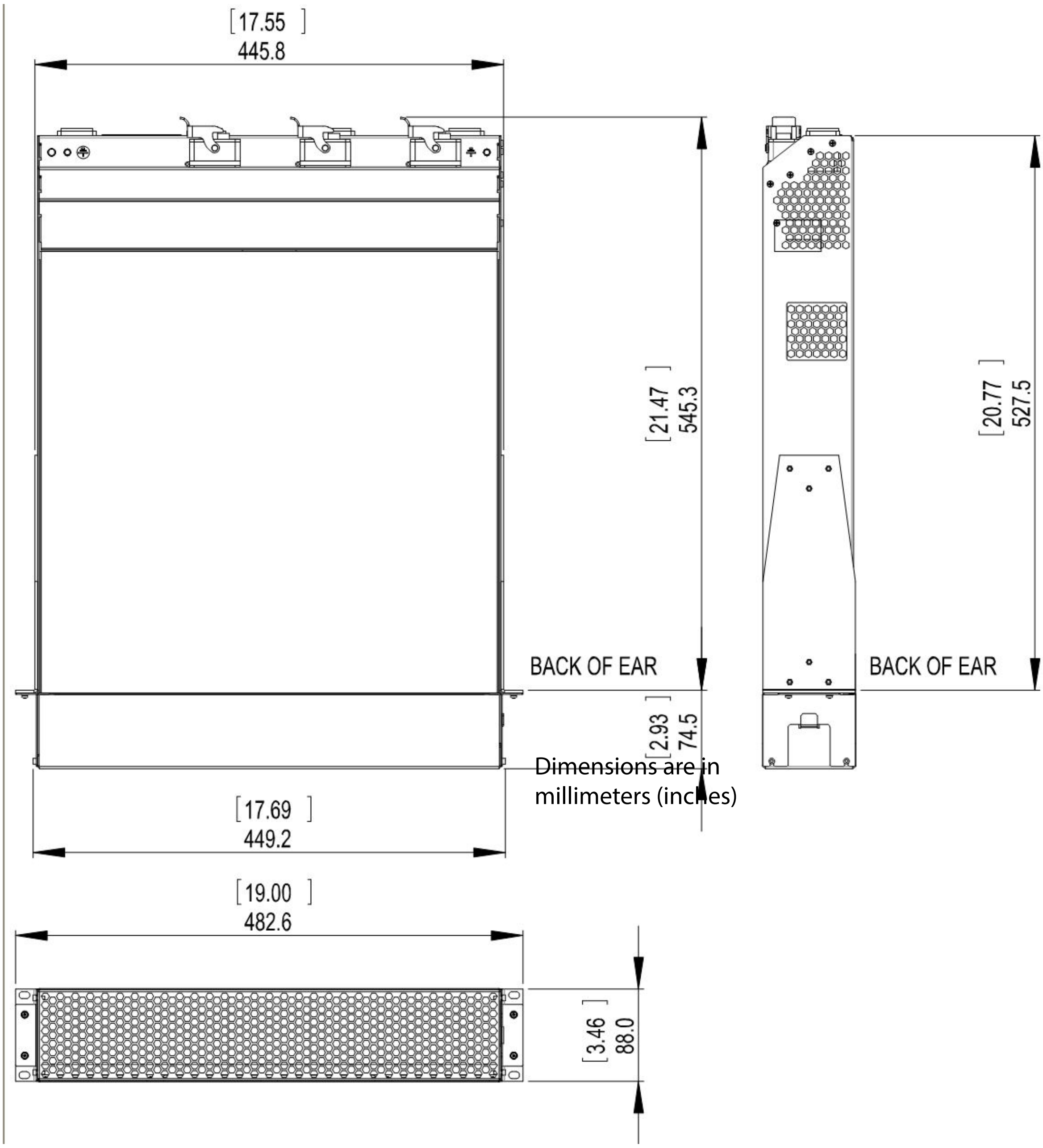


Figure 230 Power Supply Shelf Dimensions

Appendix B Router Power Supply Shelf Requirements

Appendix contains:

B.1 Power Supply Redundancy

To ensure full dual redundancy, half of the power supplies should be powered from a separate power source to the other power supplies. Under normal operating conditions with dual power sources, each power supply unit runs at less than 50% loading.

B.1.1 Sirius 830: Power Supply Shelf Requirements

The number of power supply shelves should be selected based on the mains supply operating voltage and router configuration, see Table 110 for information.

See Appendix B.2 for power shelf, PSU and power cable order codes.

To reduce the risk of electric shock, plug each power supply shelf into separate branch circuits employing separate service grounds.

Table 110 Sirius 830 Power Supply Redundancy

Sirius 830 Router Configuration	Mains Supply (V AC)	Number of Power Supply Shelves and Units Required for Redundancy
Typical router configuration of less than 12 video AHP modules (5919/5949/5915/5925) fitted in the router	100 - 120 V AC Nominal	1 Shelf 4 Power Supply Units 2 DC Cables
If 12 or more video AHP modules (5919/5949/5915/5925) are fitted in the router	100 - 120 V AC Nominal	2 Shelves 6 Power Supply Units 4 DC Cables
All router configurations	220 - 240 V AC Nominal	1 Shelf 4 Power Supply Units 2 DC Cables

Important

- If the Sirius 830 router is expanded from its initial configuration check Table 110 to see if extra power supply shelves are required.
- It is the responsibility of the Sirius 830 installer to ensure any AC power requirements are met.

B.1.2 Sirius 840: Power Supply Shelf Requirements

The number of power supply shelves should be selected based on the mains supply operating voltage and router configuration, see Table 111 for information.

See Appendix B.2 for power shelf, PSU and power cable order codes.

To reduce the risk of electric shock, plug each power supply shelf into separate branch circuits employing separate service grounds.

Table 111 Sirius 840 Power Supply Redundancy

Sirius 840 Router Configuration	Mains Supply (V AC)	Number of Power Supply Shelves and Units Required for Redundancy
Typical router configuration of less than 36 video AHP modules (5919/5949/5915/5925) fitted in the router	100 - 120 V AC Nominal	2 Shelves 8 Power Supply Units 4 DC Cables
If 36 or more video AHP modules (5919/5949/5915/5925) are fitted in the router	100 - 120 V AC Nominal	3 Shelves 12 Power Supply Units 6 DC Cables
Typical router configuration of less than 36 video AHP modules (5919/5949/5915/5925) fitted in the router	220 - 240 V AC Nominal	1 Shelf 4 Power Supply Units 3 DC Cables
If 36 or more video AHP modules (5919/5949/5915/5925) are fitted in the router	220 - 240 V AC Nominal	2 Shelves 8 Power Supply Units 6 DC Cables

Important

- If the Sirius 840 router is expanded from its initial configuration check Table 111 to see if extra power supply shelves are required.
- It is the responsibility of the Sirius 840 installer to ensure any AC power requirements are met.

B.1.3 Sirius 850: Power Supply Shelf Requirements

The number of power supply shelves should be selected based on the mains supply operating voltage and router configuration, see Table 112 for information.

See Appendix B.2 for power shelf, PSU and power cable order codes.

To reduce the risk of electric shock, plug each power supply shelf into separate branch circuits employing separate service grounds.

Table 112 Sirius 850 Power Supply Redundancy

Sirius 850 Router Configuration	Mains Supply (V AC)	Number of Power Supply Shelves and Units Required for Redundancy
Typical router configuration of less than 20 video AHP modules (5919/5949/5915/5925) fitted in the router **and** no 5928 expansion output modules fitted (outputs above 576 or expansion to a second frame)	100 - 120 V AC Nominal	2 Shelves 8 Power Supply Units 4 DC Cables
If 20 or more video AHP modules (5919/5949/5915/5925) are fitted in the router **and** any 5928 expansion output modules are fitted (outputs above 576 or expansion to a second frame)	100 - 120 V AC Nominal	3 Shelves 12 Power Supply Units 6 DC Cables
All router configurations	220 - 240 V AC Nominal	2 Shelves 8 Power Supply Units 6 DC Cables

Important

- If the Sirius 850 router is expanded from its initial configuration check Table 112 to see if extra power supply shelves are required.
- It is the responsibility of the Sirius 850 installer to ensure any AC power requirements are met.

B.2 DC Power Supply Order Codes

- **2U Power Supply Shelf** (no PSU modules fitted)
  Order Code 1911
  1 x 2U Power Supply Shelf, can be fitted with up to 4 x 48 V DC PSUs
- **48 V DC PSU** (Power Supply Unit)
  Order Code U48N3800
  1 x 48 V DC PSU

B.2.1 DC Power Cable Order Codes

CAUTION

Use cables of the *same* length to the same PSU module.
The use of cables of different lengths can lead to abnormal heating effects.

- **DC Power Cable Kit - 2.5 metres**:
  Order Code 1913
  Cable kit consists of:

  2 x 2.5 metre (8 Feet) DC power cables
  1 x 2.5 metre (8 Feet) Earth cable
  1 x 2.5 metre (8 Feet) PSU alarm cable
- **Additional DC Power Cable - 2.5 metres**:
  Order Code 636025
  Consists of 1 x 2.5 metre (8 Feet) DC power cable.
- **DC Power Cable Kit - 8 metres**:
  Order Code 1918
  Cable kit consists of:

  2 x 8 metre (26 Feet) DC power cables
  1 x 8 metre (26 Feet) Earth cable
  1 x 8 metre (26 Feet) PSU alarm cable
- **Additional DC Power Cable - 8 metres**:
  Order Code 636035
  Consists of 1 x 8 metre (26 Feet) DC power cable.

Appendix C Modules No Longer Supplied With New Systems

Appendix contains:

Modules No Longer Supplied With New Systems

C.1 Input Rear Panels

C.1.1 Sirius 830: 1235 Video BNC Input Rear Panel

Note:

- The 1235 rear panel was supplied with earlier Sirius 830 router systems and is shown here for users that already have them fitted.
- On newer systems the 1234 rear panel can be used instead of the 1235 and is compatible with the same video input modules so is a direct replacement.

The 1234/1235 video BNC input rear panels have 24 BNC inputs.

The 1234/1235 rear panels are used in the Sirius 830 with either the 5919/5915 input module (24 channel video with de-embedder, re-clocking and AHP) or the 5917/5916 input modules (24 channel video with re-clocking).

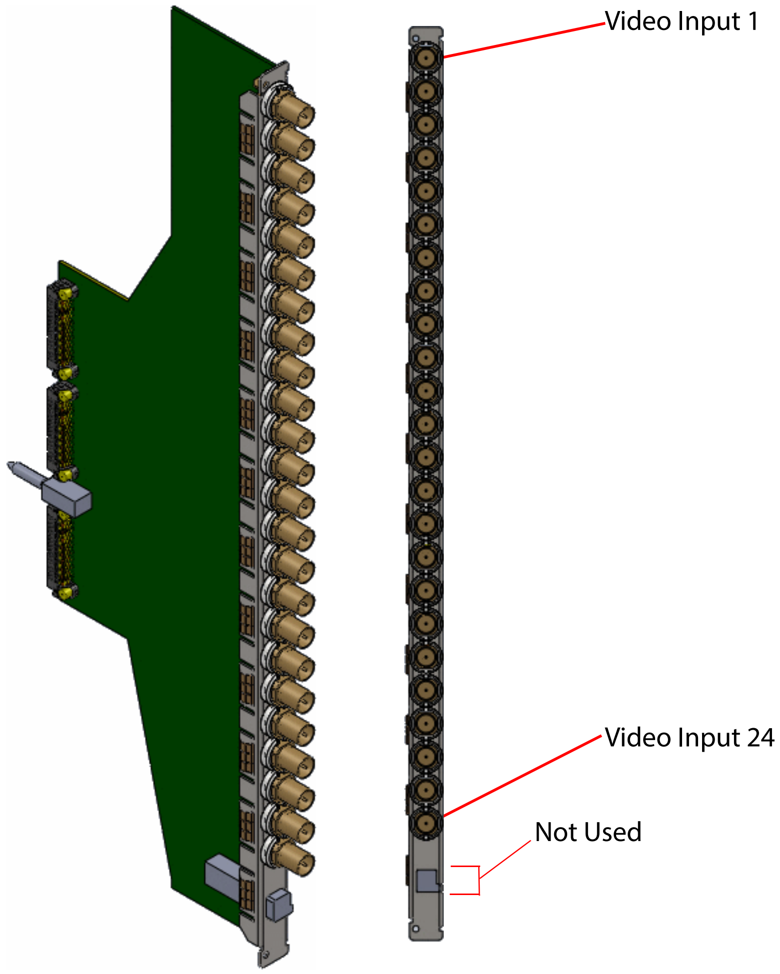


Figure 231 1234/1235 Input BNC Rear Panel (Sirius 830 only)

All the BNC connectors on the 1234/1235 rear panels have Grass Valley's unique Catsii feature that illuminates each connector. See section 4 for details of the Catsii functionality.

C.1.2 Sirius 840/850: 1289 Video BNC Input Rear

Note:

- The 1289 rear panel was supplied with earlier Sirius 840/850 router systems and is shown here for users that already have them fitted.
- On newer systems the 1349 rear panel can be used instead of the 1289 and is compatible with the same video input modules so is a direct replacement.

The 1349/1289 video BNC input rear panels have 24 BNC inputs.

The 1349/1289 rear panels are used in the Sirius 840/850 with the 5919/5915 video input module (24 channel video with de-embedder, re-clocking and AHP) and the 5917 video input module (24 channel video with re-clocking).

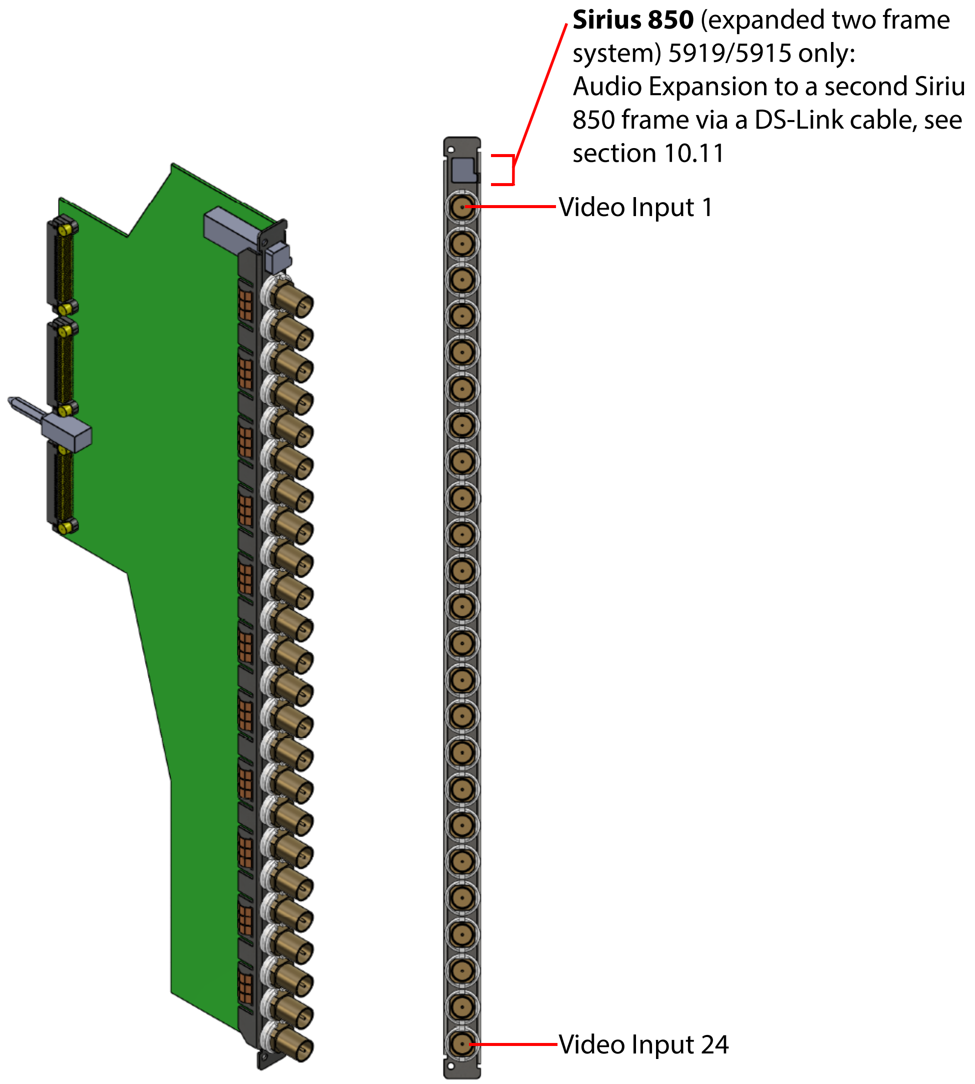


Figure 232 1349/1289 Input BNC Rear Panel (Sirius 840/850 only)

All the BNC connectors on the 1349/1289 rear panels have Grass Valley's unique Catsii feature that illuminates each connector. See section 4 for details of the Catsii functionality.

C.1.3 Sirius 830: 1299 Balanced AES Input Rear Panel

The 1299 balanced AES input rear panel has 5 x 62 way female high density sockets for balanced AES audio inputs.

Note:

- The 1299 Sirius 830 Balanced AES input rear panel was supplied with earlier Sirius 830 router systems and is shown here for users that already have them fitted.
- The 1354 Sirius 830 Balanced AES input rear panel can be supplied as direct replacement for the 1299 if required. see section 7.18.1 for details of the 1354 rear panel.
- If unbalanced AES inputs are required see section 7.19.1 for details.

The 1299 rear panel is used in the Sirius 830 with the 4915 120 channel AES/MADI input module. For the wiring details for the 62 way D-Type sockets see section 7.18.3.

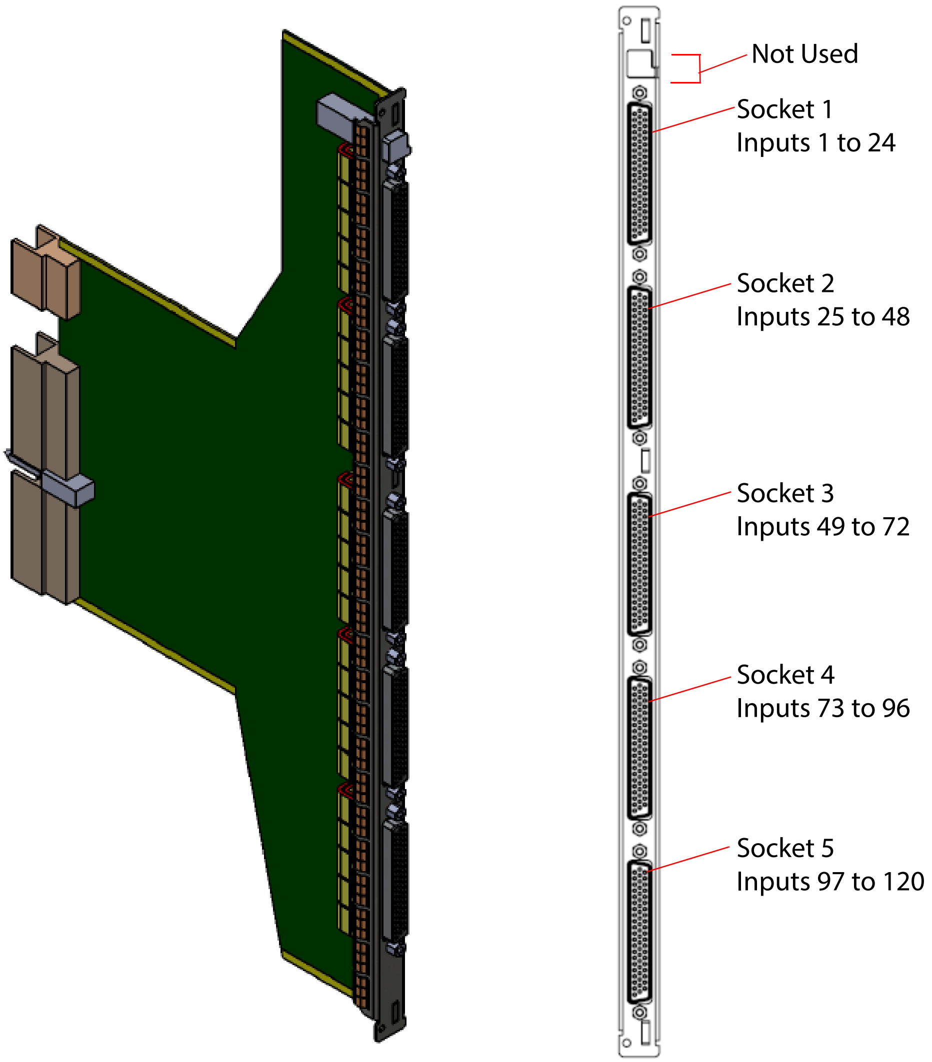


Figure 233 1299 AES Balanced Input Rear Panel (Sirius 830 only)

C.1.4 Sirius 840/850: 1297 Balanced AES Input Rear Panel

The 1297 balanced AES input rear panel has 5 x 62 way female high density sockets for balanced AES audio inputs.

Note:

- The 1297 Sirius 840/850 Balanced AES input rear panel was supplied with earlier Sirius 840/850 router systems and is shown here for users that already have them fitted.
- The 1352 Sirius 840/850 Balanced AES input rear panel can be supplied as direct replacement for the 1297 if required. see section 7.18.2 for details of the 1352 rear panel.
- If unbalanced AES inputs are required see section 7.19.2 for details.

The 1297 rear panel is used in the Sirius 840/850 with the 4915 120 channel AES/MADI input module. For the wiring details for the 62 way D-Type sockets see section 7.18.3.

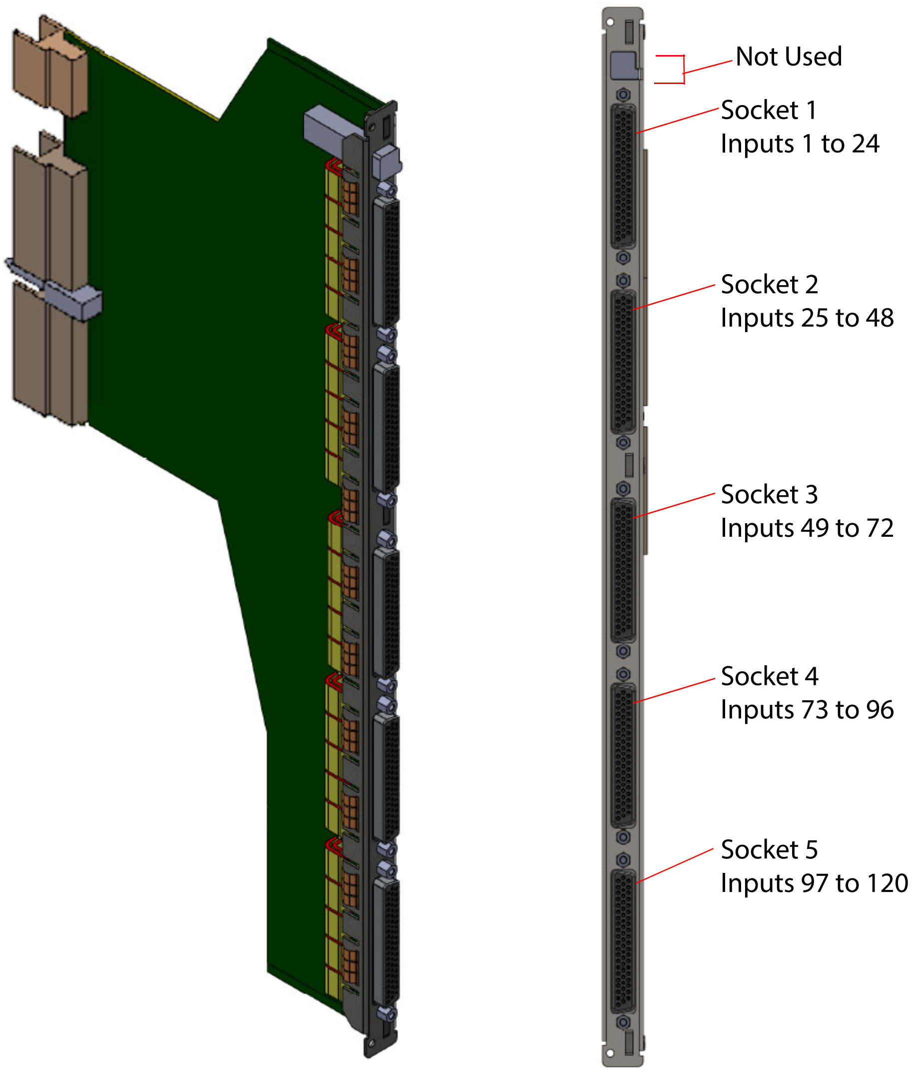


Figure 234 1297 Balanced AES Input Rear Panel (Sirius 840/850 only)

C.2 Input Modules

C.2.1 5913/4 Sirius 840/850 Standard Video Input Module

Note:

- The 5913 and 5914 Sirius 840/850 standard video input modules were supplied with earlier Sirius 840/850 router systems and are shown here for users that already have them fitted.
- The 5913 and 5914 Sirius 840/850 standard video input modules can be supplied as replacements for these earlier systems if required.
- On newer systems the 5917 video input module can be used instead of either the 5913 or 5914 but the 5917 requires different rear panels so is not a direct replacement. see section 7.22 for details.

The 5913 Sirius 840/850 standard video BNC input module has 24 BNC input channels and can handle SD, ASI and HD signals up to 3Gb/s.

The 5914 Sirius 840/850 standard video fiber input module has 24 fiber input channels (12 dual channel fiber receivers) and can handle SD, ASI and HD signals up to 3Gb/s.

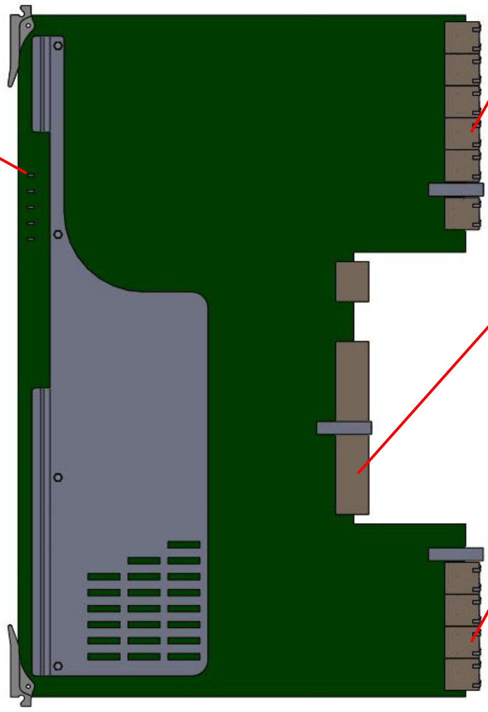


Figure 235 5913/5914 Sirius 840/850 Standard Video Input Module

The 5913 Input Module is compatible with the 1285 BNC rear panel (see section 7.9). The 5914 Input Module is compatible with the 1286 Fiber rear panel (see section 7.10).

C.2.1.1 5913/5914 Input Module LED Information

Table 113 shows the LED color code on the 5913 and 5914 input modules, and Figure 236 shows the input module LEDs on the edge of the module.

Table 113 5913/5914 Sirius 840/850 Standard Video Input Module LED Information

LED Color	Function	Detail	Normal Working Status
Green	Power OK	Power to the module	**On Solid** - working correctly
Yellow	Local Command OK	Receiving messages from local Nucleus control module (the Nucleus controller in this frame)	**Flashing** - receiving information and working correctly
Red	Local Error	Error with messages from local Nucleus control module (the Nucleus controller in this frame)	**Off** - normal state **Flashing** - the command message from the router controller is corrupt or hasn’t been received. This communications error could be caused by a hardware failure or incorrect insertion. Check that the module is inserted correctly. If the “Local Error” LED is flashing at the same time as the “Local Command OK” LED is flashing it suggests a mismatch in the configuration of the Nucleus controller. Check the controller configuration.
Yellow	Remote Command OK	Receiving messages from remote Nucleus control module (the Nucleus controller in the frame linked to this frame)	**Sirius 830/840/850 (no expansion)**: **Off** - Expansion not used. **Sirius 850 (expanded to second frame)**: **Flashing** - receiving information and working correctly
Red	Remote Error	Error with messages from remote Nucleus control module (the Nucleus controller in the frame linked to this frame)	**Sirius 830/840/850 (no expansion)**: **Off** - Expansion not used. **Sirius 850 (expanded to second frame)**: **Off** - normal state, **Flashing** - the command message from the remote router controller is corrupt or hasn’t been received. This communications error could be caused by a hardware failure a or incorrect insertion. Check that the module is inserted correctly and the four RJ45 connections between the frames are fitted correctly (see section 10.2). If the “Remote Error” LED is flashing at the same time as the “Remote Command OK” LED is flashing it suggests a mismatch in the configuration of the Nucleus controller. Check the controller configuration.

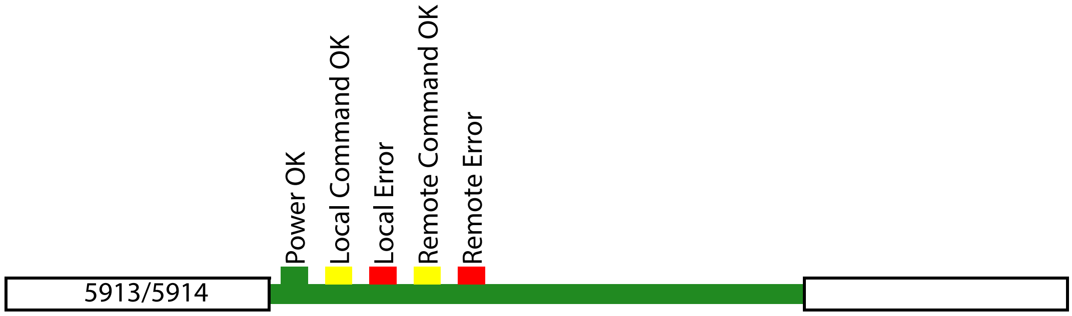


Figure 236 5913/5914 Sirius 840/850 Standard Video Input Module LEDs

C.2.2 5915 Sirius 800 Video AHP Input Module

Important

- The 5915 Sirius 800 video AHP input module was supplied with earlier Sirius 800 router systems and is shown here for users that already have them fitted.
- The 5915 Sirius 800 video AHP input module can be supplied as a replacement for these earlier systems if required.

The 5915 module heat sink can get very hot during normal operation. When removing the 5915 module from a router do not touch the heat sink until it has had time to cool down.

The 5915 Sirius 800 video AHP input module with audio de-embedder and re-clocking has 24 input channels and can handle SD and HD signals up to 3Gb/s. The module also accepts DVB-ASI input signals, but there is *no processing* in this case.

The audio de-embedder extracts up to 16 mono audio channels per video input channel (16 for SD and HD) giving up to 768 audio channels per 5915 input module. The 5915 passes all of the de-embedded audio channels (including VU&C data) to the audio crosspoints.

The 5915 AHP video input module contains a powerful processing engine that can manipulate the individual audio channels passing through it (see Appendix C.2.2.1). Audio processing is a licensed feature which must be purchased for each module it is needed on, see section 1.9.1 for licensing details.

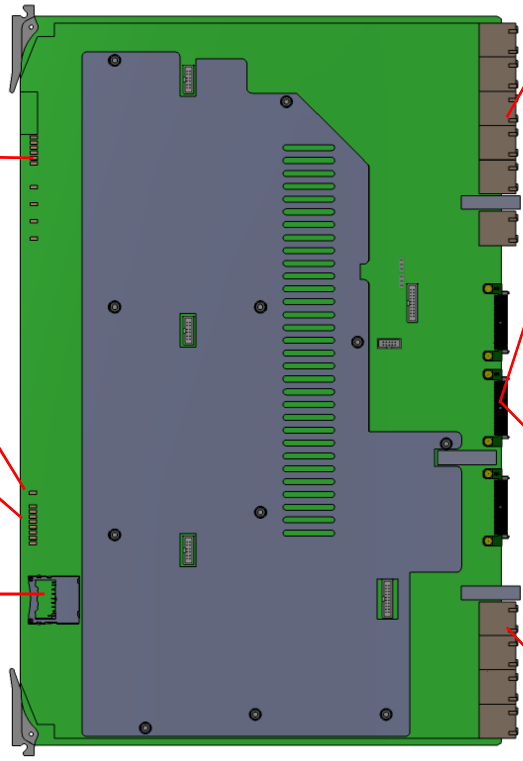


Figure 237 5915 Sirius 800 Video AHP Input Module

Note:

- Jumpers and Headers are present on the video input module and these are for Grass Valley Use Only.
- In normal operation no jumper links or headers are fitted.

The 5915 Input Module is compatible with the rear panels listed in Table 114

Table 114 5915 Rear Panel Compatibility

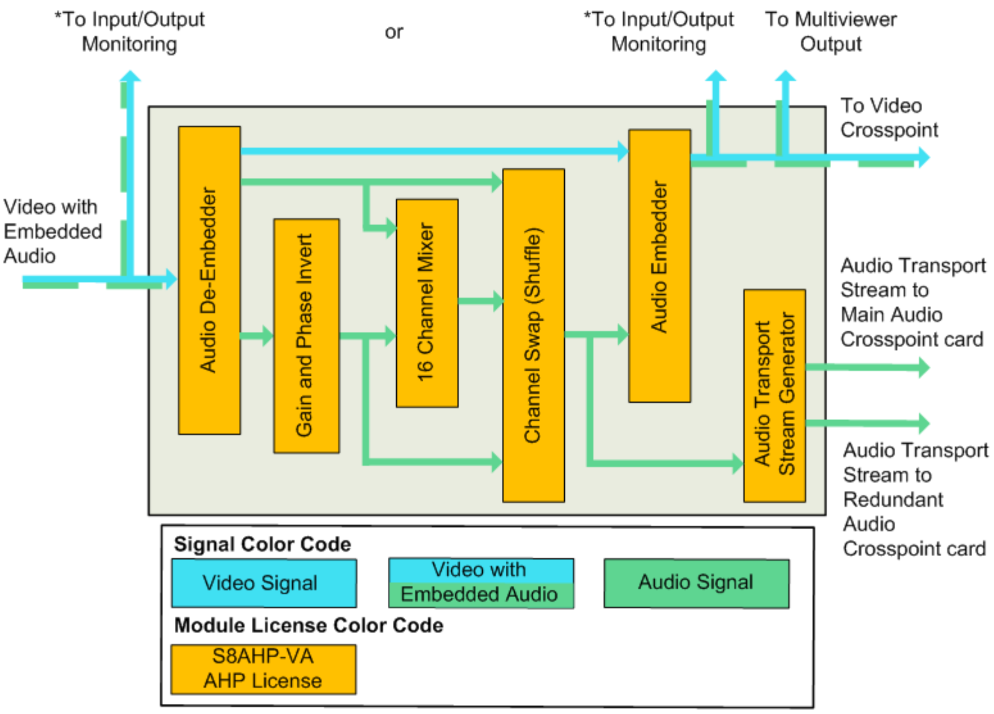
Rear Panel	See Section
Sirius 830: 1234 & 1235 BNC rear panel	see section 7.1
Sirius 830: 1372 HD BNC rear panel	see section 7.2
Sirius 830: 1236 Fiber rear panel	see section 7.3
Sirius 830: 1373 Fiber rear panel	see section 7.4
Sirius 840/850: 1349/1289 BNC rear panel	see section 7.11
Sirius 840/850: 1360 HD BNC rear panel	see section 7.12
Sirius 840/850: 1305 Fiber rear panel	see section 7.13
Sirius 840/850: 1361 Fiber rear panel	see section 7.14
Sirius 840/850: 1362 DS-Link rear panel	see section 7.15

C.2.2.1 Processing on the Input Module

The 5915 video input module can manipulate the audio channels received from the input rear panels before outputting them to the video and audio crosspoint modules. This makes it possible to customize the audio input channels to a house standard within the router.

Note: Processing is a licensed option and must be purchased for each module it is used on (see section 1.6 for details).

Processing is configured in Workbench. Figure 238 shows the order that the processing is applied to the audio.



*Input/Output Monitoring selected from either the input or the output of the module (pre- or post-processing). See section 3.6.2 for details on how to configure this using the router Door PC.

Figure 238 Processing Block Diagram

If any embedded audio channels are asynchronous to the video signal the input module will use drop/repeat to synchronize the audio channels with the video signal.

C.2.2.2 Gain Control and Phase Invert

Gain

Gain is applied to an audio input channel as Silence (mute) or in steps of 0.1dB in a range of -72 dB to +30 dB.

Phase Invert

Phase invert will invert the audio waveform.

C.2.2.3 16 Channel Mixer

There are 16 Mixers available per video input channel and each mixer can mix up to 16 channels of audio. Each 16 channel mixer is used to mix two or more audio input channels together to create a single mono signal that is output from the mixer.

For example, using Mixer 6 to mix the stereo pair of channels 1 and 2 would result in a single mono signal being output from Mixer 6.

The mixing process is purely additive and the gain of signals being mixed will need to be reduced to ensure the final mixed signal has the correct gain level.

C.2.2.4 Channel Swap (Shuffle)

The channel shuffler is used to change the channel order of one or more of the audio channels.

C.2.2.5 5915 Connections to the Audio Crosspoints

The 5915 video input module creates two identical multiplexed audio transport streams, each of which contains all of the audio channels on the input module (up to 768 mono channels). One transport stream is sent to the main audio crosspoint module and a duplicate transport stream is sent to the redundant audio crosspoint module.

C.2.2.6 5915 Input Module LED Information

Table 115 shows the LED color code on the 5915 Input Module, and Figure 239 shows the front edge of the input module.

Table 115 5915 Sirius 800 Video AHP Input Module LED Information

LED Color	Label	Detail	Normal Working Status
Red	1	FPGA 1 status	**Each Pair of FPGA LEDS:** **Flashing rapidly between Red & Green** (2 Hz each LED) - starting up **Green On Solid & Red Off** - normal state working correctly **Green Off & Red On Solid** - FPGA programming fault found. Remove module and refit to force a reboot. **Red & Green Flashing very rapidly in sync** (4 Hz each LED) - A change has been made to the module settings database in RAM but it has not yet been written to flash memory. This is not a fault and the flash memory will be updated after 10 seconds of no audio setting changes being made. Do not remove power from the module while this indication is present as the flash may become corrupted. Other indications are displayed when performing a firmware upgrade, see the Sirius 800 Maintenance & Upgrade manual for details.
Green			
Red	2	FPGA 2 status	
Green			
Red	3	FPGA 3 status	
Green			
Red	4	FPGA 4 status	
Green			
Green	Power OK	Power to the module	**On Solid** - working correctly
Yellow	Local Command OK	Receiving messages from local Nucleus control module (the Nucleus controller in this frame)	**Flashing** - receiving information and working correctly
Red	Local Error	Error with messages from local Nucleus control module (the Nucleus controller in this frame)	**Off** - normal state **Flashing** - the command message from the router controller is corrupt or hasn't been received. This communications error could be caused by a hardware failure or incorrect insertion. Check that the module is inserted correctly. If the "Local Error" LED is flashing at the same time as the "Local Command OK" LED is flashing it suggests a mismatch in the configuration of the Nucleus controller. Check the controller configuration.

Table 115   5915 Sirius 800 Video AHP Input Module LED Information (Continued)

LED Color	Label	Detail	Normal Working Status
Yellow	Remote Command OK	Receiving messages from remote Nucleus control module (the Nucleus controller in the frame linked to this frame)	**Sirius 830/840/850 (no expansion)**: **Off** - Expansion not used. **Sirius 850 (expanded to second frame)**: **Flashing** - receiving information and working correctly
Red	Remote Error	Error with messages from remote Nucleus control module (the Nucleus controller in the frame linked to this frame)	**Sirius 830/840/850 (no expansion)**: **Off** - Expansion not used. **Sirius 850 (expanded to second frame)**: **Off** - normal state, **Flashing** - the command message from the remote router controller is corrupt or hasn't been received. This communications error could be caused by a hardware failure or incorrect insertion. Check that the module is inserted correctly and the four RJ45 connections between the frames are fitted correctly (see section 10.2). If the "Remote Error" LED is flashing at the same time as the "Remote Command OK" LED is flashing it suggests a mismatch in the configuration of the Nucleus controller. Check the controller configuration.
Blue/Green	Fugue Status	CPU status of on-board operating system	**Flashing sequence Green, Green, Blue** - normal operation the CPU is programmed and running **Brief Red Flash at startup** - normal **Flashing Red** - CPU Error. Remove module and refit to force a reboot.
Amber		Eight Diagnostic LEDs - Grass Valley Use Only	**Normal LED Pattern Sequence** 1. All LEDs On for one Second 2. All LEDs Off except the top LED 3. All LEDs Off except the second LED from the top 4. This sequence continues until all LEDs are Off except for the bottom LED 5. All LEDs Off for 10 Seconds 6. Return to Step 1 Any other pattern - abnormal operation contact Grass Valley Customer Support

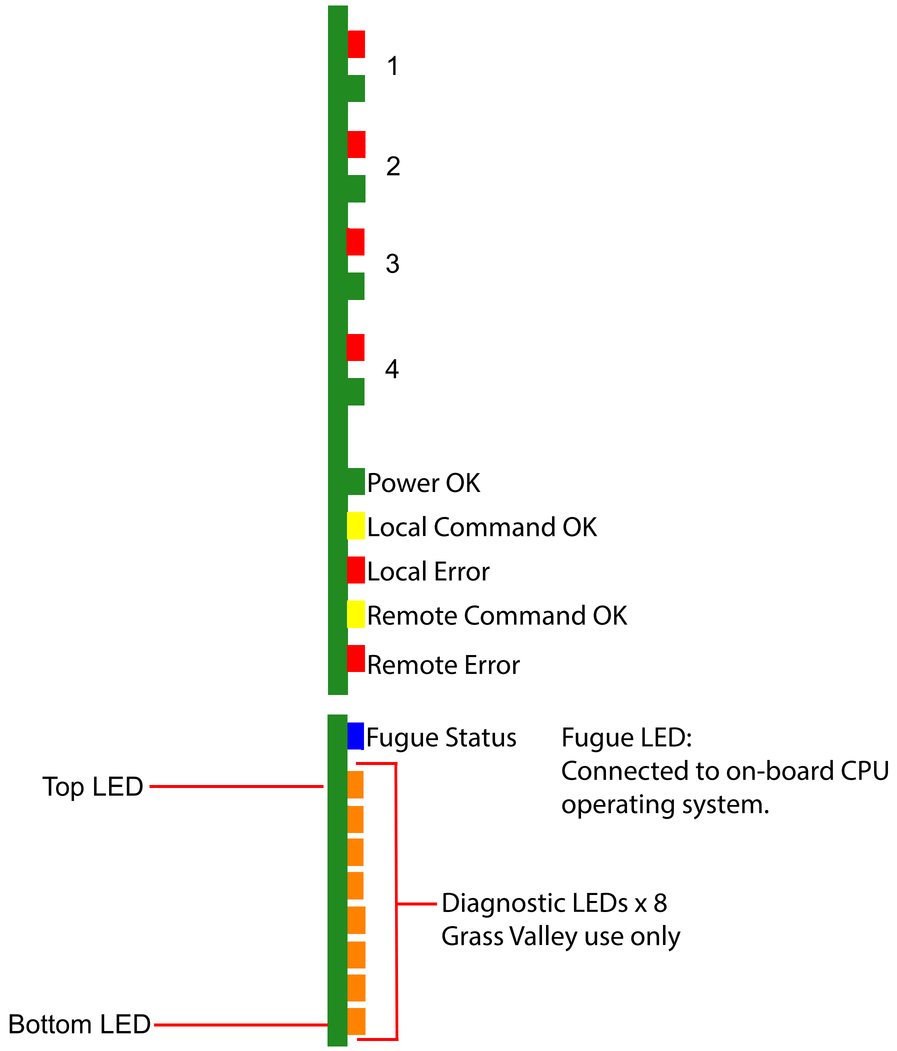


Figure 239   5915 Sirius 800 Video AHP Input Module LEDs

C.2.3 5916 Sirius 830 Standard Video BNC/Fiber Input Module

Note:

- The 5916 video input module was supplied with earlier Sirius 830 router systems and is shown here for users that already have them fitted.
- The 5916 video input module can be supplied as a replacement for these earlier systems if required.
- On newer systems the 5917 video input module can be used instead of the 5916 and uses the same rear panels so is a direct replacement. see section 7.22 for details.

The 5916 standard video BNC/Fiber input module has 24 input channels and can handle SD, ASI and HD signals up to 3Gb/s.

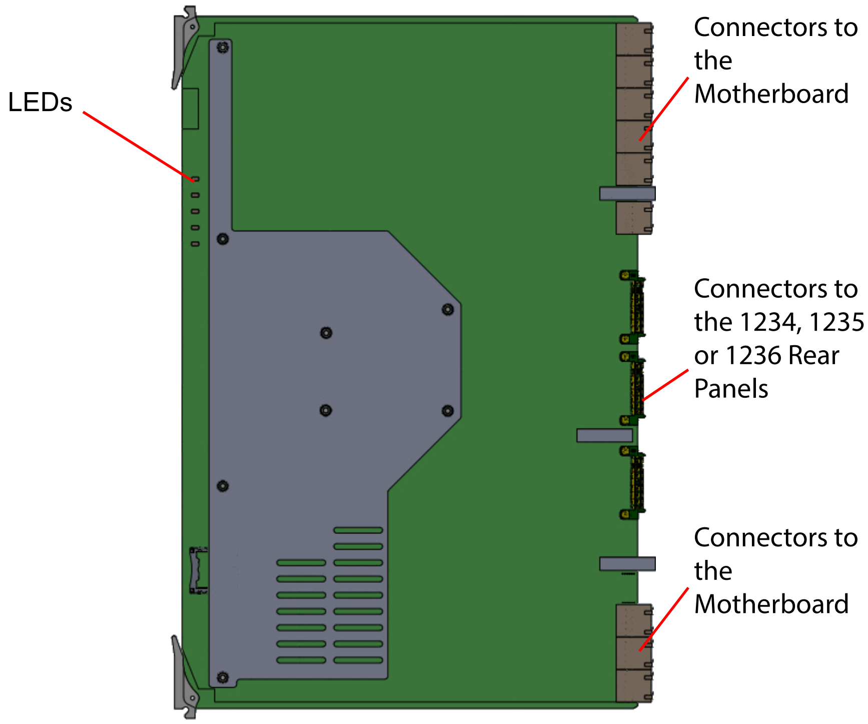


Figure 240 5916 Standard Video BNC/Fiber Input Module

The 5916 input module is compatible with the rear panels listed in Table 116.

Table 116 5916 Rear Panel Compatibility

Rear Panel	See Section
1234 & 1235 BNC rear panel	see section 7.1
1372 HD BNC rear panel	see section 7.2
1236 Fiber rear panel	see section 7.3
1373 Fiber rear panel	see section 7.4

C.2.3.1 5916 Input Module LED Information

Table 113 shows the LED color code on the 5916 input module, and Figure 236 shows the input module.

Table 117 5916 Standard Video BNC/Fiber Input Module LED Information

LED Color	Label	Detail	Normal Working Status
Green	Power OK	Power to the module	**On Solid** - working correctly
Yellow	Local Command OK	Receiving messages from local Nucleus control module (the Nucleus controller in this frame)	**Flashing** - receiving information and working correctly
Red	Local Error	Receiving CRC error messages from local Nucleus control module (the Nucleus controller in this frame)	**Off** - normal state **Flashing** - the command message from the router controller is corrupt or hasn't been received. This communications error could be caused by a hardware failure or incorrect insertion. Check that the module is inserted correctly. If the "Local Error" LED is flashing at the same time as the "Local Command OK" LED is flashing it suggests a mismatch in the configuration of the Nucleus controller. Check the controller configuration.
Yellow	Remote Command OK	Receiving messages from remote Nucleus control module (the Nucleus controller in the frame linked to this frame)	**Sirius 830/840/850 (no expansion)**: **Off** - Expansion not used. **Sirius 850 (expanded to second frame)**: **Flashing** - receiving information and working correctly
Red	Remote Error	Error with messages from remote Nucleus control module (the Nucleus controller in the frame linked to this frame)	**Sirius 830/840/850 (no expansion)**: **Off** - Expansion not used. **Sirius 850 (expanded to second frame)**: **Off** - normal state, **Flashing** - the command message from the remote router controller is corrupt or hasn't been received. This communications error could be caused by a hardware failure or incorrect insertion. Check that the module is inserted correctly and the four RJ45 connections between the frames are fitted correctly (see section 10.2). If the "Remote Error" LED is flashing at the same time as the "Remote Command OK" LED is flashing it suggests a mismatch in the configuration of the Nucleus controller. Check the controller configuration.

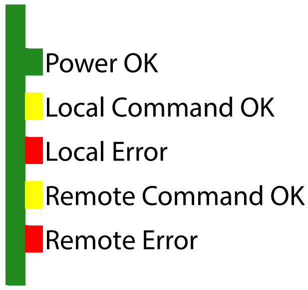


Figure 241 5916 Standard Video BNC/Fiber Input Module LEDs

C.3 5901 Sirius 800 Series Video Crosspoint Module

Note:
- The 5901 video crosspoint module was supplied with earlier Sirius 800 router systems and is shown here for users that already have them fitted.
- On newer systems or when spares are required the 5905 video crosspoint module can be used as a direct replacement. see section 8.1 for details.
- 5905 and 5901 video crosspoint modules can be freely mixed in a router frame.

The Sirius 800 routers all use the same video crosspoint modules with the larger routers fitted with more video crosspoint modules to cope with the higher number of routes that can be set.

See section 8.2 for details of the Sirius 830 video crosspoint module arrangement and section 8.3 for the Sirius 840/850 video crosspoint module arrangement.

The Video Crosspoint modules each have a configuration of 288 inputs and 288 outputs.

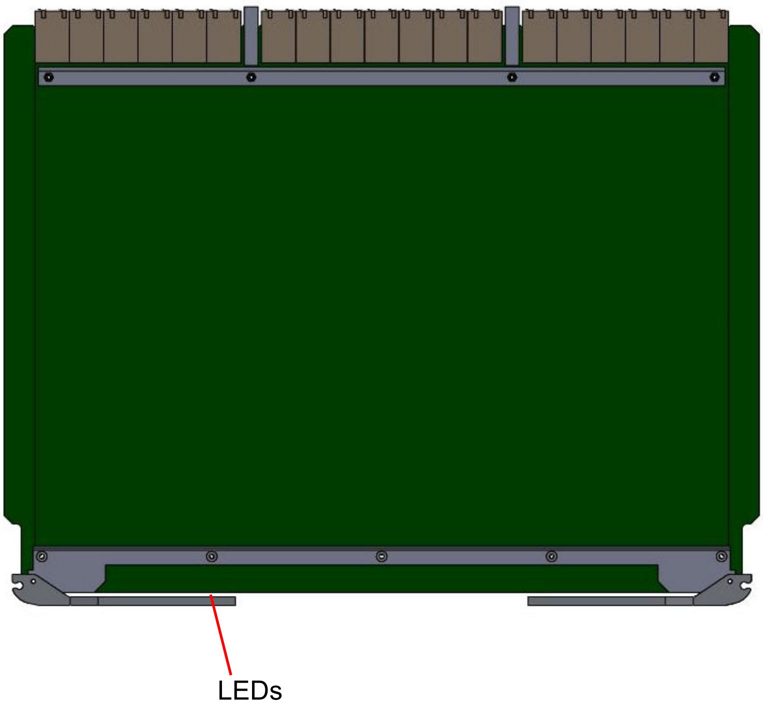


Figure 242 5901 Video Crosspoint Module

C.3.1 Video Crosspoint Module LED Information

Table 118 shows the LED color code on the Video Crosspoint Modules, and Figure 243 shows the front edge of the module.

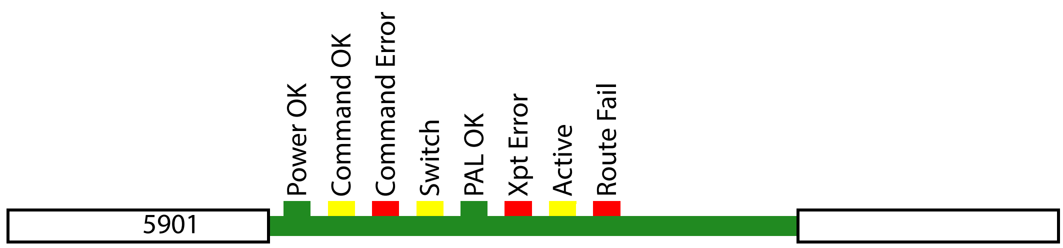


Figure 243 5901 Video Crosspoint Module LEDs

Note: If the active LED is not illuminated, it is safe to remove the video crosspoint module without affecting any active routes.

Table 118 5901 Video Crosspoint Module LED Information

LED Color	Label	Detail	Status
Green	Power OK	Power to the module	**On Solid** - working correctly
Green	PAL OK	FPGA Working	**Flashing** - the FPGA is working correctly
Yellow	Command OK	Command from the Control module	**Flashing** - receiving information and working correctly
Red	Command Error	Error with command from the Control module	**Off** - normal state **Flashing** - the command message from the router controller is corrupt or hasn't been received. If all of the crosspoint modules indicate a Command Error check that the router controller is operating correctly. If only one of the crosspoint modules indicates the error contact Grass Valley Customer Support (see *Grass Valley Technical Support* on page 476for contact details).
Yellow	Switch	Flashes on a take signal when switching a route	**Off** - normal state **Flashes** - each time a route is set
Red	Xpt Error	Displays if there is a problem with any crosspoints	**Off** - normal state **On solid** - problem with one or more crosspoints on the module. **Flashing** - Crosspoint module overheating, make sure the fan assemblies are all closed and the fans are all operating correctly.
Yellow	Active	Route is active on crosspoint	**Flashing** - when this module is routing one or more signals to live outputs. Removing the crosspoint module will disturb the signal(s) passing through the crosspoint module.
Red	Route Fail	Illuminated if a route failure has been detected on this crosspoint	**Off** - normal state **Flashing** - receiving error messages related to a route failure

C.4 Output Modules

C.4.1 4925 Sirius 800 AES/MADI Output Module (no audio delay)

Important

- The 4925 audio output module was supplied with earlier Sirius 800 router systems and is shown here for users that already have them fitted.
- The 4925 audio output module can be supplied as a replacement for these earlier systems if required.

The 4925 Sirius 800 AES/MADI output module (no audio delay) can transmit either 120 AES outputs (balanced or unbalanced) with up to 3 MADI output channels or 12 channels of MADI outputs depending on the rear panel fitted. The 4925 Output Module is compatible with the rear panels listed in Table 119

Table 119 4929 Rear Panel Compatibility

Rear Panel	See Section
Up to 120 AES outputs and up to 3 MADI output channels:	
1353 Balanced AES + HD BNC MADI rear panel	see section 9.12
1356 Unbalanced AES + HD BNC MADI rear panel	see section 9.13
1298 Balanced AES rear panel (no MADI) - No longer supplied	See Appendix C.5.1
Up to 12 MADI output channels:	
1295 MADI Output BNC rear panel	see section 9.10
1296 MADI Output Fiber rear panel	see section 9.11

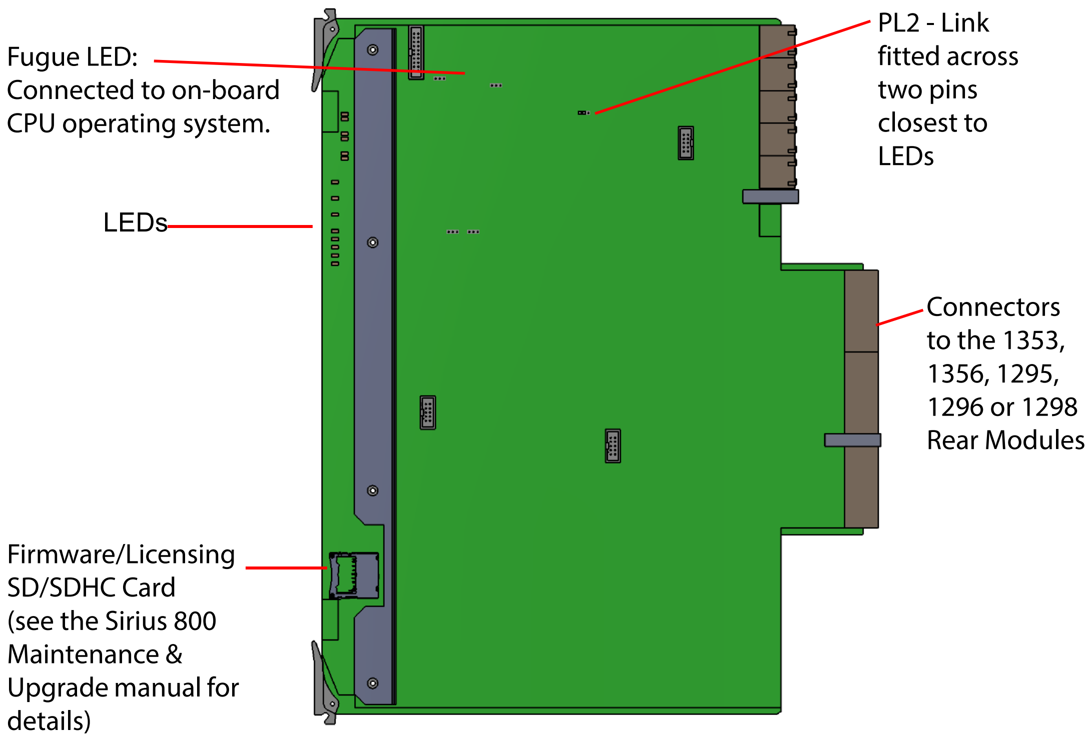


Figure 244 4925 Sirius 800 AES/MADI Output Module (no audio delay)

Note:

- Jumpers and Headers are present on the audio output module and these are for Grass Valley Use Only.
- In normal operation no jumper links or headers are fitted except for PL2 which has a link fitted across the two pins closest to the LEDs on the front of the module.

C.4.1.1 Duplicate MADI Outputs

When fitted with the 1295 or 1296 MADI rear panels the 4925 module outputs 12 MADI channels and a further 12 duplicate MADI channels. The main and duplicate channels can be used to give the MADI outputs resilience if the equipment receiving the outputs is capable of automatically switching between main and backup feeds.

The main and backup connections are shown in the rear panel diagrams listed in Table 120

Table 120 MADI Main and Backup Connections

Rear Panel	See Figure Number
1295 BNC rear panel	See Figure 157 on page 236.
1296 Fiber rear panel	See Figure 158 on page 237.

C.4.1.2 Configuring MADI to 56 or 64 Channels

Individual MADI channels are configured to output in 56 or 64 channel MADI using the Workbench Online Editor.

Nucleus2 Router Control Module Navigate to:

`Controller | Devices | Devices[1]: LocalRouterDevice | LocalRouterConfig | ModuleConfigurations | ModuleConfiguration[XXX]: AudioOutput | MADIControl | MADIControl[YY] | Format=`

Where:
XXX= the Module ID of the Audio Output Module (see the Workbench manual for details)
YY = the MADI channel (1 to 12) being configured

Select the number of MADI channels from the drop down menu:

- `MADI56` = configures the MADI channel to 56 channels
- `MADI64` = configures the MADI channel to 64 channels

Note:

- Ensure both Nucleus2 router control modules are configured the same by using the **Copy to Partner** function in Workbench once configurations changes have been made.

C.4.1.3 AES Audio Outputs

- Up to 120 balanced or unbalanced AES outputs (dependent on rear panel fitted)
- Re-generates the AES clock from incoming data (nominal 48 kHz)
- VU&C (Validity, User and Channel status) flags are regenerated to a default standard on each channel when re-aligning audio. (See Table 147 on page 421 for default standard details).
- Pass asynchronous audio or Dolby E transparently at the original sample rate.
- Asynchronous channels pass VU&C data transparently (parity is recalculated for each output).
- Up to 3 MADI outputs are also available on HD BNC connectors (with correct rear panel, see section 9.15 for details)
    - Up to 64 channels of audio per MADI output

C.4.1.4 MADI Audio Outputs

To connect MADI audio outputs from a 4925 input module it must be used with either a 1295 BNC or 1296 Fiber rear panel.

- Up to 12 MADI outputs, (one main and one duplicate output of each channel).

Note: When fiber SFP modules are used the main and duplicate MADI outputs span two separate SFP modules to guard against an SFP failure, see section 9.11 for details.

- Up to 64 channels of audio per MADI output.
- Maximum of 768 (12 x 64) audio channels per 4925 audio output module.
- Maximum of 768 (12 x 64) audio channels per 4929 audio output module.
- MADI streams are generated locked to the AES reference. All audio must be synchronous for fully transparent operation. Re-generate VU&C data. (See Table 147 on page 421 for default standard details).
- Asynchronous AES channels will be added to the MADI using drop/repeat techniques.
- Asynchronous Dolby E will not pass error free through MADI outputs.

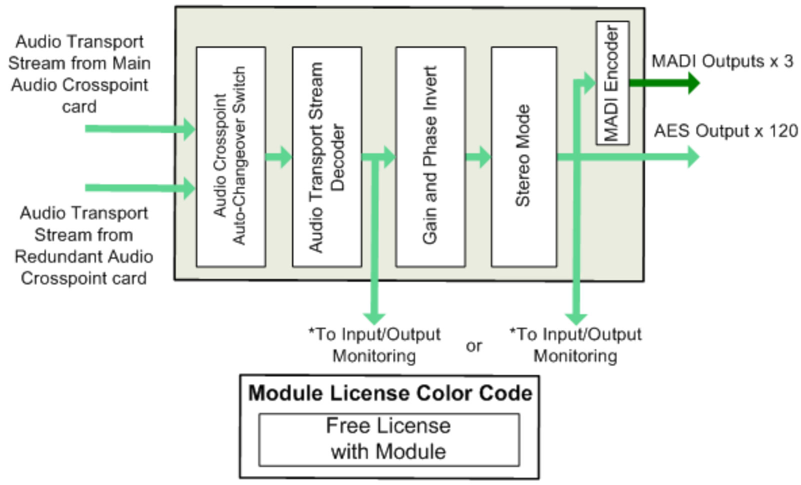
C.4.1.5 Audio Processing on the Output Module

The 4925 audio output module can manipulate the audio channels received from the audio crosspoint before outputting them. This makes it possible to manipulate the audio output channels within the router.

Note: The audio processing functions allow gain control, phase invert and stereo mode (left/right swap, left both, right both or mono mix). The audio processing is standard for each audio module.

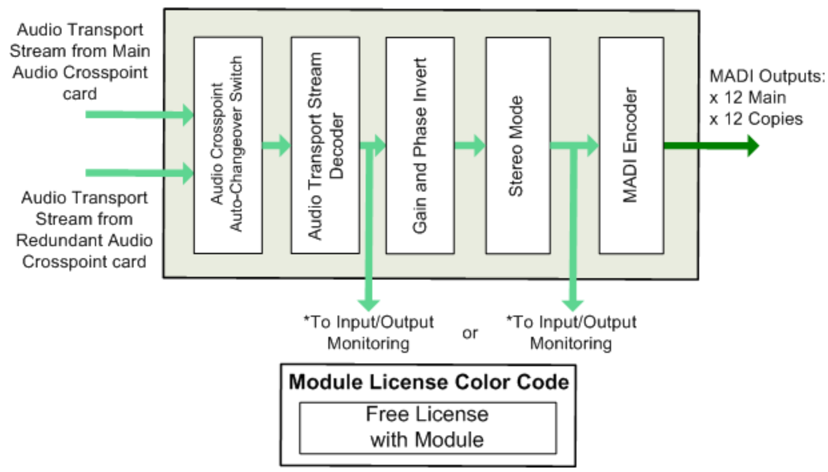
Audio processing is controlled from Workbench, RollCall or RollPod panels.

Figure 245 and Figure 246 shows the order that the processing is applied to the audio signals.



*Input/Output Monitoring selected from either the input or the output of the module (pre- or post-processing). See section 3.6.2 for details on how to configure this using the router Door screen.

Figure 245 Audio Channel Processing Block Diagram (AES Rear Panel)



*Input/Output Monitoring selected from either the input or the output of the module (pre- or post-processing). See section 3.6.2 for details on how to configure this using the router Door screen.

Figure 246 Audio Channel Processing Block Diagram (MADI Rear Panel)

C.4.1.6 Gain Control and Phase Invert

Gain

Gain is applied to an audio output channel as Silence (mute) or in steps of 0.1dB in a range of -72 dB to +30 dB.

Phase Invert

Phase invert will invert the audio waveform.

C.4.1.7 Stereo Mode

Stereo Mode is used to manipulate stereo pairs. Options include: Left/Right Swap, Left Both, Right Both and Mono Mix.

Left/Right Swap

Left/Right swap is used to swap the two audio channels of an AES pair over.

Left Both & Right Both

Left Both and Right Both are used to duplicate a single channel of a stereo pair and pass the two duplicate channels out of the router in place of the original pair.

Mono Mix

Mono Mix is used to mix a stereo pair together to create a single mono signal. This single mono signal is passed out of the router on both of the original channels.

The Mono Mix is: $\frac{A + B}{2}$

C.4.1.8 4925 Connections from the Audio Crosspoints

The 4925 audio output module receives two identical multiplexed audio transport streams, each of which contains all of the audio channels on the output module (up to 768 mono channels). One transport stream is received from the main audio crosspoint module and a duplicate transport stream is received from the redundant audio crosspoint module. The output module monitors the transport streams received from each of the audio crosspoint modules for errors. If an error is found the output module will use the transport stream from the other audio crosspoint module if it is fitted.

Important

- Due to the nature of multiplexed audio transport streams there is an extremely small delay between groups of channels as the transport stream is constructed. If the audio is locked to the input these delays will need to be considered.
- If the audio is locked to an external reference these delays are managed by the router and the audio will remain co-timed.

C.4.1.9   4925 Output Module LED Information

Table 121 shows the LED color code on the 4925 output module, and Figure 247 shows the front edge of the output module.

Table 121   4925 Sirius 800 AES/MADI Output Module (no audio delay) LED Information

<table>
<tr><th>LED Color</th><th>Label</th><th>Detail</th><th>Normal Working Status</th></tr>
<tr><td>Blue/Green</td><td>Fugue Status</td><td>CPU status of on-board operating system</td><td>Flashing sequence Green, Green, Blue - normal operation the CPU is programmed and running
Brief Red Flash at startup - normal
Flashing Red - CPU Error. Remove module and refit to force a reboot.</td></tr>
<tr><td>Red</td><td>LED R</td><td rowspan="2">FPGA status</td><td rowspan="2">Flashing rapidly between Red & Green (2 Hz each LED) - starting up
Green On Solid & Red Off - normal state working correctly
Green Off & Red On Solid - FPGA programming fault found. Remove module and refit to force a reboot.
Red & Green Flashing very rapidly in sync (4 Hz each LED) - A change has been made to the module settings database in RAM but it has not yet been written to flash memory. This is not a fault and the flash memory will be updated after 10 seconds of no audio setting changes being made. Do not remove power from the module while this indication is present as the flash may become corrupted.

Other indications are displayed when performing a firmware upgrade, see the Sirius 800 Maintenance & Upgrade manual for details.</td></tr>
<tr><td>Green</td><td>LED G</td></tr>
<tr><td>Green</td><td>Power OK</td><td>Power to the module</td><td>On Solid - working correctly</td></tr>
<tr><td>Yellow</td><td>Command OK</td><td>Receiving messages from local Nucleus control module (the Nucleus controller in this frame)</td><td>Flashing - receiving information and working correctly</td></tr>
<tr><td>Red</td><td>Error</td><td>Error with messages from local Nucleus control module (the Nucleus controller in this frame)</td><td>Off - normal state
Flashing - the command message from the router controller is corrupt or hasn't been received.

This communications error could be caused by a hardware failure or incorrect insertion. Check that the module is inserted correctly.

If the “Error” LED is flashing at the same time as the “Command OK” LED is flashing it suggests a mismatch in the configuration of the Nucleus controller. Check the controller configuration.</td></tr>
</table>

Table 121 4925 Sirius 800 AES/MADI Output Module (no audio delay) LED Information

LED Color	Label	Detail	Normal Working Status
Green	Video Ref 1	External Video Reference 1 Status	**On Solid** - external video reference present and local oscillators locked. **Off** - external video reference not present.
Green	Video Ref 2	External Video Reference 2 Status	**On Solid** - external video reference present and local oscillators locked. **Off** - external video reference not present.
Green	Video Ref 3	External Video Reference 3 Status	**On Solid** - external video reference present and local oscillators locked. **Off** - external video reference not present.
Green	Video Ref 4	External Video Reference 4 Status	**On Solid** - external video reference present and local oscillators locked. **Off** - external video reference not present.
Green	AES Ref	External AES Reference Status	**On Solid** - external AES reference present and local oscillators locked. **Off** - external video reference not present.

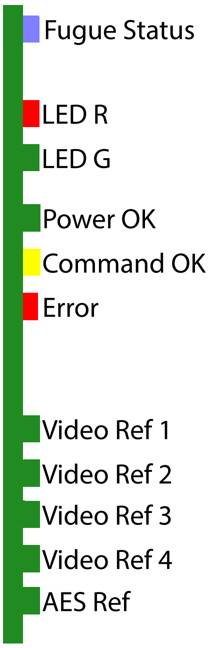


Figure 247 4925 Sirius 800 AES/MADI Output Module (no audio delay) LEDs

C.4.2 5923/4 Sirius 840/850 Standard Video Output Module

Note:

- The 5923 and 5924 video output modules were supplied with earlier Sirius 840/850 router systems and are shown here for users that already have them fitted.

Note: Possible alternative output modules and rear panels:

- **On Sirius 840 routers:**
  A 5926 standard video output module and its accompanying rear panel can be used instead of either the 5923 or 5924 and their rear panels.
  The Module / Rear panel pair (5923 / 1295 or 5924 / 1296) must be changed.
  See Table 122 below for module/rear alternatives.
- **On Sirius 840 and 850 routers:**
  A 5938 expandable video output module and its accompanying rear panel can be used instead of either the 5923 or 5924 and their rear panels.
  The Module / Rear panel pair (5923 / 1295 or 5924 / 1296) must be changed.
  See Table 122 below for module/rear alternatives.

Module/ Rear	**Substitute Module / Rear pairs**	
	Sirius 840	**Sirius 850**
5923 / 1295 or 5924 / 1296	5938 / 1294(BNC) or 5938 / 1363(HD-BNC) or 5938 / 1302(Fiber) or 5938 / 1364(DS-Link) or 5926 / 1294(BNC) or 5926 / 1363(HD-BNC) or 5926 / 1302(Fiber) or 5926 / 1364(DS-Link)	5938 / 1294(BNC) or 5938 / 1363(HD-BNC) or 5938 / 1302(Fiber) or 5938 / 1364(DS-Link)

Table 122 Alternative Module/Rear pairs

More information on the alternative modules and rears:

- For more information on the 5926, see Section 9.2 “55926 and 5926 Standard Video O/p Module (Non Expandable)” on page 211.
- For more information on the 5938, see Section 10.3 “55938 and 5938 S850 Standard Video O/p Module (Expandable)” on page 257.

The 5923 Sirius 840/850 standard video BNC output module connects to the 1295 rear panel (*1295 Video/MADI BNC Output Rear Panel* on page 236) which has 24 BNC outputs.

The 5924 Sirius 840/850 standard video BNC output module connects to the 1296 rear panel (see section 9.11) which has 24 Fiber outputs which are split into 12 dual channel transmitters.

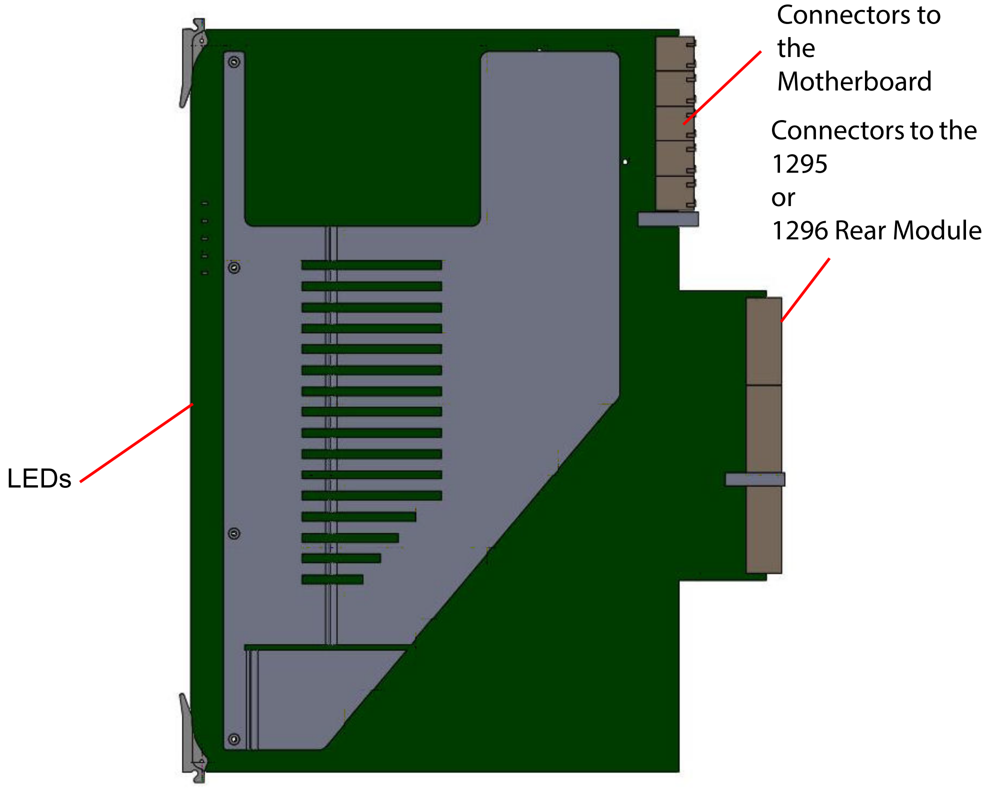


Figure 248 5923/5924 Sirius 840/850 Standard Video Output Module

The 5923 video output module is compatible with the 1295 BNC rear panel (see section 9.10). The 5924 output module is compatible with the 1296 Fiber rear panel (see section 9.11).

C.4.2.1 5923/5924 Output Module LED Information

Table 123 shows the LED color code on the 5923 and 5924 output module, and Figure 249 shows the output module LEDs.

Table 123   5923/5924 Sirius 840/850 Standard Video Output Module LED Information

LED Color	Function	Detail	Normal Working Status
Green	Power OK	Power to the module	**On Solid** - working correctly
Yellow	Command OK	Receiving messages from local Nucleus control module (the Nucleus controller in this frame)	**Flashing** - receiving information and working correctly
Red	Command Error	Error with messages from local Nucleus control module (the Nucleus controller in this frame)	**Off** - normal state **Flashing** - the command message from the router controller is corrupt or hasn't been received. This communications error could be caused by a hardware failure or incorrect insertion. Check that the module is inserted correctly. If the “Command Error” LED is flashing at the same time as the “Command OK” LED is flashing it suggests a mismatch in the configuration of the Nucleus controller. Check the controller configuration.
Yellow	Remote Command OK	Receiving messages from remote Nucleus control module (the Nucleus controller in the frame linked to this frame)	**Sirius 830/840/850 (no expansion)**: **Off** - Expansion not used. **Sirius 850 (expanded to second frame)**: **Flashing** - receiving information and working correctly
Red	Remote Error	Error with messages from remote Nucleus control module (the Nucleus controller in the frame linked to this frame)	**Sirius 830/840/850 (no expansion)**: **Off** - Expansion not used. **Sirius 850 (expanded to second frame)**: **Off** - normal state, **Flashing** - the command message from the remote router controller is corrupt or hasn’t been received. This communications error could be caused by a hardware failure or incorrect insertion. Check that the module is inserted correctly and the four RJ45 connections between the frames are fitted correctly (see section 10.2). If the “Remote Error” LED is flashing at the same time as the “Remote Command OK” LED is flashing it suggests a mismatch in the configuration of the Nucleus controller. Check the controller configuration.

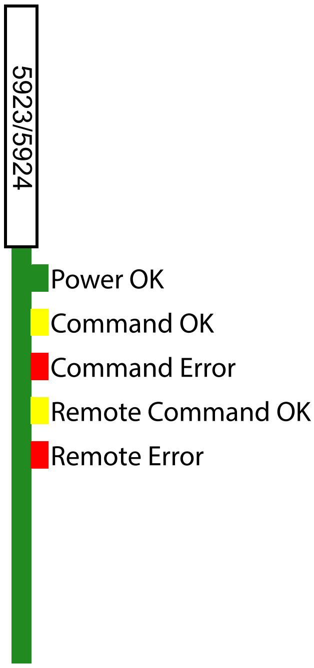


Figure 249 5923/5924 Sirius 840/850 Standard Video Output Module LEDs

C.4.3 5925 Sirius 800 Video AHP Output Module

Important

- The 5925 Sirius 800 video AHP output module was supplied with earlier Sirius 800 router systems and is shown here for users that already have them fitted.
- The 5925 Sirius 800 video AHP output module can be supplied as a replacement for these earlier systems if required.

The 5925 module heat sink can get very hot during normal operation. When removing the 5925 module from a router do not touch the heat sink until it has had time to cool down.

The 5925 Sirius 800 video AHP output module with audio embedder and re-clocking has 24 video output channels and can handle SD and HD signals up to 3Gb/s.The module also accepts DVB-ASI input signals, but there is *no processing* in this case.

The audio embedder synchronously re-inserts up to 16 mono audio channels per video output channel (16 for SD and HD) giving up to 768 audio channels per 5925 output module.

The 5925 AHP video output module contains a powerful processing engine that can manipulate the individual audio channels passing through it (see Appendix C.4.3.1). Audio processing is a licensed feature which must be purchased for each module it is needed on, see section 1.9.1 for licensing details.

The 5925 output module synchronizes routed audio channels (by drop/repeat) to re-time to the video signal for embedding. All VANC (Vertical Ancillary) data and all non-audio HANC (Horizontal Ancillary) data is removed.

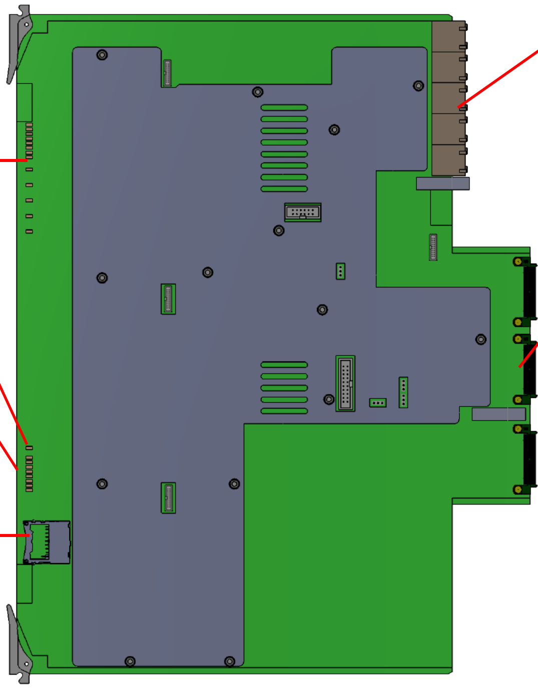


Figure 250 5925 Sirius 800 Video AHP Output Module

Note:

- Jumpers and Headers are present on the video output module and these are for Grass Valley Use Only.
- In normal operation no jumper links or headers are fitted.

The 5925 video output module is compatible with the rear panels listed in Table 124

Table 124 5925 Rear Panel Compatibility

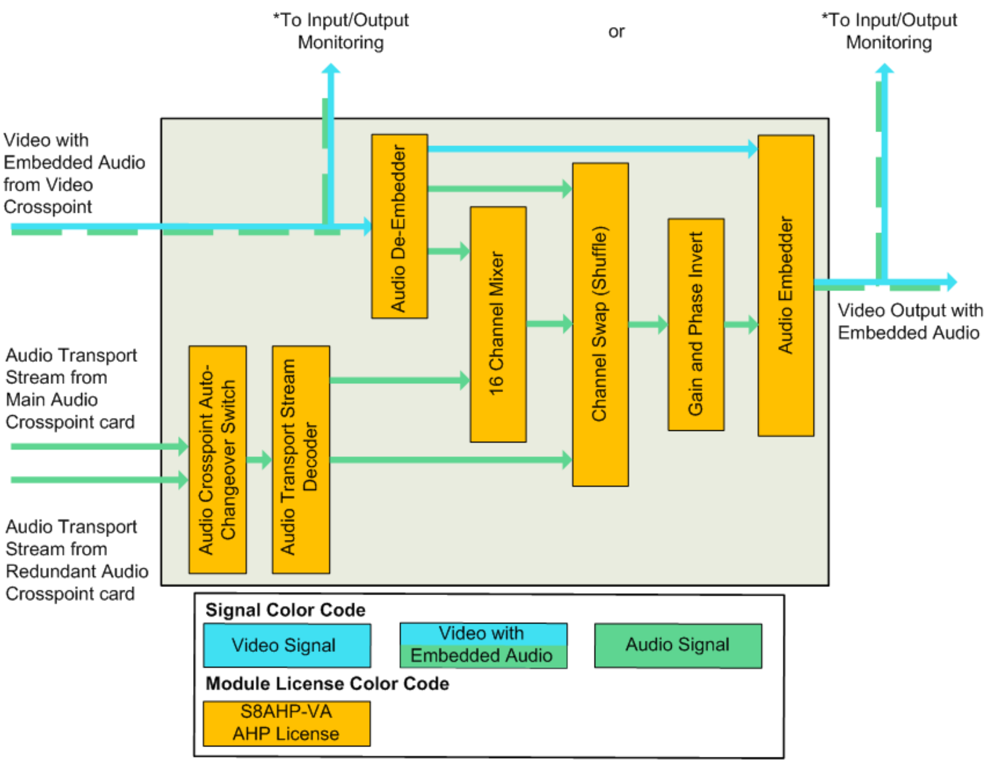
Rear Panel	See Section
1294 BNC rear panel	see section 9.5
1363 HD BNC rear panel	see section 9.6
1302 Fiber rear panel	see section 9.7
1364 DS-Link rear panel	see section 9.8

C.4.3.1 Processing on the Output Module

The 5925 video output module can manipulate the audio channels received from the crosspoint modules before outputting them. This makes it possible to customize the video and audio output channels to a house standard reference within the router.

Note: Audio processing is a licensed option and must be purchased for each module it is used on (see section 1.6 for details).

Processing is configured in Workbench.
Figure 251 shows the order that the processing is applied to the signal.



*Input/Output Monitoring selected from either the input or the output of the module (pre- or post-processing). See section 3.6.2 for details on how to configure this using the router Door PC.

Figure 251 Processing Block Diagram

If any audio channels routed from the audio crosspoints are asynchronous to the video signal they are being embedded in the output module will use drop/repeat to synchronize the audio channels with the video signal.

C.4.3.2 16 Channel Mixer

There are 16 Mixers available per video output channel and each mixer can mix up to 16 channels of audio. Each 16 channel mixer is used to mix two or more audio output channels together to create a single mono signal that is output from the mixer.

For example, using Mixer 6 to mix the stereo pair of channels 1 and 2 would result in a single mono signal being output from Mixer 6.

The mixing process is purely additive and the gain of the mixed signal will need to be reduced to ensure it has the correct gain level.

C.4.3.3 Channel Swap (Shuffle)

The channel shuffler is used to change the channel order of one or more of the audio channels

For example, this might be used if a stereo pair arrives at the router as right, left and they need to be swapped to left, right to match the house reference.

C.4.3.4 Gain control

Gain is applied to an audio output channel as Silence (mute) or in steps of 0.1dB in a range of -72 dB to +30 dB.

For example, this might be used when the feed is destined for another country that requires a specific audio level that is different from the current audio level.

C.4.3.5 Phase Invert

Phase invert will invert the audio waveform.

For example, this might be used if one channel of a stereo pair is out of phase with the other.

C.4.3.6 5925 Connections to the Audio Crosspoints

The 5925 video output module receives two identical multiplexed audio transport streams, each of which contains all of the audio channels on the output module (up to 768 mono channels). One transport stream is received from the main audio crosspoint module and a duplicate transport stream is received from the redundant audio crosspoint module. The output module monitors the transport streams received from each of the audio crosspoint modules for errors. If an error is found the output module will use the transport stream from the other audio crosspoint module if it is fitted.

Important

- Due to the nature of multiplexed audio transport streams there is an extremely small delay between groups of channels as the transport stream is constructed. If the audio is locked to the input these delays will need to be considered.
- If the audio is locked to an external reference these delays are managed by the router and the audio will remain co-timed.

C.4.3.7 5925 Output Module LED Information

Table 125 shows the LED color code on the 5925 output module, and Figure 252 shows the front edge of the output module.

Table 125 5925 Sirius 800 Video AHP Output Module LED Information

<table>
<tr><th>LED Color</th><th>Label</th><th>Detail</th><th>Normal Working Status</th></tr>
<tr><td>Red</td><td rowspan="2">1</td><td rowspan="2">FPGA 1 status</td><td rowspan="8">Each Pair of FPGA LEDS:

Flashing rapidly between Red & Green (2 Hz each LED) - starting up
Green On Solid & Red Off - normal state working correctly
Green Off & Red On Solid - FPGA programming fault found. Remove module and refit to force a reboot.
Red & Green Flashing very rapidly in sync (4 Hz each LED) - A change has been made to the module settings database in RAM but it has not yet been written to flash memory. This is not a fault and the flash memory will be updated after 10 seconds of no audio setting changes being made. Do not remove power from the module while this indication is present as the flash may become corrupted.

Other indications are displayed when performing a firmware upgrade, see the Sirius 800 Maintenance & Upgrade manual for details.</td></tr>
<tr><td>Green</td></tr>
<tr><td>Red</td><td rowspan="2">2</td><td rowspan="2">FPGA 2 status</td></tr>
<tr><td>Green</td></tr>
<tr><td>Red</td><td rowspan="2">3</td><td rowspan="2">FPGA 3 status</td></tr>
<tr><td>Green</td></tr>
<tr><td>Red</td><td rowspan="2">4</td><td rowspan="2">FPGA 4 status</td></tr>
<tr><td>Green</td></tr>
<tr><td>Green</td><td>Power OK</td><td>Power to the module</td><td>On Solid - working correctly</td></tr>
<tr><td>Yellow</td><td>Local Command OK</td><td>Receiving messages from local Nucleus control module (the Nucleus controller in this frame)</td><td>Flashing - receiving information and working correctly</td></tr>
<tr><td>Red</td><td>Local Command Error</td><td>Error with messages from local Nucleus control module (the Nucleus controller in this frame)</td><td>Off - normal state
Flashing - the command message from the router controller is corrupt or hasn't been received.

This communications error could be caused by a hardware failure or incorrect insertion. Check that the module is inserted correctly.

If the “Local Command Error” LED is flashing at the same time as the “Local Command OK” LED is flashing it suggests a mismatch in the configuration of the Nucleus controller. Check the controller configuration.</td></tr>
</table>

Table 125 5925 Sirius 800 Video AHP Output Module LED Information (Continued)

LED Color	Label	Detail	Normal Working Status
Yellow	Remote Command OK	Receiving messages from remote Nucleus control module (the Nucleus controller in the frame linked to this frame)	**Sirius 830/840/850** (no expansion): **Off** - Expansion not used. **Sirius 850** (expanded to second frame): **Flashing** - receiving information and working correctly
Red	Remote Error	Error with messages from remote Nucleus control module (the Nucleus controller in the frame linked to this frame)	**Sirius 830/840/850** (no expansion): **Off** - Expansion not used. **Sirius 850** (expanded to second frame): **Off** - normal state, **Flashing** - the command message from the remote router controller is corrupt or hasn't been received. This communications error could be caused by a hardware failure a or incorrect insertion. Check that the module is inserted correctly and the four RJ45 connections between the frames are fitted correctly (see section 10.2). If the "Remote Error" LED is flashing at the same time as the "Remote Command OK" LED is flashing it suggests a mismatch in the configuration of the Nucleus controller. Check the controller configuration.
Blue/Green	Fugue Status	CPU status of on-board operating system	**Flashing sequence Green, Green, Blue** - normal operation the CPU is programmed and running **Brief Red Flash at startup** - normal **Flashing Red** - CPU Error. Remove module and refit to force a reboot.
Amber		Eight Diagnostic LEDs - Grass Valley Use Only	**Normal LED Pattern Sequence** 1. All LEDs On for one Second 2. All LEDs Off except the top LED 3. All LEDs Off except the second LED from the top 4. This sequence continues until all LEDs are Off except for the bottom LED 5. All LEDs Off for 10 Seconds 6. Return to Step 1 Any other pattern - abnormal operation contact Grass Valley Customer Support

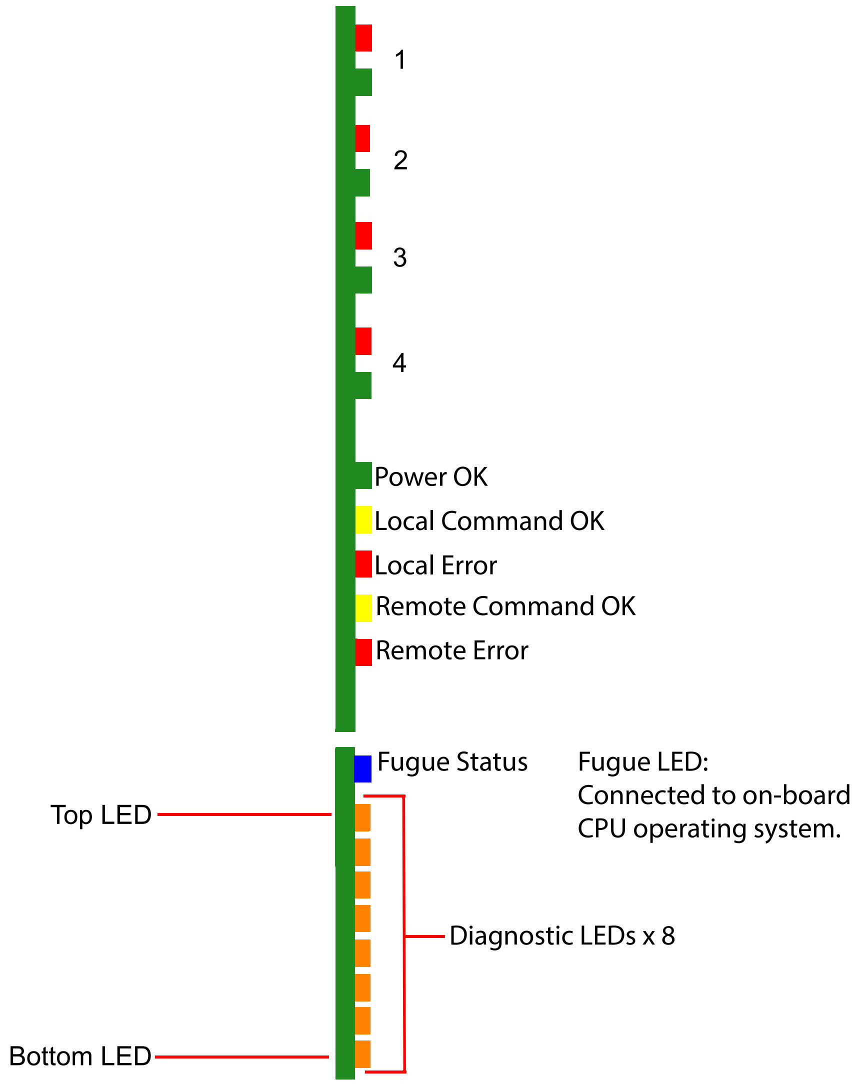


Figure 252 5925 Sirius 800 Video AHP Output Module LEDs

C.4.4 5937 Sirius 830 Standard Video BNC/Fiber Output Module

Note:

- The 5937 Sirius 830 standard video BNC/Fiber output module was supplied with earlier Sirius 830 router systems and is shown here for users that already have it fitted.
- The 5937 Sirius 830 standard video BNC/Fiber output module can be supplied as replacements for these earlier systems if required.
- On newer systems the 5926 Sirius 800 standard video output module (non-expandable) can be used instead of the 5937 and uses the same rear panels so is a direct replacement. see section 9.2 for details.

The 5937 Sirius 830 standard video BNC/Fiber output module is a 24-channel output module with re-clocking.

Routing to the output module is controlled by the Nucleus router controller module. There are two main buses to the output module, one from the motherboard and one from the rear connector board.

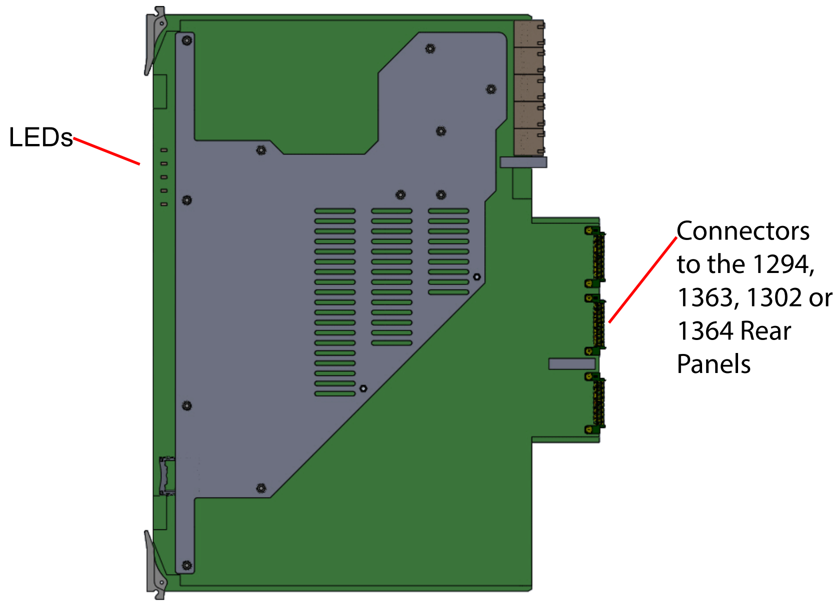


Figure 253 5937 Sirius 830 Standard Video BNC/Fiber Output Module

The 5937 video output module is compatible with the rear panels listed in Table 124

Table 126 5937 Rear Panel Compatibility

Rear Panel	See Section
1294 BNC rear panel	see section 9.5
1363 HD BNC rear panel	see section 9.6
1302 Fiber rear panel	see section 9.7
1364 DS-Link rear panel	see section 9.8

C.4.4.1 5937 Output Module LED Information

Table 123 shows the LED color code on the 5937 output module, and Figure 249 shows the output module.

Table 127 5937 Sirius 830 Standard Video BNC/Fiber Output Module LED Information

LED Color	Label	Detail	Normal Working Status
Green	Power OK	Power to the module	**On Solid** - working correctly
Yellow	Command OK	Receiving messages from local Nucleus control module (the Nucleus controller in this frame)	**Flashing** - receiving information and working correctly
Red	Command Error	Error with messages from local Nucleus control module (the Nucleus controller in this frame)	**Off** - normal state **Flashing** - the command message from the router controller is corrupt or hasn't been received. This communications error could be caused by a hardware failure or incorrect insertion. Check that the module is inserted correctly. If the “Command Error” LED is flashing at the same time as the “Command OK” LED is flashing it suggests a mismatch in the configuration of the Nucleus controller. Check the controller configuration.
Yellow	Expansion Message OK	Message from the corresponding expansion module received correctly	**Off** - Expansion not used.
Red	Expansion Message Error	Error Message sent from the output of one frame to the output of the expanded frame	**Off** - Expansion not used.

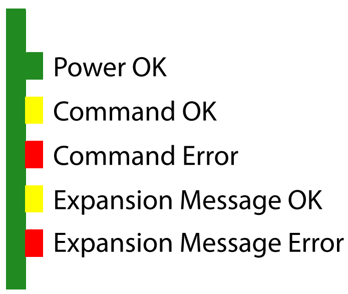


Figure 254 5937 Sirius 830 Standard Video BNC/Fiber Output Module LEDs

C.5 Output Rear Panel

C.5.1 1298 Sirius 800 Balanced AES Output Rear Panel

The 1298 Sirius 800 balanced AES output rear panel has 5 x 62 way female high density sockets for balanced AES audio outputs.

Note:

- The 1298 Sirius 800 Balanced AES output rear panel was supplied with earlier Sirius 800 router systems and is shown here for users that already have them fitted.
- The 1353 Sirius 800 Balanced AES output rear panel can be supplied as direct replacement for the 1298 if required. see section 9.12 for details of the 1353 rear panel.
- If unbalanced AES outputs are required see section 9.13 for details.

The 1298 rear panel is used with the 4929/4925 120 channel AES/MADI output module. For the wiring details for the 62 way D-Type sockets see section 9.12.1.

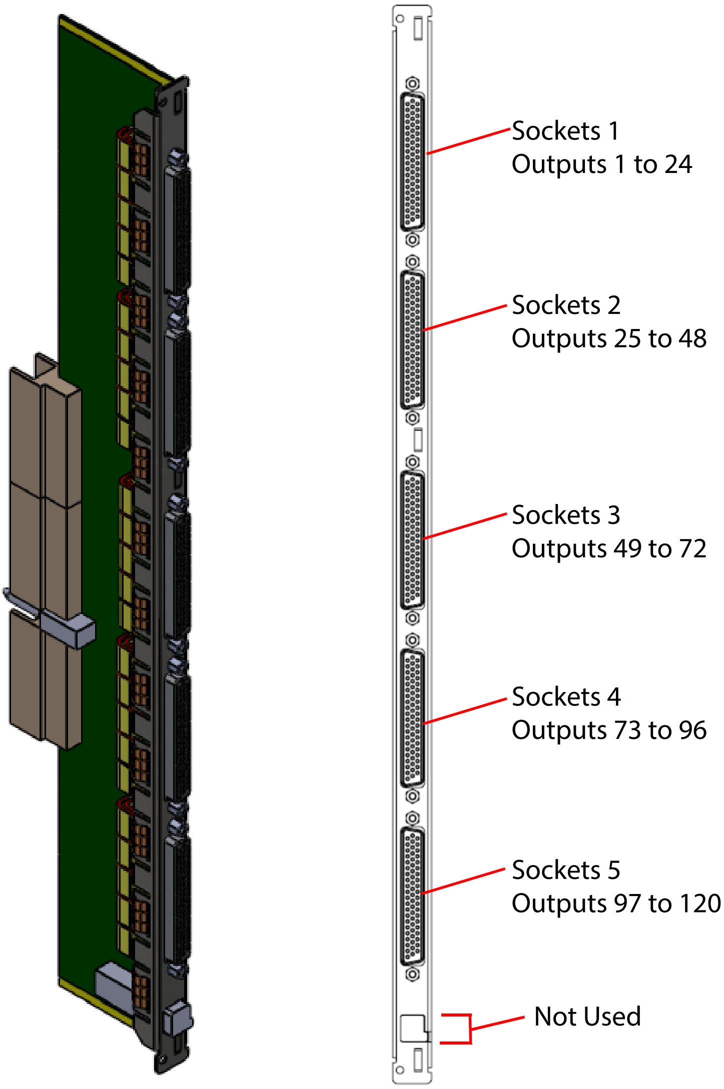


Figure 255 1298 Sirius 800 Balanced AES Output Rear Panel

C.6 Multiviewer Modules and Rear Panels

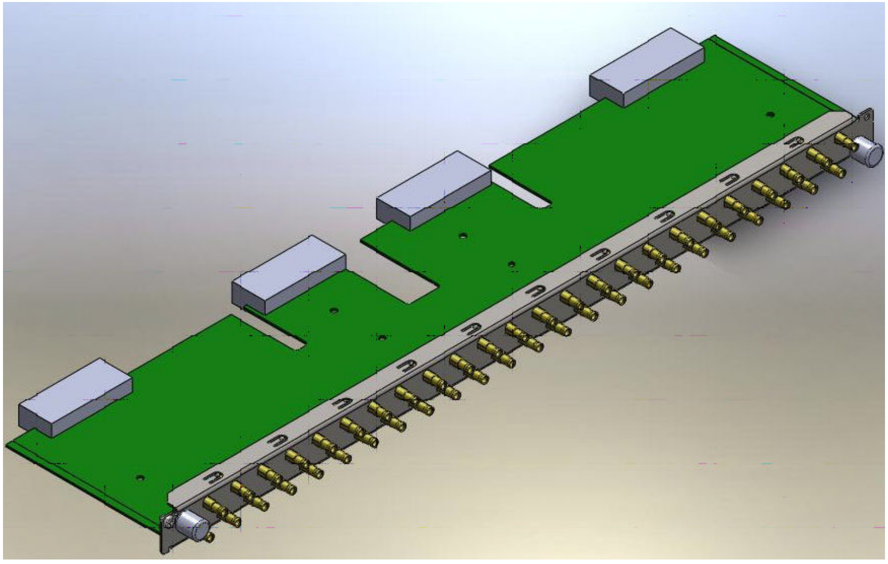
C.6.1 1309 Sirius 830/840 Multiviewer Coax Rear Panel

The 1309 Sirius 830/840 multiviewer coax rear panel has 48 DIN 1.0/2.3 connectors.

Note:

- The 1309 Sirius 830/840 multiviewer coax rear panel was supplied with earlier Sirius 830 and 840 router systems and is shown here for users that already have them fitted.
- The 1309 rear panel is no longer supplied with new systems but is available as a spares replacement if required.
- If the system is being expanded with a second or third 5931 external multiviewer output module the 1369 Sirius 830/840 external multiviewer HD BNC rear panel can be used, see section 11.10.

The 1309 rear panel is compatible with the 5931 external multiviewer output module (see section 11.6). One 5931 module is required to drive each of the 1309 48 channel rear panels. Up to three 1309 rear panels can be fitted to the Sirius 830 or Sirius 840 router frames.



If three 1309 rear panels are used then the third rear panel is fitted in the top multiviewer slot and numbered as follows:

If two 1309 rear panels are used then the second rear panel is fitted in the middle multiviewer slot and numbered as follows:

If one 1309 rear panel is used it is fitted in the bottom multiviewer slot and numbered as follows:

Figure 256 1309 Sirius 830/840 Multiviewer Coax Rear Panel

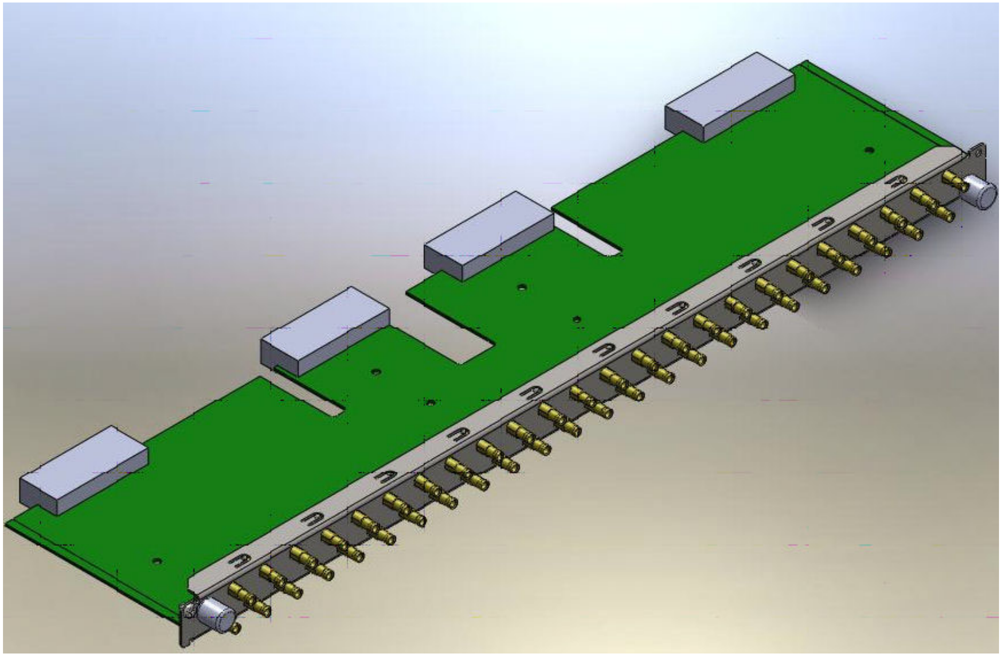
C.6.2 1291 Sirius 850 Multiviewer Coax Rear Panel

The 1291 Sirius 850 multiviewer coax rear panel has 48 DIN 1.0/2.3 connectors.

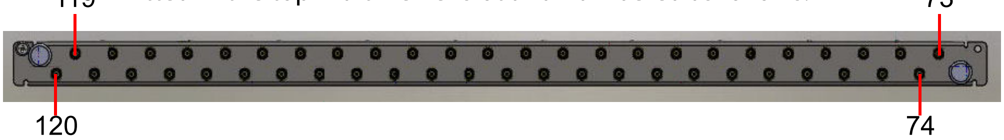
Note:

- The 1291 Sirius 850 multiviewer coax rear panel was supplied with earlier Sirius 850 router systems and is shown here for users that already have them fitted.
- The 1291 rear panel is no longer supplied with new systems but is available as a spares replacement if required.
- If the system is being expanded with a second 5931 external multiviewer output module the 1307 Sirius 850 multiviewer HD BNC rear panel can be used, see section 11.11.

The 1291 rear panel is compatible with the 5931 external multiviewer output module (see section 11.6). One 5931 module is required to drive each of the 1291 48 channel rear panels. Up to two 1291 rear panels can be fitted to the Sirius 850 router frame.



If two 1291 rear panels are used then the second rear panel is fitted in the top multiviewer slot and numbered as follows:



If one 1291 rear panel is used it is fitted in the bottom multiviewer slot and numbered as follows:

Figure 257 1291 Sirius 850 Multiviewer Coax Rear Panel

C.6.3 5932 Sirius 850 Multiviewer Output Module

The 5932 Sirius 850 multiviewer output module takes the multiviewer output signals from the multiviewer crosspoint module and passes each signal through a re-clocker. Each 5932 module has 72 Outputs.

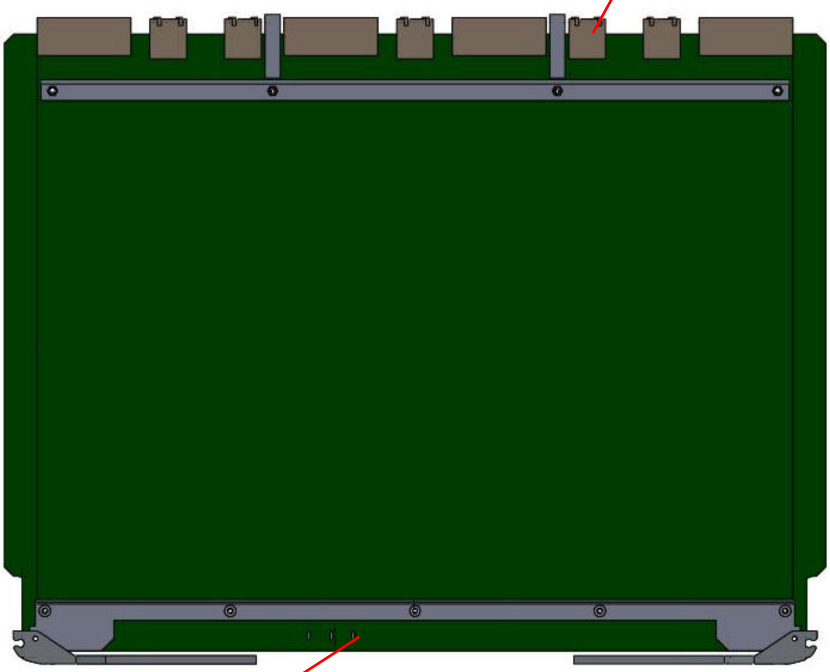


Figure 258 5932 Sirius 850 Multiviewer Output Module

The output of the 5932 is connected to one of the two possible rear panel arrangements in order to link to an external multiviewer system. One 5932 multiviewer output module is required for each rear panel fitted.

Table 128 5932 Sirius 850 Multiviewer Output Module - Possible Rear Panel Arrangements

Sirius 850: 1370 Rear Panel - up to two	Up to 2 rear panels with 48 HD BNC connectors per rear panel (up to 96 multiviewer outputs). see section 11.11 for details.
Sirius 850: 1291 Rear Panel - up to two No longer supplied and shown here for users that already have them fitted.	Up to 2 rear panels with 48 Coax DIN 1.0/2.3 connectors per rear panel (up to 96 multiviewer outputs). see section C.6.2 for details.
Sirius 850: 1292 Rear Panel- up to two No longer supplied and shown here for users that already have them fitted.	Up to two rear panels with nine MV-Link connectors per rear panel. The 1292 rear panel is an interface to the Miranda KaleidoX multiviewer. Fitting one rear panel supplies 72 outputs and fitting two rear panels supplies 140 outputs. see section C.6.4 for details.

C.6.3.1 5932 Multiviewer Output Module LED Information

Table 129 shows the LED color code on the edge of the 5932 multiviewer output module, and Figure 259 shows the module.

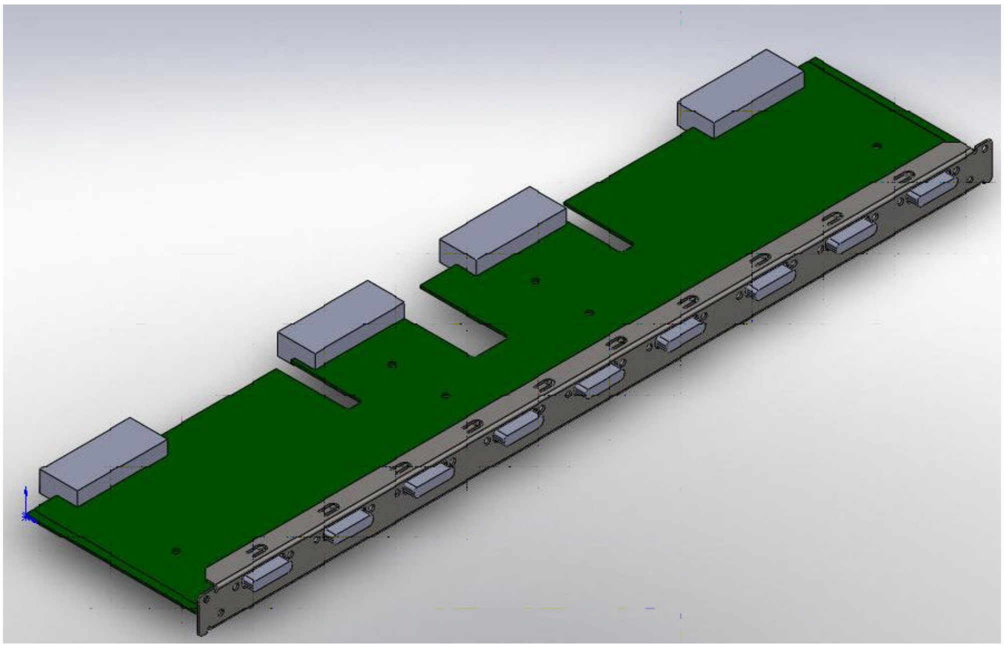
Table 129 5932 Sirius 850 Multiviewer Output Module LED Information

LED Color	Function	Detail	Normal Working Status
Green	Power OK	Power to the module	**On Solid** - working correctly
Yellow	Command OK	Command from the Nucleus Module	**Flashing** - receiving information and working correctly
Red	Command Error	Error messages from Nucleus control module	**Off** - normal state, if it is flashing then it is receiving error messages.

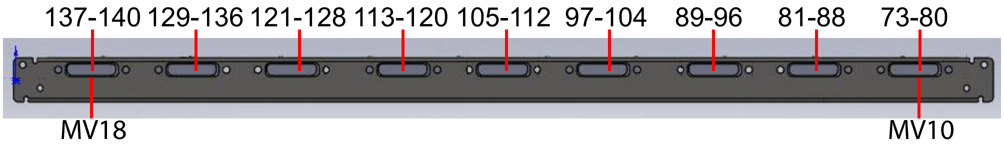
Figure 259 5932 Sirius 850 Multiviewer Output Module LEDs

C.6.4 Sirius 850: 1292 MV-Link Rear Panel

Note: The 1292 MV-Link rear panel is no longer supplied and is shown here for users that already have them fitted.



If two 1292 rear panels are used then the second rear panel is fitted in the top multiviewer slot and numbered as follows:



If one 1292 rear panel is used it is fitted in the bottom multiviewer slot and numbered as follows:

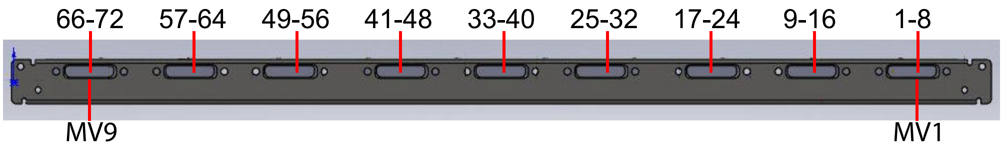
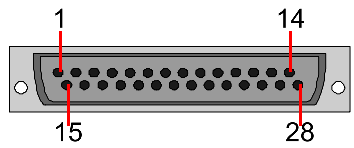


Figure 260 1292 MV-Link Rear Panel

Note: Figure 260 shows that Multiviewer port 18 has only has four outputs, the other four outputs are not used.

C.6.4.1 Sirius 850: Multiview Link Outputs

Table 130 Multiview Link Outputs



Pins	Function	Pins	Function
1	Input [7] +	15	Input [7] Shield
2	Input [7] -	16	Input [8] +
3	Input [8] Shield	17	Input [8] -
4	Input [5] +	18	Input [5] Shield
5	Input [5] -	19	Input [6] +
6	Input [6] Shield	20	Input [6] -
7	Input [3] +	21	Input [3] Shield
8	Input [3] -	22	Input [4] +
9	Input [4] Shield	23	Input [4] -
10	Input [1] +	24	Input [1] Shield
11	Input [1] -	25	Input [7] +
12	Input [2] Shield	26	Input [7] -
13	NC +	27	Shield
14	NC -	28	NC

Note: Cables are supplied if MV-Link is ordered, Kaleido must also be ordered with MV-Link.

C.7 Sirius 850 Video Expansion

C.7.1 1293 Sirius 850 Video DIN 1.0/2.3 (mini Coax) Output Rear Panel

The 1293 Sirius 850 Video DIN 1.0/2.3 (mini Coax) Output rear panel has 24 x DIN 1.0/2.3 Coax connectors.

Note:

- The 1293 Sirius 850 video DIN 1.0/2.3 (mini Coax) output rear panel was supplied with earlier Sirius 850 router systems and is shown here for users that already have them fitted.
- The 1293 rear panel is no longer supplied with new systems but is available as a spares replacement if required.
- If the system is expanded further 1366 Sirius 850 HD BNC expansion rear panels can be mixed with 1293 rear panels, see section 10.8.

The output from the 5928 expansion output module is via the 1293 24 Channel Expansion Output Rear Panel. When 1293 cards are fitted to a Sirius 850 it is then a single frame 576 x 1152 router with no further expansion capability.

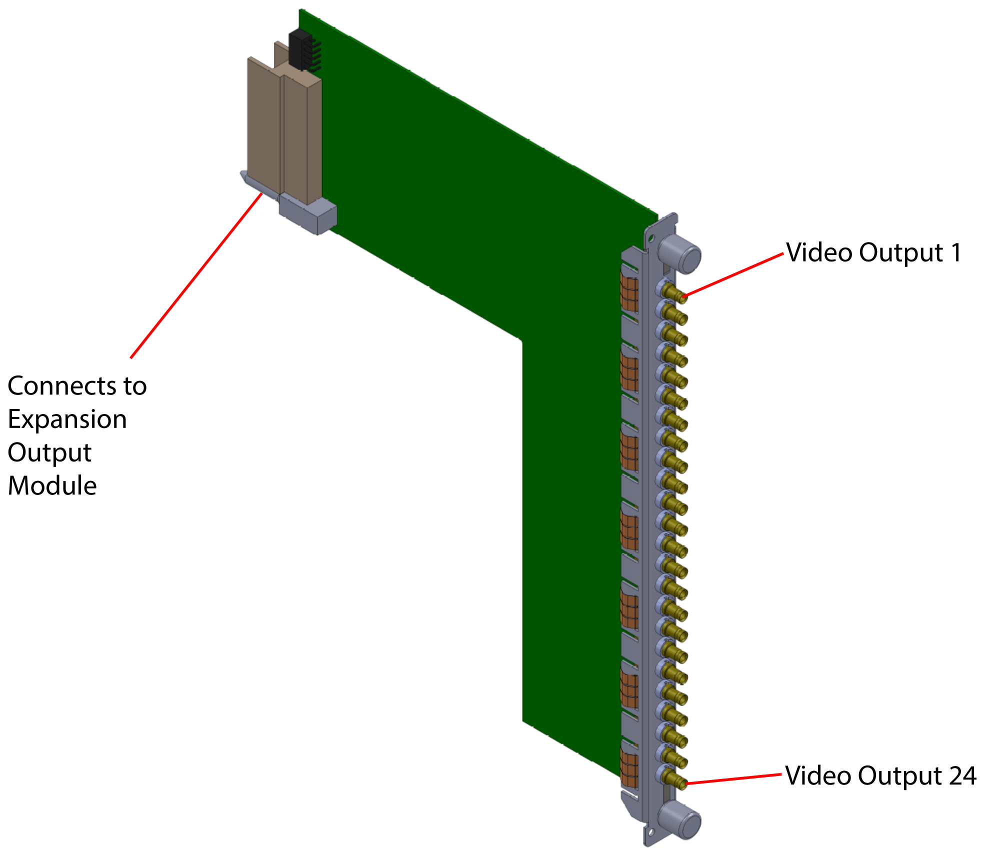


Figure 261 1293 24 Channel Expansion Output Rear Panel

Note:

- It is not possible to mix the 1290/1365 and 1293/1366 Output Rear Panels in a frame.
- 1366 and 1293 rear panels can be mixed if required.
- It is not possible to monitor the 1293 expansion outputs.
- The 1293 expansion output rear panels are not fitted with Catsii LEDs.
- A second Sirius 850 frame cannot be used if one or more 1293 Output Rear Panels are fitted in a frame.
- If a second Sirius 850 frame is required at a future date all 1366/1293 rear panels must be removed and replaced with 1365/1290 expansion rear panels.

C.8 Nucleus (2450) Router Controller

The 2450 Nucleus router control modules only supports video routing and cannot be used if any audio signals need to be routed.

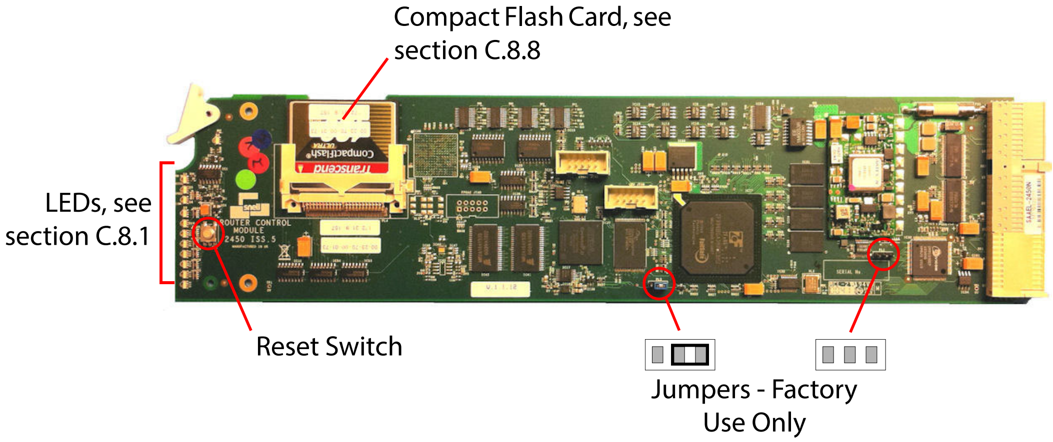


Figure 262 Nucleus 2450 Control Module

Refer to the Workbench manual for details about configuring the Nucleus Controller.

Note:

- The Nucleus controller has a default database, use Workbench to configure the modules in the Sirius 800. Modules are configured from the **Local Router hardware** tab **| Advanced Configuration | Edit Module Configurations...** in Workbench. See the Workbench manual for full details.
- The IP address of the Nucleus controller is found in the Config.ini file, see section C.8.11.

C.8.1 Nucleus 2450 Controller LEDs

The LEDs on the Nucleus controller card are shown in Figure 263 and Table 131 lists the 2450 Nucleus controller LED functions. Table 131

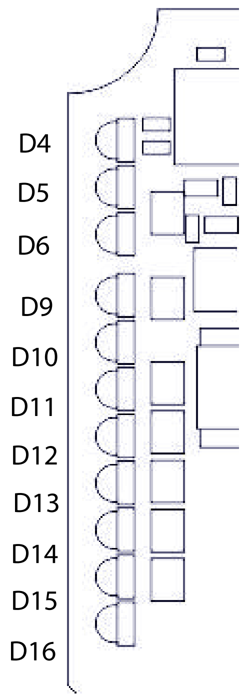


Figure 263 Nucleus 2450 Controller LEDs

Table 131 lists the 2450 Nucleus router control module LEDs.

Table 131 2450 Nucleus Router Control Module LEDs

LED	Description
D4	Active/Idle • Blue = Active • Purple (Blue + Red) = Idle
D5	100Mb Ethernet • Green = 100 Mb (Ethernet) • Off = 10Mb Ethernet
D6	Ethernet Link • Flashes = Ethernet activity
D9	Crosspoint Switch • Toggles between Blue and Off each time a Crosspoint is switched
D10	Not used
D11	Not used
D12	Not used
D13	Communications to other processor • Green = Communications to other processor • Off = No communications to other processor
D14	LTC • Flashes Blue = 625 TC present • Green = 525 TC present, • Off = TC not present
D15	When the Nucleus Controller powers up, if it detects a difference between what was configured last and the current configuration, it applies the new configuration and the D15 LED shows an FPGA validation error, see Figure 263 The next time the Nucleus Controller is rebooted there is no mismatch and therefore the D15 LED is off. If the D15 LED remains on, it could indicate a fault in the interface to the modules. An FPGA interface validation error occurs if the software detects a difference between the modules configured in the database and the configuration last written to the modules in the frame. This can happen when a reconfigure is done to recognize new cards and the Nucleus Controller is rebooted. On a dual processor system, the D15 LED can indicate a mismatch between the databases on the two controllers. • Red = FPGA interface validation error • Off = no error
D16	Active/Idle • Flashes Green = Active • Flashes Red = Idle

C.8.2 Door PC Screen - References

The reference screens are used to view the status of the references and also to configure the derived references and offsets. If the router is fitted with Nucleus 2450 controllers only the Reference Status screen will be displayed (see Figure 264).

For details on video references see section 1.12 and for the audio reference see section 1.13.

This screen displays the status of the router reference inputs. See the on screen Key for details.

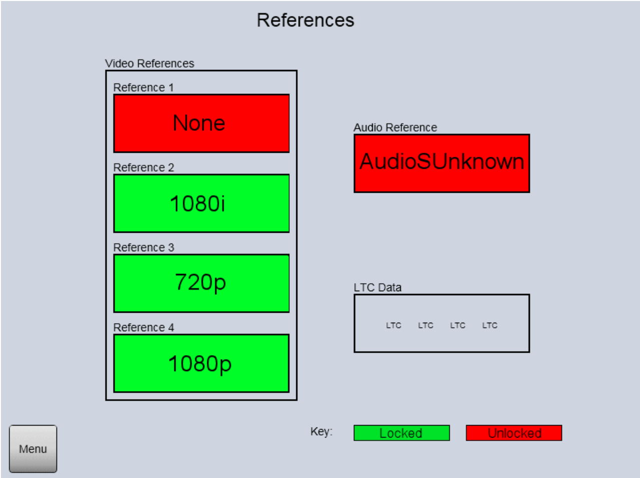


Figure 264 Reference Status (Nucleus 2450 only)

C.8.3 Workbench Catsii Control

To apply a user-assigned color configuration through Workbench from a remote PC:

1. In Workbench Configuration mode click on **Edit Controller Config**, select the **Generic** tab and click on the **Edit Controller** button. This opens the **Generic Editor**.

   Navigate to:

```
Controller | Devices | Devices | Config2450 | ModuleConfigura-
tions | ModuleConfigurations[280]: TCatsiiControlModule
```

2. Select a parameter and then select the color from the drop down list.

C.8.4 Enabling/Disabling Video Redundancy

The video redundant crosspoint algorithm is enabled or disabled by using the Generic Configuration Editor. See the Workbench manual for information on using the Generic Configuration editor.

Nucleus (2450) Controller Navigate to:

```
Control2450| CommonControl|RouterSpecificControl:
Sirius800Control | RedundantXpntControl | Enable = True
```

Select the required action from the drop down menu:

- Redundant crosspoint algorithm enabled = True
- Redundant crosspoint algorithm disabled = False

C.8.5 Configuring Video Crosspoint Failure Action

The action on crosspoint failure for video and audio is set from the Workbench controller on-line editor. See the Workbench manual for information on using the on-line editor.

Nucleus (2450) Controller Navigate to:

`Control2450| CommonControl|RouterSpecificControl: Sirius800Control |`

Nucleus2 & Nucleus (2450) Controllers

Video navigate to:

`| RedundantXpntControl | ActionOnFail = MoveFailedRoute|`

Select the required action from the drop down menu:

- NoAction = Notify the user and leave them to take appropriate action
- MoveFailedRoute = Move the failed route to the redundant crosspoint (default when shipped)
- MoveAllRoutes = Move all routes from the crosspoint with the failure to the redundant crosspoint

C.8.6 Single Active IP Address on Dual Redundant Controllers (Optional)

Nucleus 2450 Single Active/Idle IP Address Configuration:

1. The address settings are stored in the controller Network.ini file. They are shown as highlighted text in the Network.ini extract below). The existing controller Network.ini file must be edited using a pure text editor such as Microsoft Notepad. The same Network.ini file should be used on both controllers.

```
[NETWORK]
Force10M=1
IPAddress=172.31.9.30
IPAddressIdle=172.31.9.31
SubNetMask=255.255.224.0
DefaultGateway=0.0.0.0
DNSAddress=0.0.0.0
UseDHCP=0
UseSNMP=1
```

   a IPADDRESS=
   Configures the Active IP Address

   b IPADDRESSIDLE=
   Configures the Idle IP Address (controller address will not change if not defined)

2. 2. Use the Workbench Generic Editor to configure auto changeover on loss of controller Ethernet (see the Workbench manual for details. Navigate to:

   a ConfigurationItems, MiscellaneousFeatures, AutoChangeoverIfNoNetworkTime=2
   Configures the time, in seconds, that active controller will stay active after it loses its Ethernet connection. When this time has elapsed the active controller will go idle and the idle controller will go active. A setting of -1 will disable the feature but this is not recommended.

3. See the Sirius 800 Maintenance & Upgrade manual for details on editing the Network.ini file on the compact flash card.

In this example:

- The active address is set to 172.31.9.30
- The idle IP address is set to 172.31.9.31

C.8.7 Nucleus 2450: Sirius 800 Input and Output Port Mapping

Note:

- The information in this section is only correct if the Sirius 800 router is fitted with Nucleus 2450 router controllers with the default database. Databases can be modified including the mapping information. If this is the case please see the database configuration for details.
- When the Sirius 800 router is fitted with Nucleus2 router controllers using the default database the number scheme will be different. Please see the database configuration for details.

C.8.7.1 Sirius 830 Input and Output Port Mapping

Table 132 shows the Sirius 830 crosspoint address mapping:

Table 132 Sirius 830 Input and Output Port Mapping

	Input/Output Range	Addresses
Video Inputs	1 to 288	Source 0 to 287
Main Video Outputs	1 to 288	Destination 0 to 287
Multiviewer Outputs	1 to 140	Destination 1152 to 1291 the default configuration controls these as 289 to 428 as this then reduces the matrix size and provides a continuous range of outputs
Monitoring Outputs	1 to 4	Destination 16370 to 16373
Video Destinations 289 to 1152 are not used and do not respond to any control		

C.8.7.2 Sirius 840 Input and Output Port Mapping

Frame ID Switch set to 3 - see section 14.3.1.

Table 133 shows the Sirius 840 crosspoint address mapping:

Table 133 Sirius 840 Input and Output Port Mapping

	Input/Output Range	Addresses
Video Inputs	1 to 576	Source 0 to 575
Main Video Outputs	1 to 576	Destination 0 to 575
Multiviewer Outputs	1 to 140	Destination 1152 to 1291 the default configuration controls these as 577 to 716 as this then reduces the matrix size and provides a continuous range of outputs
Monitoring Outputs	1 to 4	Destination 16370 to 16373
Video Destinations 577 to 1152 are not used and do not respond to any control		

C.8.7.3 Sirius 850: Input Output Port Mapping

Sirius 850 Single Frame: Frame 1 of 1 (Frame ID Switch set to 0 - see section 14.3.1)

Table 134 shows the Sirius 850 crosspoint address mapping for Frame 1 of 1:

Table 134 Sirius 850: Input Output Port Mapping (Frame 1 0f 1)

	Input/Output Range	**Addresses**
Video Inputs	1 to 576	Source 0 to 575
Main Video Outputs	1 to 576	Destination 0 to 575
Expansion Video Outputs (using 5928 expansion modules & 1366 expansion output rear panels)	577 to 1152	576 to 1151
*Multiviewer Outputs (using two 1291 multiviewer rear panels)	1 to 96	Destination 1152 to 1199 & Destination 1224 to 1271
Monitoring Outputs	1 to 4	Destination 16370 to 16373

Note: *Multiviewer Outputs: 1152 to 1291 only if two 1292 multiviewer MV-Link rear panels are fitted - (no longer supplied)

Expanded Sirius 850 Two Frame System

Sirius 850 frame one of two (Frame ID Switch set to 1 - see section 14.3.1)

Table 135 shows the Sirius 850 crosspoint address mapping for Frame 1 of 2:

Table 135 Sirius 850: Input Output Port Mapping (Frame 1 0f 2)

	Input/Output Range	**Addresses**
Video Inputs	1 to 1152	Source 0 to 1151
Main Video Outputs (using 5928 expansion modules & 1365/1290 expansion output rear panels)	1 to 576	Destination 0 to 575
*Multiviewer Outputs (using two 1291 multiviewer rear panels)	1 to 96	Destination 1152 to 1199 & Destination 1224 to 1271
Monitoring Outputs	1 to 4	Destination 16370 to 16373
Destinations 577 to 1152 are not used and do not respond to any control		

Note: *Multiviewer Outputs: 1152 to 1291 only if two 1292 multiviewer MV-Link rear panels are fitted - (no longer supplied)

Sirius 850 frame two of two (Frame ID Switch set to 2 - see section 14.3.1)

Table 136 shows the Sirius 850 crosspoint address mapping for Frame 2 of 2:

Table 136 Sirius 850: Input Output Port Mapping (Frame 2 0f 2)

	Input/Output Range	Addresses
Video Inputs	1 to 1152	Source 0 to 1151
Main Video Outputs (using 5928 expansion modules & 1365/1290 expansion output rear panels)	577 to 1152	Destination 576 to 1151
*Multiviewer Outputs (using two 1291 multiviewer rear panels)	1 to 96	Destination 1292 to 1339 & Destination 1364 to 1411
Monitoring Outputs	1 to 4	Destination 16370 to 16373
Destinations 1 to 576 are not used and do not respond to any control		

Note: *Multiviewer Outputs: 1292 to 1431 only if two 1292 multiviewer MV-Link rear panels are fitted - (no longer supplied)

C.8.8 Nucleus 2450: Config.ini File

The Nucleus configuration details can be found in the Config.ini file which is on the Compact Flash memory card. The Config.ini file stores configuration details such as; Test Mode, switching delay, SW-P-02 over IP settings, etc. See the Workbench user manual for full details of the Config.ini file.

The following entries are required in the Config.ini file:

[DEBUG]	
TestMode=0	Grass Valley internal testing use only. Must be set to "=0" for router control. The Nucleus router control module will not be able to control the router if TestMode is set to any other value.

[ROUTING]	
Set_Delay=-1	A delay in milliseconds before setting a crosspoint following the first crosspoint received. The default is -1 (disabled). The purpose is to ensure multiple crosspoints, sent serially, are set on a single frame boundary. For example, if an external controller is setting two crosspoints serially using general switcher protocol, and the external controller cannot tell where in the frame it is sending the messages, it is possible for one crosspoint to go on one frame, and the second on the next, if the serial commands straddled a frame. By configuring a Set Delay of two milliseconds (the time to send the second crosspoint), both crosspoints will have been received when they are set. That way both crosspoints will go on the same frame.

[CONFIG]	
ResetAfterConfigPush=1	Configure the action to be taken after a configuration push. Set to "1" to restart the controller after a full database push. Default "0" disables automatic restart.

[02overIP]	
Enable=true	Enables SW-P-02 protocol over IP control. **Note:** The default setting for this parameter is Enabled, so if the parameter is missing, or commented out, it will still be enabled.
TCP_IP_Port=2000	Port used for TCP/IP server connection. Default port is 2000.
UDP_Connect_Port=2001	Port used for UDP broadcast messages for connecteds. Default port is 2001.
UDP_Stat6_Port=2002	Port used for UDP broadcast messages for status 6 changes. Default port is 2002.
Connect_MC_addr=224.1.1.1	Multi-cast address used for connecteds. Default address is 224.1.1.1
Stat6_MC_addr=224.1.1.2	Multi-cast address used for status 6 changes. Default address is 224.1.1.2
TCP_IP_Link_Time=0	Time (in seconds) that the link remains open after the last message is received. A value of 0 causes the link to remain open indefinitely. Default is 0 (ink remains open indefinitely).
Polltime=1000	The frequency (in milliseconds) the 2450 polls the router for status. Default value is every 1000 milliseconds. Increasing this value reduces the load on 2450 and the router by polling it less frequently. However, it does in crease the time before an error is reported. It may be necessary to do this on a heavily loaded 2450 or router. Reducing this value reduces the time before an error is reported but increases the load on the 2450 and the router. The value should not be set lower than the TIMEOUT value.
Timeout=50	This is the timeout in milliseconds for a response from the router. The default is 50 milliseconds. This should be sufficient for most routers when single commands are sent in a TCP/IP packet. If multiple connect messages are sent in a single TCP/IP packet the timeout should be increased to 200 milliseconds. Also if the router is heavily loaded this value may need to be increased. The number of TCP/IP connections to the 2450 should not effect the timeout, since this is the timeout on the serial port to the router. The clients connecting to the 2450 may need to adjust their timeout for the response on the network due to messages on multiple TCP/IP connections being serialized to the router.
Return_Status_5=true	This determines whether status request 1 messages return the status response 5 message, or whatever response is returned from the router. The default is YES. Setting this to NO means that status response 1 to 4 are returned depending on what router the 2450 is connected to (See SW-P-02 for which routers return which responses). This is intended for use with existing equipment that does not support the status response 5 message.
TCP_Connecteds=true	Used to switch on or off unsolicited connects on the TCP connection. When set to false a connected messages are only sent on a TCP port in response to a connect on that TCP port. When set to true it behaves more like the serial ports in that whenever a crosspoint is set a connected is sent on all open TCP connections, even if not set by a command on that port, for example, a panel. The default =true.
Connect_MC_ENA=true	Enables the multi-cast address used for connecteds. Default=true.
Stat6_MC_ENA=true	Enables the multi-cast address used for status 5 changes. Default=true.

C.8.9 Nucleus 2450: Network.ini File

Each Nucleus 2450 controller has its own configuration file that defines the network connections. The Network.ini file can be edited using a text editor, for setting the IP address, for example.

The following fields are required in the Network.ini file:

[NETWORK]	
Force10M=1	The “Force10M” flag specifies whether the network speed of the controller is limited to 10Mbits per second or 100Mbits per second. For Sirius 800 routers this must be set to 1, this is the default value and sets the network communication speed to 10 Mbps.
IPAddress= nnn.nnn.nnn.nnn	This specifies a standard 4 byte IPv4 address. This value is not used if “UseDHCP” is set to 1.
SubNetMask= nnn.nnn.nnn.nnn.	This specifies a standard 4 byte IPv4 subnet mask. This value is not used if “UseDHCP” is set to 1.
DefaultGateway= nnn.nnn.nnn.nnn	This specifies a standard 4 byte IPv4 address of the default gateway. This value is not used if “UseDHCP” is set to 1.
DNSAddress= nnn.nnn.nnn.nnn	This specifies a standard 4 byte IPv4 address of the domain name server. This value is not used if “UseDHCP” is set to 1.
UseDHCP=1	The “UseDHCP” parameter is used to specify if the Nucleus controller should obtain an IP address via DHCP (as opposed to the address specified in the ini file). If this is set to 1 then the IP address of the controller is assigned by the local DHCP server and the IPAddress, SubNetMask, DefaultGateway and DNSAddress settings in the ini file are ignored. If it is set to 0 then the ini file settings is used. If “UseDHCP” is not specified in the ini file then it defaults to 1.
UseSNMP=1	The “UseSNMP” flag enables or disables the SNMP features on the controller card. If set to 0 no SNMP features are activated on the card. If set to 1 the SNMP features are activated (subject to the restrictions in the next section). **Note**. If this changes, the card requires a restart. If this entry is omitted from the ini file it defaults to 0.

[ROLLCALL]	
Enable=1	The “Enable” flag enables or disables the ability of the Nucleus 2450 router controller to connect to a computer running RollCall. Set to 1 to enable RollCall connection (this is the default setting) or set to 0 to disable RollCall connection.
StartupDelay=5 SharePort=2050 BridgePort=2600 BridgeRemoteAddress= 128.1.1.1 BridgeAutoConnect=0 Name=2450 Information1=Info1 Information2=Info2 NetNibbles=1000 UseLongNames=0	These settings are shown with their default values and they need not be changed unless instructed to do so by Grass Valley Support

[SNMP]	
Version=Version Description Text	The “Version” variable is the text that is returned when the sysDescr SNMP request (.1.3.6.1.2.1.1.1) is received by the card.

[SNMP]	
Contact=Unknown	The “Contact” variable is the text that is returned when the sysContact SNMP request (.1.3.6.1.2.1.1.4) is received by the card. This can be set to the name and/or contact details responsible for this equipment.
Location=Unknown	The “Location” variable is the text that is returned when the sysLocation SNMP request (.1.3.6.1.2.1.1.6) is received by the card. This can be set to the physical location of the equipment in the facility.
SysName=2450	The “SysName” variable is the text that is returned when the SysName SNMP request (.1.3.6.1.2.1.1.5) is received by the card. This can be set to the name by which the equipment is locally referred to.
NumberCommunityGet Names=1	The “NumberCommunityGetNames” variable is used to specify how many community get names are listed in the ini file using the CommunityGetNameN variable. Up to 2 community strings of up to 20 characters in length can be specified for get operations. This is typically set to 1.
NumberCommunitySet Names=1	The “NumberCommunitySetNames” variable is used to specify how many community get names are listed in the ini file using the CommunitySetNameN variable. Up to 2 community strings of up to 20 characters in length can be specified for set operations. This is typically set to 1.
TrapManager=1	The “TrapManager” variable is used to specify how many trap manager addresses are listed in the ini file using the TrapManagerAddrN variable. Up to 10 trap manager addresses can be specified. Any more than this is ignored. This is typically set to 1.
TrapManagerAddrN=172.3 1.7.133	The “TrapManagerAddrN” variable is used to specify the IP address for trap managers. The N should be replaced by the number of the trap manager (1-10).
CommunityGetName N=public	The “CommunityGetNameN” variable is used to specify 1 of the community strings used for get operations. The N should be replaced by a unique digit (either 1 or 2).
CommunitySetName N=private	The “CommunitySetNameN” variable is used to specify 1 of the community strings used for set operations. The N should be replaced by a unique digit (either 1 or 2).
EnableSnellTraps=1	The “EnableSnellTraps” variable is used to specify whether traps are sent for changes to certain Grass Valley specific variables. If this is set to 0 MIBv2 system traps are sent, but no Grass Valley specific traps (for example, routed source change) are sent.
TrapMessageDelay=10	The “TrapMessageDelay” variable specifies the number of milliseconds minimum that occurs between consecutive Grass Valley trap messages. For example if it is set to 10 there is a gap of at least 10ms between each Grass Valley specific trap message that is sent. The reason for this is that when large numbers of crosspoints are changed simultaneously (for example) a large number of traps can be sent in quick succession, which can cause unnecessary loading on the controller and management station. It is recommended that this variable is set to a value between 0 and 100. Note: No traps are discarded as a result of this setting they are simply queued up and sent at the specified intervals.

[SNMP]	
DisableInitialNotify=1	The "DisableInitialNotify" flag can be used to prevent the controller card from sending power on startup traps for each variable type that supports traps. The reason for implementing this flag is that in a router with a large number of destinations (512 for example) there are 5 trappable parameters per destination. On startup this particular router would result in 2560 traps for the destination variables alone. By setting this variable to 1 these initial traps are not sent (but all subsequent ones are). This is global setting that affects all Grass Valley specific variables.

C.8.10 Nucleus 2450: Viewing/Modifying Config.ini and Network.ini Files

The Nucleus 2450 controller Compact Flash card stores the Config.ini file and the Network.ini file. These files are used to set various controller parameters and can be modified if required to change controller configuration.

The contents of the Config.ini file are listed in section C.8.8 and the contents of the Network.ini file are listed in section C.8.9.

This section describes how to view and modify the ini files using a simple text editor such as Microsoft Notepad.

There are two methods to modify the ini files:

- FTP access to the Nucleus, see section C.8.10.1.
- Removing the compact flash card and viewing/modifying an ini file on the compact flash card, see section C.8.10.2.

C.8.10.1 Modify an ini File Using FTP

1. Use Workbench to check the IP address(es) of the Nucleus controller(s) to be updated.
2. Use a client FTP program such as "FileZilla" or "SmartFTP". Open an FTP connection to either one of the Nucleus controllers in the router using the IP address of the Nucleus and the normal login:

   User: 2450

   Password: xyz
3. If no changes are required the ini file can simply be opened with a text editor, such as Microsoft Notepad, viewed and then closed again without saving.

Note: Before making any changes backup the ini file to be modified to the computer using the FTP software. It is a good idea to modify the backup filename with a date in case it is required at a future date.

4. Copy the ini file to be modified from the controller to your computer using the FTP software and open it using a text editor such as Microsoft Notepad.
5. Make any changes required to the ini file and **Save** the modified file to the computer.
6. Copy the modified ini file back to the controller using the FTP software and confirm that the file is to be overwritten when prompted.
7. Now use the FTP program to connect to the second Nucleus controller (if it is fitted) and repeat the process so that both controllers contain the modified ini file.
8. Now with the modified ini file on both controllers check which of the controllers is Idle (using Workbench) and reset the idle controller from the controller Reset button or Workbench.

Note: If the router is only fitted with a single controller the controller will be Active rather than Idle.

9. If only one controller is fitted to the router frame the update will be complete once the controller has rebooted and is displayed as connected (Green) in Workbench.
10. If a second controller is fitted reset it from the Workbench Controller Configuration interface software so that it goes Idle.

C.8.10.2 Modify an ini File Using Copy

1. Ensure the Nucleus Controller card to be removed is idle:

Note: If the router is only fitted with a single controller the controller will be Active rather than Idle.

Table 137 Nucleus 2450 Active/Idle LED Status

Nucleus Controller	LED Number/Color	LED Number/Color
2450	**LED D4**: Idle = Purple Active = Blue	**LED D16**: Idle = Flashing Red Active = Flashing Green

2. If the Nucleus controller to be removed is Active (see Table 137) press the reset button on it (see Figure 262 on page 396) and the Active and Idle Nucleus controllers will swap over.
3. Remove the Idle Nucleus controller card.
4. Remove the Compact Flash memory card from the Nucleus controller and insert it into a card reader.
5. Plug the card reader into your computer and view the files on the memory card.
6. If no changes are required the ini file can simply be opened with a text editor, such as Microsoft Notepad, viewed and then closed again without saving.

Note: Before making any changes backup the ini file to be modified to the computer. It is a good idea to modify the backup filename with a date in case it is required at a future date.

7. Open the ini file to be modified using a text editor such as Microsoft Notepad.
8. Make any changes required to the ini file and **Save** the modified file to the Compact Flash card.
9. Eject the Compact flash card from your computer and remove the Compact flash card.
10. Insert the Compact flash card back in the Nucleus controller.
11. Replace the Nucleus controller in the router and it will reboot.
12. If changes are also required on the second Nucleus controller (if it is fitted) repeat the process so that both controllers contain the modified ini file.

C.8.11 Nucleus 2450: Changing the IP Address

The Nucleus controller IP address and network connection information is stored in the Network.ini file on the Compact Flash card on the Nucleus controller, see section C.8.9 for details of the contents of the Network.ini file.

The Network.ini can be opened by using a text editor such as Microsoft Notepad at which point it can be viewed, backed up and modified as required. If the IP address is known then this can be done remotely via FTP software or if it is not known then the Compact Flash card can be removed from the controller and read locally on a computer. See section C.8.10 for details on both methods.

Note: If the controller IP address is changed remember to use the new IP address to connecting to it.

C.8.12 Nucleus 2450: Setting the Network Communication Speed

The Nucleus 2450 network communication speed is set in the controller Network.ini file. The Nucleus 2450 controller network speed must be set to 10 Mbps, see section C.8.9 for details.

C.8.13 Nucleus 2450: Enabling RollCall

RollCall is enabled by default. To use RollCall with the router the RollCall template files must be loaded on the controller and RollCall must be enabled in the controller Network.ini file.

In the **[RollCall]** section of the ini file change **Enabled=0** to **Enabled=1**.

For details on editing the Network.ini files see section C.8.10.

C.8.14 Nucleus 2450: Setting Parity for SW-P-02 & SW-P-08 Protocols

Note:

- The default parity settings for the SW-P-02 and SW-P-08 protocol are correct when used with Grass Valley products and need not be changed.
- Some third party products use a parity that is different from the default parity. In this case the parity used by the Grass Valley router controller can be changed to match the third party product.

Parity can be changed for communication ports configured with SW-P-02 or SW-P-08 protocols (Nucleus 2450 only). Parity is set using the Workbench Generic Editor and can be; Default, None, Even or Odd.

Note:

- For a dual controller router systems select the inactive controller and set that one first.
- The new Parity setting will only take effect after the controller has been restarted.

Using the Generic Editor Navigate to:

```
RouterController | Comms | Comms[1] to [4] (as required) |
CommsType: Serial | Parity=
```

Parity options are:

- `Default:`

  - SW-P-02 - Even

  - SW-P-08 - None
- `None`
- `Even`
- `Odd`

Push the new configuration to the controller (see the Workbench user manual for details).

In a dual controller system make the updated controller active, select it and click on the **Copy to Partner** button to update the second controller.

C.8.15 Further Information

The Sirius 800 Maintenance & Upgrade manual contains details on updating the controller software/firmware.

C.9 DS-Link 12 metre Cable

This cable was discontinued in December 2018.

DS-Link to DS-Link Cable - 12 meter:
Order Code FGAEY WDS12THICK
Cable kit consists of 1 x 12 metre (39 Feet) DS-Link to DS-Link cable.

Appendix D Specifications

Appendix contains:

Specifications

D.1 Inputs

D.1.1 Video Inputs

Table 138 Main Video Inputs

5917, 5919, 5913, 5915 and 5916 Video Input Modules used with: • 1234, 1349, 1235, 1285 or 1289 Main Coax Video Input Rear Panels • or 1360, 1372 Main HD BNC Video Input Rear Panels • or 1362 DS-Link Video Input Rear Panels	
Number and type	24 per module automatic cable equalization and re-clocked
Connectors	BNC, 75Ω electrical impedance. Gold plated. HD BNC, 75Ω electrical impedance. Gold plated. DS-Link, Densishield highspeed cable connector (proprietary connector format)
Standards supported	SMPTE-259M 525 and 625 SD-SDI EN50083-9 DVB-ASI SMPTE 292M 720p and 1080i HD-SDI SMPTE 424M 1080p 3G-SDI
Impedance	75 Ω
Data rate	3 Mb/s - 3 Gb/s. Standard video rates re-clocked, all other rates auto-bypassed.
Return loss	>15dB 10MHz to 1.5GHz >10dB 1.5GHz to 3GHz
Amplitude	800mV p-p nominal
DC offset	<5V
Cable Equalization	Automatic for: Up to 350 m (1150 feet) Belden 1694A, PSF1/2M at SD rates Up to 200 m (650 feet) Belden 1694A at HD Up to 140 m (460 feet) Belden 1694A at 3G

D.1.2 12G-SDI Video Inputs

Table 139 12G Video Inputs

12G-SDI: 55917/5917/5919 Video Input Module used with: • **1840 or 1841 12G-SDI HD-BNC Video Inputs Rear Panels**	
Number and type	6 per module. Automatic cable equalization and re-clocked
Connectors	HD BNC, 75Ω electrical impedance. Gold plated.
Standards supported	ST2018 for 6G SDI, ST 2082-1,-10 for 12G SDI '2 sample interleaved' (2SI) mode. **Note:** The 12G SDI Input modules also support the following video standards in 'pass-through' mode: • SMPTE-259M 525 and 625 SD-SDI • SMPTE-292M 720p and 1080i HD-SDI • SMPTE-424M 1080p 3G-SDI
Impedance	75 Ω
Data rate	11.88 Gb/s for 12G-SDI, 5.94Gb/s for 6G-SDI
Return loss	TBC
Amplitude	800mV p-p nominal
DC offset	<5V
Cable Equalization	up to 60 m of Belden 1694A

D.1.3 Optical Video Inputs

Table 140 Main Optical Video Inputs

Optical: 5917, 5919, 5914, 5915 and 5916 Video Input Modules used with: • **1236, 1286, 1361, 1373 or 1305 Main Optical Input Rear Panels**	
Number and type	24 per module, re-clocked - removable video SFP modules
Note: Specifications are based on fitting standard SFP receivers - Grass Valley Order Code SRR-3	
Connectors	LC/PC single mode fiber connection as standard.
Wavelength	Wideband receiver, 1260-1620 nm nominal
Sensitivity	-18 dBm
Typical link length	10km @ 3 Gb/s 20km @ 1.5 Gb/s 30km @ 270MBit/s
Standards supported	SMPTE-259M 525 and 625 SD-SDI EN50083-9 DVB-ASI SMPTE 292M 720p and 1080i HD-SDI SMPTE 424M 1080p 3G-SDI

D.1.4 Video AHP Inputs

Table 141 5919 and 5915 Video AHP Input Modules

5919 and 5915 - Video AHP Input Modules	
Video Processing - 5919 only (optional Licensed features - see section 1.6)	
Video Processing License, Grass Valley Order Code: S8AHP-VF, 1 license, 8 assignable channels (assigned to any input or output channels)	
*Frame/Line Sync and Video Delay	***Frame Sync offset**: set in frames, lines and pixels or milliseconds ***Line Sync offset**: set in pixels or milliseconds ***Video Delay**: set in pixels
*The video processing block can be used for frame/line sync or video delay on a channel by channel basis but they cannot both be used on the same channel.	
Input Standard	1125 (1080)/50P (A & B - Level B dual link only) 1125 (1080)/59P (A & B - Level B dual link only) 1125 (1080)/29i 1125 (1080)/25i 750 (720)/59P 750 (720)/50P 525 (480)/29i 625 (576)/25i
Default Video Output Standard	Last known good
Controls (per channel) Genlock & Video Delay	
Genlock Mode	Lock to Reference, Lock to Input
Genlock H-Phase	±0.5H in pixel clock steps
Genlock V-Phase	±0.5F in 1 line steps
Video H-Delay	0 - 1 Line in pixel clock steps
Video V-Delay	0 - 1 Frame in 1 line steps
Video Delay	0 - 14 Pictures (Picture = Frame in progressive formats) (Picture = Field in interlaced formats)
Reference Select Mode	Configured for each input or output - any of 4 looping references or internally derived references
Other Controls	
Action on Loss of Input	Freeze, Black (configurable)
HANC Data Blank	On/Off On removes all HANC data. **Note**: this includes removal of embedded audio
VANC Data Blank	On = Blank all VANC interval Off = Pass VANC except SMPTE defined switching line and line following
Other Functions	
DVB-ASI Handling	Automatically detected and passed transparently
Synchronization Method	Video and audio frame drop/repeat
Audio Selection	Pre or post video synchronization
Freeze	Field on interlaced standards Frame in progressive standards
Minimum Delay (Reference lock or free run)	2 µs to 7 µs for all formats (dependent on hysteresis state)

Table 141 5919 and 5915 Video AHP Input Modules (Continued)

5919 and 5915 - Video AHP Input Modules		
Synchronizer Hysteresis Window		5 µs
Embedded Audio Delay - 5919 only (optional Licensed feature - see section 1.6)		
Embedded Audio Delay License, Grass Valley Order Code: S8AHP-VD (1 per module, 24 channels)		
Audio Delay		Per audio input channel in steps of 0.25 ms in a range of 0 to 5.46 Seconds.
Embedded Audio Processing (including de-embedding) - 5919 & 5915 (optional Licensed features - see section 1.6)		
Embedded Audio Processing License, Grass Valley Order Code: S8AHP-VA (1 per module, 24 channels)		
Audio phase Invert		Available per mono or stereo signal. NORMAL/INVERT control (on/off)
Audio Gain/Mute adjustment		Per mono or stereo signal. Silence (Mute) or -72 to +30 dB in 0.1 dB steps
Audio mixing		Up to 16 mono channels per mix. Gain adjustment range per channel -Silence or -72 to +30 dB in 0.1 dB steps
Channel Swap (shuffle)		Change the channel order of up to 16 audio inputs.
Video Format	**Audio Channels**	**Format**
525/625	Up to 16	SMPTE ST259 carrier: Embedded Audio to SMPTE ST272ADEF; synchronous and asynchronous, 20 bit audio packets only
720p	Up to 16	SMPTE ST292 carrier: SMPTE ST296 720p - 4:2:2 10 bit, 50/59.94/60 progressive frames/s. Embedded Audio to SMPTE ST299-1 Audio synchronous or asynchronous to video 48 kHz nominal sample rate
1080i	Up to 16	SMPTE ST292 carrier: SMPTE ST274 1080i - 4:2:2 10 bit, 25/29.97/30 interlaced frames/s Embedded Audio to SMPTE ST299-1 Audio synchronous or asynchronous to video 48 kHz nominal sample rate
1080p	Up to 16	SMPTE ST424M carrier: SMPTE ST 425M Level A - 1080p 4:2:2 10 bit 50/59.94/60 progressive frames/s (Mapping structure 1) Embedded Audio to SMPTE299-1 & ST299-2 Audio synchronous or asynchronous to video 48 kHz nominal sample rate
	Up to 16	SMPTE ST 425 Level B Dual Link, mapped to SMPTE ST372/ST274 - 4:2:2 10bit at 50/59.94/60 progressive frames/s Embedded Audio to SMPTE ST299 Audio synchronous or asynchronous to video 48 kHz nominal sample rate

D.1.5 AHP Audio Inputs

Table 142 4915 AES/MADI Input Module

4915 - AES/MADI Input Module	
AES Inputs - Functional	
Signal Standard	AES3-2009
Sample Rate	48 kHz nominal Synchronous or asynchronous to references or video input signals
Format	20 bit or 24 bit transparent
AES Inputs Electrical Interface (1352, 1354, 1355, 1357,1297 and 1299 Rear Panels)	
Number and Type	120 AES pairs per card Balanced AES: 1352, 1354, 1297 and 1299 Unbalanced AES: 1355 and 1357
Connector	5 x 62 way high density D type Sockets
Input signal sensitivity	>250 mV pk-pk
MADI Inputs - Functional	
Signal Standard	AES10-2003 56 or 64 channels @ 48 kHz sample rate
Sample Rate	48 kHz nominal Synchronous or asynchronous to references or video input signals
Audio Format	20 bit or 24 bit transparent
MADI Inputs on AES Rear Panel (1352, 1354, 1355 and 1357 Rear Panels)	
Number	3
Connector	HD BNC, 75 Ω electrical impedance.
Impedance	75 Ω nominal
Cable Equalisation	200 m (650 Feet) Belden 1855 or equivalent
MADI Inputs on Coax Rear Panel (1285 or 1303 Rear Panels)	
Number and Type	12 with main and backup inputs per signal, auto fail-over on signal loss, or manual changeover.
Connector	BNC, 75 Ω electrical impedance.
Impedance	75 Ω nominal
Cable Equalisation	200 m (650 Feet) Belden 1855 or equivalent
MADI Inputs on Fiber Rear Panel (1286 or 1304 Rear Panels)	
Number and Type	12 with main and backup inputs per signal, auto fail-over on signal loss, or manual changeover. Removable SFP modules
Fiber Connector	LC/PC single mode
Wavelength	Wideband receiver, 1260-1620 nm nominal
Sensitivity	-18 dBm
Typical Fiber Length	20 km (12.5 Miles) single mode
Note: Fiber MADI specifications are based on fitting standard SFP receivers - Grass Valley Order Code SRR-3	
Audio Processing (free License with each module)	
Gain/Mute	Per mono or stereo signal. Silence (Mute) or -72 to +30 dB in 0.1 dB steps
Phase Invert	Available per mono or stereo signal. NORMAL/INVERT control (on/off)

Table 142 4915 AES/MADI Input Module (Continued)

4915 - AES/MADI Input Module	
Stereo Mode	Options are; Left/Right swap, Left Both, Right Both, Mono Mix or Normal

D.2 Outputs

D.2.1 Video Outputs

Table 143 Main Coax Video Outputs

5926, 5938, 5949, 5923 and 5925 Video Output Modules used with: • **1294 or 1295 Main Router Coax Video Output Rear Panels** • **or 1363 Main Router HD BNC Video Output Rear Panels** • **or 1364 Main Router DS-Link Video Output Rear Panels**	
Type	24 per module, re-clocked.
Connectors	BNC8, 75Ω electrical impedance. Gold plated. HD BNC, 75Ω electrical impedance. Gold plated. DS-Link, Densishield highspeed cable connector (proprietary connector format)
Standards supported	SMPTE-259M 525 and 625 SD-SDI EN50083-9 DVB-ASI SMPTE 292M 720p and 1080i HD-SDI SMPTE 424M 1080p 3G-SDI
Impedance	75 Ω
Data rate	3Mb/s - 3 Gb/s. Standard video rates re-clocked, all other rates auto-bypassed.
Return loss	>15 dB 10 MHz to 1.5 GHz >10dB 1.5 GHz to 3 GHz
Amplitude	800 mV p-p ±10%
Rise/Fall time	<90ps @ 3G <180ps @ HD <650ps @ SD
Timing Jitter	<0.25UI @ 1.5G and 3G <0.15UI @ SD
Alignment Jitter	<0.15UI @ 1.5G and 3G <0.1UI @ SD
DC offset	0V ± 0.5V

D.2.2 12G-SDI Video Outputs

Table 144 12G Coax Video Outputs

12G-SDI: 5949 Video Output Module used with: • **1842 12G-SDI HD-BNC Video Output Rear Panels**	
Type	6 per module.
Connectors	HD BNC. Gold plated.
Standards supported	ST2081 for 6G SDI, ST2082-1,-10 for 12G SDI **Note:** The 12G SDI Output module also supports the following video standards in 'pass-through' mode: • SMPTE-259M 525 and 625 SD-SDI • SMPTE-292M 720p and 1080i HD-SDI • SMPTE-424M 1080p 3G-SDI
Impedance	75 Ω

Table 144 12G Coax Video Outputs

12G-SDI: 5949 Video Output Module used with: • **1842 12G-SDI HD-BNC Video Output Rear Panels**	
Data rate	11.88 Gb/s for 12G-SDI, 5.94Gb/s for 6G-SDI
Return loss	TBC
Amplitude	800 mV p-p ±10%
Rise/Fall time	TBC
Timing Jitter	TBC
Alignment Jitter	TBC
DC offset	0V ± 0.5V

D.2.3 Optical Video Outputs

Table 145 Main Optical Video Outputs

Optical: 5926, 5938, 5949, 5924 and 5925 Video Output Modules used with: • **1296 or 1302 Main Router Optical Video Output Rear Panels**	
Type	24 per module, re-clocked, removable video SFP modules
Note: Fiber MADI specifications are based on fitting standard SFP transmitters Order Code ST31ST31-3	
Connector	LC/PC single mode connection as standard.
Wavelength	1310nm
Output Power	Typical -2dBM Other power and CWDM options available - contact factory
Standards supported	SMPTE-259M 525 and 625 SD-SDI EN50083-9 DVB-ASI SMPTE 292M 720p and 1080i HD-SDI SMPTE 424M 1080p 3G-SDI
Data rate	3Mb/s - 3 Gb/s. Standard video rates re-clocked, all other rates auto-bypassed.

D.2.4 Video AHP Outputs

Table 146 5949 and 5925 Video AHP Output Modules

5949 and 5925 - Video AHP Output Modules	
Video Processing - 5949 only (optional Licensed features - see section 1.6)	
Video Processing License, Grass Valley Order Code: S8AHP-VF, 1 license, 8 assignable channels (assigned to any input or output channels)	
*Frame/Line Sync and Video Delay	***Frame Sync offset**: set in frames, lines and pixels or milliseconds ***Line Sync offset**: set in pixels or milliseconds ***Video Delay**: set in pixels
*The video processing block can be used for frame/line sync or video delay on a channel by channel basis but they cannot both be used on the same channel.	
Input Standard	1125 (1080)/50P (A & B - Level B dual link only) 1125 (1080)/59P (A & B - Level B dual link only) 1125 (1080)/29i 1125 (1080)/25i 750 (720)/59P 750 (720)/50P 525 (480)/29i 625 (576)/25i
Default Video Output Standard	Last known good
Controls (per channel) Genlock & Video Delay	
Genlock Mode	Lock to Reference, Lock to Input
Genlock H-Phase	±0.5H in pixel clock steps
Genlock V-Phase	±0.5F in 1 line steps
Video H-Delay	0 - 1 Line in pixel clock steps
Video V-Delay	0 - 1 Frame in 1 line steps
Video Delay	0 - 14 Pictures (Picture = Frame in progressive formats) (Picture = Field in interlaced formats)
Reference Select Mode	Configured for each input or output - any of 4 looping references or internally derived references
Other Controls	
Action on Loss of Input	Freeze, Black (configurable)
HANC Data Blank	On/Off On removes all HANC data. **Note**: this includes removal of embedded audio
VANC Data Blank	On = Blank all VANC interval Off = Pass VANC except SMPTE defined switching line and line following
Other Functions	
DVB-ASI Handling	Automatically detected and passed transparently
Synchronization Method	Video and audio frame drop/repeat
Audio Selection	Pre or post video synchronization
Freeze	Field on interlaced standards Frame in progressive standards
Minimum Delay (Reference lock or free run)	2 µs to 7 µs for all formats (dependent on hysteresis state)

Table 146 5949 and 5925 Video AHP Output Modules (Continued)

5949 and 5925 - Video AHP Output Modules		
Synchronizer Hysteresis Window		5 µs
Embedded Audio Processing (including embedding) - 5949 & 5925 (optional Licensed features - see section 1.6)		
Embedded Audio Processing License, Grass Valley Order Code: S8AHP-VA (1 per module, 24 channels)		
Audio Mixing		Up to 16 mono channels per mix. Selectable from incoming video or separately routed audio. Gain adjustment range per channel - Silence or -72 to +30 dB in 0.1 dB steps
Channel Swap (Shuffle)		Change the channel order of up to 16 audio outputs.
Audio phase Invert		Available per mono or stereo signal. NORMAL/INVERT control (on/off)
Audio Gain adjustment		Per mono or stereo signal. Silence or -72 to +30 dB in 0.1 dB steps
Audio Embedding		Embedding onto each video signal is done synchronously to the video signal. All video signals operate independently to each other.
Ancillary Data		All VANC data is removed All non-audio HANC (Horizontal Ancillary) data is removed
Embedded Audio Delay - 5949 only (optional Licensed feature - see section 1.6)		
Embedded Audio Delay License, Grass Valley Order Code: S8AHP-VD (1 per module, 24 channels)		
Audio Delay		Per audio input channel in steps of 0.25 ms in a range of 0 to 5.46 Seconds.
Video Format	**Audio Channels**	**Format**
525/625	Up to 16	SMPTE ST259 carrier: Audio to SMPTE ST272 - level A (20 bits) Synchronous to video at 48 kHz sample rate nominal, 4 audio groups maximum for 525/59.94 or 525/60
720p	Up to 16	SMPTE ST292M carrier: SMPTE ST296M 720p - 4:2:2 10 bit, 50/59.94/60 progressive frames/s. Embedded Audio to SMPTE ST299M Synchronous to video at 48 kHz sample rate nominal
1080i	Up to 16	SMPTE ST292 carrier: SMPTE ST274 1080i - 4:2:2 10 bit, 25/29.97/30 interlaced frames/s Embedded Audio to SMPTE ST299 Synchronous to video at 48 kHz sample rate nominal

Table 146 5949 and 5925 Video AHP Output Modules (Continued)

5949 and 5925 - Video AHP Output Modules		
1080p	Up to 16	SMPTE 424M carrier: SMPTE 425M Level A - 1080p 4:2:2 10 bit 50/59.94/60 progressive frames/s (Mapping structure 1) Embedded Audio to SMPTE ST299-1 and ST299-2 Synchronous to video at 48 kHz sample rate nominal
	Up to 16	SMPTE 425M Level B Dual Link, mapped to SMPTE372M/274M - 4:2:2 10bit at 50/59.94/60 progressive frames/s Embedded Audio to SMPTE ST299-1 Synchronous to video at 48 kHz sample rate nominal

D.2.5 AHP Audio Outputs

Table 147 4929 and 4925 AES/MADI Output Modules

4929 and 4925- AES/MADI Output Module	
Audio Delay - 4929 only (free License with each module)	
Audio Delay	Per audio output channel in steps of 0.25 ms • **MADI** - in a range of 0 to 2 Seconds @ 48 kHz • **AES** - in a range of 0 to 2 Seconds @ 48 kHz
Audio Processing - 4929 only (optional Licensed features - see section 1.6)	
Sample Rate Conversion (SRC) License, Grass Valley Order Code: S8A-SRC (1 per module, 768 mono channels on MADI/240 mono AES channels)	
Sample Rate Conversion (SRC)	• Supported input sample rates from the audio crosspoint: 32 kHz, 44.1 kHz or 48 kHz • **MADI** - Supports conversion to: 48 kHz • **AES** - Supports conversion to: 32 kHz, 44.1 kHz, 48 kHz • **Dolby** - signals must be routed as a synchronous AES pair. The Dolby signal will automatically bypass the SRC even if the pair is selected for sample rate conversion. Any near rate reference locking is achieved by dropping or repeating Null samples in the guard band.
Audio Processing - 4929 and 4925 (free License with each module)	
Gain	Per mono or stereo signal. Silence or -72 to +30 dB in 0.1 dB steps
Phase Invert	Available per mono or stereo signal. NORMAL/INVERT control (on/off)
Stereo Mode	Options are; Left/Right swap, Left Both, Right Both, Mono Mix or Normal

Table 147 4929 and 4925 AES/MADI Output Modules (Continued)

4929 and 4925- AES/MADI Output Module	
AES Outputs - Functional	
Signal Standard	AES3-2009
Output Sample Rate	Free running (asynchronous to any reference) the signal input sample rate is re-generated at the output.
Format	20 bit or 24 bit, as input format
Transparency	Default channel status and User data applied to all re-synchronized outputs. **Default Channel Status bits set to**: • **Consumer Use of Channel Status** (bit 0) = Professional (1) • **Linear PCM Identification** (bit 1) = PCM Data Carried (0) or Non PCM data carried, e.g. Dolby data (1) • **Sampling Frequency** (bits 6 & 7) = 48kHz (0 & 1), 44.1 kHz (1 & 0) or 32 kHz (1 & 1) or Not Indicated (0, 0) • **Sampling Frequency** (bits 35 to 38) = 96 kHz (0, 1, 0, 0), 192 kHz (1, 1, 0, 0) or Not Indicated (0, 0, 0, 0) • **Use of Auxiliary Sample Bits** (bit 18) = 24 bit format (1) • All other default channel status bits set to Zero (0) **Default User Data bits set to**: • All bits set to Zero (0) Parity re-calculated on outputs. Transparent to audio data. Sample rate adjustment for near rate locking by drop/repeat.
Transparency (free running asynchronous outputs)	Transparent to audio data. Transparent to Input Channel Status and User data. Parity re-calculated on outputs.
AES Outputs Electrical Interface (1353, 1356 and 1298 Rear Panel)	
Number and Type	120 AES pairs per card Balanced AES: 1353 and 1298 Unbalanced AES: 1356
Connector	5 x 62 way high density D type Sockets
Output Amplitude	>2V pk-pk into 110 Ω
Output Impedance	110 Ω ±10%
Output Rise & Fall Time	<30 ns
MADI Outputs - Functional	
Signal Standard	AES10-2003 56 or 64 channels @ 48 kHz sample rate 4929 - see section 9.1.2 for configuration 4925 - see appendix C.4.1.2 for configuration
Sample Rate	48 kHz nominal Synchronous to the selected reference. AES or video reference 1 to 4 can be selected (AES reference selected by default). Lock to MADI channel 0 if no reference is present.
Audio Format	20 bit or 24 bit transparent

Table 147 4929 and 4925 AES/MADI Output Modules (Continued)

4929 and 4925- AES/MADI Output Module	
Transparency	Default channel status and User data applied to all re-synchronized outputs. **Default Channel Status bits set to**: • **Consumer Use of Channel Status** (bit 0) = Professional (1) • **Linear PCM Identification** (bit 1) = PCM Data Carried (0) or Non PCM data carried, e.g. Dolby data (1) • **Sampling Frequency** (bits 6 & 7) = 48kHz (0 & 1), 44.1 kHz (1 & 0) or 32 kHz (1 & 1) or Not Indicated (0, 0) • Sampling Frequency (bits 35 to 38) = 96 kHz (0, 1, 0, 0), 192 kHz (1, 1, 0, 0) or Not Indicated (0, 0, 0, 0) • **Use of Auxiliary Sample Bits** (bit 18) = 24 bit format (1) • All other default channel status bits set to Zero (0) **Default User Data bits set to**: • All bits set to Zero (0) Parity re-calculated on outputs. Transparent to audio data. Sample rate adjustment for near rate locking by drop/repeat.
Transparency (free running asynchronous outputs)	Transparent to audio data. Transparent to Input Channel Status and User data. Parity re-calculated on outputs.
MADI Outputs on AES Rear Panel (1353 and 1356 Rear Panel)	
Number	3.
Connector	HD BNC, 75 Ω electrical impedance.
Impedance	75 Ω ±2 Ω
Output Amplitude	720 mV nominal
MADI Outputs on Coax Rear Panel (1295 Rear Panel)	
Number and Type	12, with dual outputs per signal.
Connector	BNC, 75 Ω electrical impedance.
Impedance	75 Ω ±2 Ω
Output Amplitude	720 mV nominal
MADI Outputs on Fiber Rear Panel (1296 Rear Panel)	
Number and Type	12 with dual outputs per signal. Removable SFP modules
Fiber Connector	LC/PC single mode
Wavelength	1310 nm nominal.
Output Power	Typical -2 dBm. Other power and CWDM wavelength options available - contact factory
Typical Fiber Length (MADI)	20 km (12.5 Miles) single mode
Note: Fiber MADI specifications are based on fitting standard SFP transmitters Order Code ST31ST31-3	

D.2.6 Multiviewer and Additional HD BNC Outputs 577 to 1152

Table 148 Multiviewer and Additional Coax Outputs

5931 External Multiviewer Output Module used with 1369 or 1370 Ext. MV HD BNC Output Rear Panels 5928 Standard Video Expansion Output Module (Sirius 850 Only) used with 1366 HD BNC Output Rear Panels for Additional Outputs 577 to 1152	
Type	Ext. Multiviewer (1369 & 1370): 48 per module, re-clocked Additional Outputs (1366): 24 per module, re-clocked
Connectors	HD BNC Gold plated
Standards Supported	SMPTE-259M 525 and 625 SD-SDI EN50083-9 DVB-ASI SMPTE 292M 720p and 1080i HD-SDI SMPTE 424M 1080p 3G-SDI
Impedance	75Ω
Data Rate	3 Mb/s - 3 Gb/s. Standard video rates re-clocked, all other rates auto-bypassed.
Return Loss	>15dB 10MHz to 1.5GHz >10dB 1.5GHz to 3GHz
Amplitude	800 mV pk-pk ±10% @ SD & HD 600 mV pk-pk ±10% @ 3G
Rise/Fall time	<800ps @ SD <440ps @ HD <200ps @ 3G
Timing Jitter	<0.15UI @ SD <0.35UI @ 1.5G <0.2UI @ 3G,
Alignment Jitter	<0.15UI @ SD <0.2UI @ 1.5G and 3G
DC Offset	0 V ± 0.5 V

D.2.7 External Multiviewer O/ps and Additional Coax O/ps 577 to 1152

These are no longer supplied.

Table 149 Multiviewer and Additional Coax Outputs (No Longer Supplied)

5931 External Multiviewer Output Module used with 1291 or 1309 MV DIN 1.0/2.3 Coax Output Rear Panels **5928 Standard Video Expansion Output Module (Sirius 850 Only) used with 1293 DIN 1.0/2.3 Coax Output Rear Panels for Additional Outputs 577 to 1152**	
Type	Multiviewer (1291 & 1309): 48 per module, re-clocked Additional Outputs (1293): 24 per module, re-clocked
Connectors	DIN 1.0/2.3 Gold plated.
Standards Supported	SMPTE-259M 525 and 625 SD-SDI EN50083-9 DVB-ASI SMPTE 292M 720p and 1080i HD-SDI SMPTE 424M 1080p 3G-SDI
Impedance	75Ω
Data Rate	3 Mb/s - 3 Gb/s. Standard video rates re-clocked, all other rates auto-bypassed.
Return Loss	>15dB 10MHz to 1.5GHz >10dB 1.5GHz to 3GHz
Amplitude	800 mV pk-pk ±10% @ SD & HD 600 mV pk-pk ±10% @ 3G
Rise/Fall time	<800ps @ SD <440ps @ HD <200ps @ 3G
Timing Jitter	<0.15UI @ SD <0.35UI @ 1.5G <0.2UI @ 3G,
Alignment Jitter	<0.15UI @ SD <0.2UI @ 1.5G and 3G
DC Offset	0 V ± 0.5 V

D.3 Video IP Input and Output Modules

5960 Video IP Input Module used with:

- 1824 and 1825 40Gb/s Video IP Input Rear Panels

5970 Video IP Output Module used with:

- 1832 40Gb/s Video IP Output Rear Panel

D.3.1 Video IP Ports

Table 150 Video IP Ports

Video IP Ports for: • **5960 Video IP Input Module.** • **5970 Video IP Output Module.**	
Video IP Network Connection (Video IP Input or Video IP Output)	
Connector Cage Format	QSFP+ cages only. Cages compatible with MSA compliant pluggable modules: • QSFP+: 40Gb/s.
IP Standards Supported on Video IP Port	
Uncompressed Video Transport	Encapsulation: • RFC4175 RTP • SMPTE-2022-6
Compressed Video Transport	SMPTE-2042 (VC2) - Compressed low-latency, high-quality encoding profile.
Audio	PCM: • RFC3190 • AES67
Metadata (SMPTE-291M)	IETF “RTP Payload for Ancillary Data”
Timing and Synchronisation	IEEE-1588v2 (PTP) SMPTE-2059-2 compliant
Network Redundancy	SMPTE-2022-7
Video Standards Supported	
Video Standards	3G-SDI SMPTE 424M/425M level A/B compatible. HD-SDI SMPTE 292M/274M/296M SD-SDI SMPTE 259M-C
Video Resolution	1080p50, p59 (A) 720p50, p59 1080i25, i29 625i25, 525i29
Ethernet Standards Supported	
40Gb/s ports (4x 10Gb/s)	10G Ethernet to IEEE 802.3

D.3.2 Other Ports on Video IP I/O modules

Table 151 Other Connections on Video IP Input and Output Modules

	Other Ports on: • **5960 Video IP Input Module.** • **5970 Video IP Output Module.**
Control IP Network Connector	
Connector format	SFP cage fitted with Grass Valley 1Gb/s Ethernet SFP pluggable modules. **Note:** Only replace SFP with an authorized Grass Valley 1Gb/s SFP spare (Order code: FGAEY 1GBE-SFP .)
5960 DensiShield	
Connectors	1-off, DensiShield highspeed cable connector (proprietary connector format)
Inputs	1 multi-channel audio signal per connector.
Outputs	1 multi-channel audio signal per connector.
Standards supported	Proprietary multi-channel audio.
Impedance	75 Ω
Data rate	3 Mb/s to 3 Gb/s
Return loss	>15dB 10MHz to 1.5GHz >10dB 1.5GHz to 3GHz
Amplitude	800mV p-p nominal
DC offset	<5V
Cable Equalization	Automatic for: Up to 350 m (1150 feet) Belden 1694A, PSF1/2M at SD rates Up to 200 m (650 feet) Belden 1694A at HD Up to 140 m (460 feet) Belden 1694A at 3G
5970 DensiShield	
Connectors	3-off DensiShield highspeed cable connector (DS-Link proprietary connector format)
Inputs	8 video signals per connector.
Standards supported	SMPTE-259M-C 525 and 625 SD-SDI SMPTE 292M/274M/296M 720p and 1080i HD-SDI SMPTE 424M/425M 1080p 3G-SDI, level A B compatible.
Impedance	75 Ω
Data rate	3 Mb/s to 3 Gb/s
Return loss	>15dB 10MHz to 1.5GHz >10dB 1.5GHz to 3GHz
Amplitude	800mV p-p nominal
DC offset	<5V
Cable Equalization	Automatic for: Up to 350 m (1150 feet) Belden 1694A, PSF1/2M at SD rates Up to 200 m (650 feet) Belden 1694A at HD Up to 140 m (460 feet) Belden 1694A at 3G

D.4 Control

Table 152 Nucleus2 2464/2463 Router Control Module

Nucleus2 2464/2463	
Serial	4 x RS485 on 9 way D type Support for SW-P-02, SW-P-06 (RS 485 multi-drop panel protocol), SW-P-08 Default 38.4 kbaud
Ethernet	1 x RJ45 per controller. 10/100Base-T SW-P-02, SW-P-08 IN, RollCall, third party control systems (using SW-P-02 & SW-P-08), SNMP Control and SNMP Monitoring support, plus DCCP connection to Workbench

Table 153 Nucleus 2450 Router Control Module

Nucleus 2450	
Serial	4 x RS485 on 9 way D type Support for SW-P-02, SW-P-02 IN (time stamped crosspoint set), SW-P-06 (RS 485 multi-drop panel protocol), SW-P-08, GVG ES-Control and Harris Passthrough Default 38.4 kbaud
Ethernet	1 x RJ45 per controller. 10/100Base-T SW-P-02 IN (IP), RollCall, third party control systems (using SW-P-02), SNMP Control, SNMP Monitoring support, plus DCCP connection to Workbench

Table 154 Alarms

Alarms	
Alarms	Relay changeover for PSU, fan and Controller failure Comprehensive alarms reporting and auto failure recovery via Workbench

Table 155 Reference Inputs

Reference Inputs	
Number and Type	4 x analogue video, all auto sensing to 525 and 625 B&B, or HD tri-level reference 1 x AES reference 48 kHz only
Switch timing	Compatible with SMPTE-RP168. Sources individually assignable to each reference or internally derived* reference or auto detected. *Internally derived reference Nucleus2 only.

D.5 Physical

D.5.1 Sirius 830 Frame

Table 156 Sirius 830 Frame Details

Sirius 830 Frame	
Weight	Between 73 kg (161 lbs) and 85 kg (187 lbs) typical full frame (without packaging and depending on modules fitted)
Height	15RU chassis - 668 mm (26.3 inches)
Power requirements	Auto ranging 100 Vac to 240 Vac, 50/60 Hz via external power supply shelf/shelves (see Table 160). See Appendix B.1.1 on page 346 for details on the number of power supply shelves and power supply units required.
Inrush Current	up to 6.0 A
Max Rated Power	2500 W for video only routing on a fully equipped system. 6500 W for video and audio routing on a fully equipped system.

Power Consumption for Typical Usage Examples	
Fully Equipped - Standard Video modules all Coax. No monitoring or redundancy options.	1750 W
Fully Equipped - Standard Video modules all Fiber. No monitoring or redundancy options.	2000 W
Fully Equipped - 50% standard Video, 50% Video AHP, all Coax. No monitoring or redundancy options.	2970 W
Additional - Redundant Video crosspoints	50 W
Additional - Redundant Audio crosspoints	55 W
Additional - 96 MV outputs	320 W

D.5.2 Sirius 840 Frame

Table 157 Sirius 840 Frame Details

Sirius 840 Frame	
Weight	Between 150 kg (330 lbs) and 175 kg (386 lbs) typical full frame (without packaging and depending on modules fitted)
Height	27RU chassis - 1198mm (47.17 inches)
Power requirements	Auto ranging 100 Vac to 240 Vac, 50/60Hz via external power supply shelf/shelves (see Table 160). See Appendix B.1.2 on page 347 for details on the number of power supply shelves and power supply units required.
Inrush Current	up to 7.0 A
Max Rated Power	7000 W for video only routing on a fully equipped system. 13000 W for video and audio routing on a fully equipped system.

Power Consumption for Typical Usage Examples	
Fully Equipped - Standard Video modules all Coax. No monitoring or redundancy options.	3250 W
Fully Equipped - Standard Video modules all Fiber. No monitoring or redundancy options.	3800 W
Fully Equipped - 50% standard Video, 50% Video AHP, all Coax. No monitoring or redundancy options.	5640 W

Table 157 Sirius 840 Frame Details (Continued)

Sirius 840 Frame	
Additional - Redundant Video crosspoints	50 W
Additional - Redundant Audio crosspoints	55 W
Additional - 96 MV outputs	320 W

D.5.3 Sirius 850 Frame

Table 158 Sirius 850 Frame Details

Sirius 850 Frame	
Weight	Between 190 Kg (419 lbs) and 215 Kg (474 lbs) typical full frame (without packaging and depending on modules fitted)
Height	34RU Expandable chassis - 1511mm (59.49 inches)
Power requirements	Auto ranging 100 Vac to 240 Vac, 50/60Hz via external power supply shelf/shelves (see Table 160). See Appendix B.1.3 on page 348 for details on the number of power supply shelves and power supply units required.
Inrush Current	up to 7.8 A
Max Rated Power	7000 W for video only routing on a fully equipped system. 13000 W for video and audio routing on a fully equipped system.
Power Consumption for Typical Usage Examples	
Fully Equipped - Standard Video modules all Coax. No monitoring or redundancy options.	4500 W (576 x 1152)
Fully Equipped - Standard Video modules all Fiber. No monitoring or redundancy options.	4870 W (576 x 1152, Fiber available on first 576 outputs only)
Fully Equipped - 50% standard Video, 50% Video AHP, all Coax. No monitoring or redundancy options.	6900 W (576 x 1152, Video AHP on 288 inputs and 288 outputs)
Additional - Redundant Video crosspoints	50 W
Additional - Redundant Audio crosspoints	55 W
Additional - 96 MV outputs	320 W

D.5.4 All Sirius 800 Frames

Table 159 Sirius 800 Common Frame Details

All Sirius 800 Frames	
Depth	590.7mm (23.26 inches)
Width	482mm (19 inches) - Physical Frame 447mm - (17.6 inches)
Power redundancy	Dual redundancy
Operating Temp.	0 to +40°C without MV-8x0 Integrated Multiviewer modules. +5 to +30°C with one or more MV-8x0 Integrated Multiviewer modules fitted.
Storage Temp.	-10 to +50°C, non-condensing
Cooling	Fan cooled. Front inlet, rear and side exhaust

Table 160 Power Supply Shelf Details

Power Supply Shelf	
Weight	24 kg - 53lbs typical (without packaging)
Height	2RU - 88mm (3.46 inches)
Depth	619.8mm (24.4 inches)
Width	482mm (19 inches) - Physical Size 449mm - (17.6 inches)
Input Voltage	Auto ranging 100 Vac to 240 Vac, 50/60Hz

Appendix E Configuration for 12G Rears

:Appendix contains:

Configuration for 12G Rears

E.1 12G Rear Installation and Configuration Steps

To install and configure 12G-SDI rears in a Sirius S800 series router, the following process steps are required:

1. Check router frame/module/rear card compatibilities:

    - Ensure the correct 12G rear is being used for the router.

      (Refer to Section 1.7.1 "Router Frame Compatibility" on page 18.)

    - Ensure the correct front module is being used with the 12G Rear.

      (Refer to Section 1.7.2 "12G SDI Rear Panel - Front Module Compatibility" on page 18.)

      And that the front module is fitted with the correct firmware.

      (Refer to Section 1.7.3 "12G SDI Rear Panel - Module Firmware Compatibility" on page 18.)

    - Ensure the 12G Rear is fitted with the correct firmware to suit the corresponding front module.

      (Refer to Section 1.7.4 "12G Rear Module Firmware" on page 18.)

2. Fit the module(s) and rear(s).
3. Check that the fan control cards have firmware that supports 12G operation.

   (Refer to Section 13 "Control/Fan Interface Module" on page 327.)
4. Configure the router for 4K (UHD, 12G-SDI) operation.

   (Refer to Section E.2 "Router Configuration" on page 433.)

   Especially check that the 12G-SDI outputs are configured.

E.2 Router Configuration

To configure the router for 4K operation, either:

- use a default 12G database (For example, S830 AHP 4K Centra Database); or
- modify an existing database. (Modify it to add 4K routing, as for quad-link.)

E.3 12G Input Rear Configuration

There are no specific requirements for configuration of a 12G input rear.

E.4 12G Output Rear Configuration

1842 12G output rears must be configured for mode of operation with the router's Workbench 'Output Connections' screen (shown in Figure 265); use the 'Mode' display.

Click 'Mode'

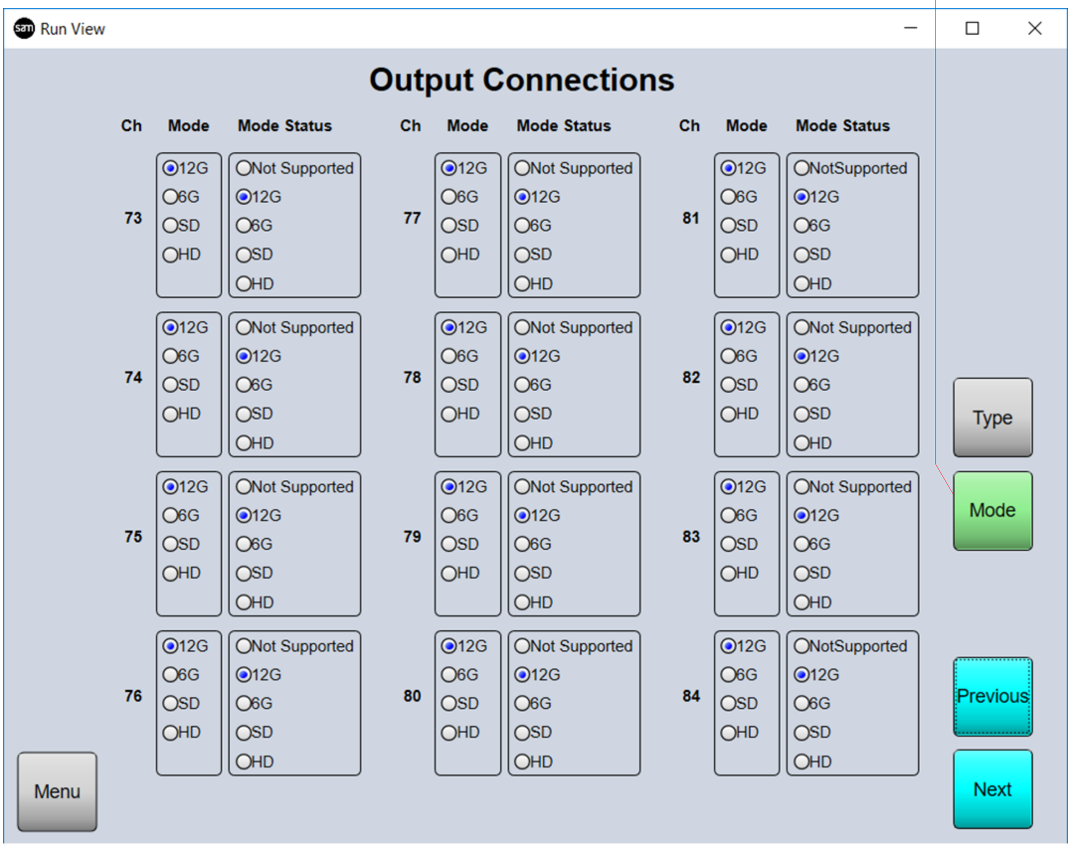


Figure 265 Workbench Output Connections Screen

Each 12G output must be configured. The default mode is 12G-SDI ('12G'). For other operation, set 'Mode' as shown in Table 161.

Table 161 Output Mode Setting in Workbench

Required Output	Setting
12G-SDI	12G
6G-SDI	6G

Table 161 Output Mode Setting in Workbench (Continued)

Required Output	Setting
3G-SDI	HD
1.5G-SDI (HD)	
270M (SD)	SD

E.5 Signal Status Reporting

E.5.1 Input Signal Status

With the introduction of native 12G-SDI into the Sirius S800 router range, the router's 'Input Signal' status screen has been modified to display both:

- the incoming signal's status (at the HD-BNC input connector); as well as
- the signal status as reported to the router's internal crosspoint.

This is shown in Figure 266.

Figure 266 Router Input Signals Status Screen

In the example of Figure 266:

1. Channel 73 has one incoming '2160p59.94' 12G-SDI signal.

   (Channels 74-76 have no signals; these are shown grayed out.)

2. The '1-to-4' de-multiplexing operation of the 12G input rear produces four constituent 3G signals and their video standard is displayed in Channels 73-76 in the 'crosspoint' column (1080p59).

If a lower rate signal were incoming (for example, 1080i50 HD-SDI) then this would be reflected on screen, see Figure 267. The signal is passed through on channel 73; channels 74-76 are unused and carry no signal ('None').

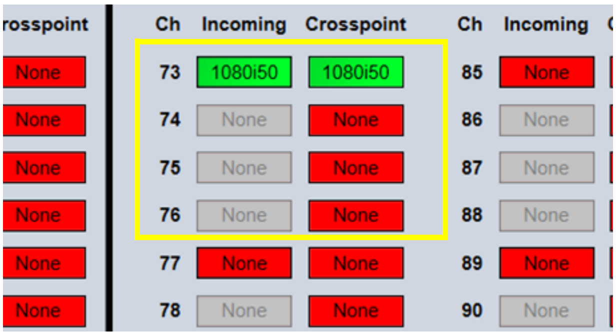


Figure 267 Lower Rate Input Signal Status

E.5.2 Output Signal Status

With the introduction of native 12G-SDI output rears on the Sirius S800 router range, the router's 'Output Status' screen has been modified to display both:

- the signal standard being detected at the input of the card (this is internal to the router, at the output of the Crosspoint); and also
- the final signal's video standard at the output HD-BNC connectors.

This is shown in Figure 268.

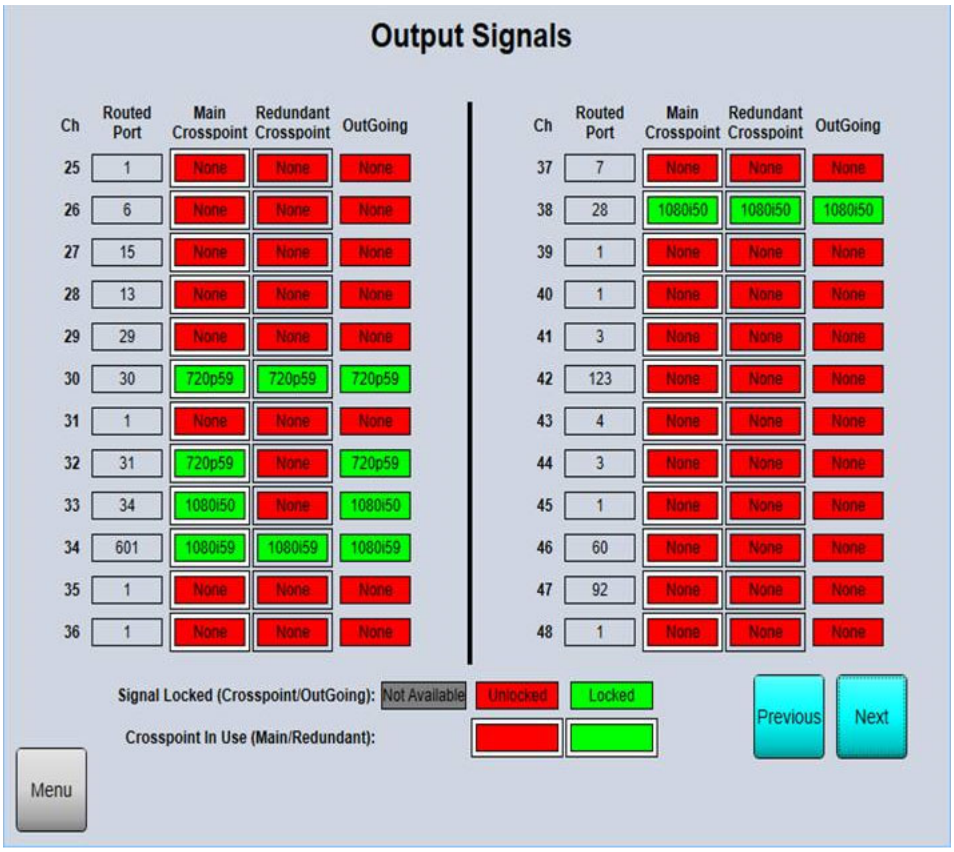


Figure 268 Router Output Signals Status Screen

In the example of Figure 268:

- Outgoing channels 73, 77, 81, 85, 89 & 93 are all HD-BNC outputs of a 12G output rear.
- Each outgoing channel carries a 12G-SDI (2160p50) signal, formed from the four internal, incoming 1080p50 G-SDI signals, from the router crosspoint.

Appendix F Video IP Input/Output Configuration

:Appendix contains:

Video IP Input/Output Configuration

This appendix describes steps required to do configuration of the Video IP Input or IP Output modules of the Sirius 800 router. The steps required are similar for the Video IP Input (5960) and Video IP Output (5970) modules.

Each module is configured via both its CTRL A and CTRL B interfaces using RollCall templates, which are accessed via Grass Valley's RollCall Control Panel tool. Each module contains two identical IP circuit blocks which require configuring separately.

Note: **RollCall Control Panel:**

The RollCall Control Panel tool is part of the RollCall Suite. (For installation instructions, see the "RollCall V4 Suite & RollCall Lite" manual.)

Install the RollCall Control Panel software on your client computer.
See the 'RollCall Control Panel User Manual' and contact Grass Valley Support for information.

F.1 5960-1824/25

The 5960-1824/25 Video IP Input module combination contains two IQMIX40-like IP-to-SDI blocks. Each must be configured separately to the router and independently.

The default control interface IP addresses for the two IP-to-SDI blocks on the 5960-1824/25 combination are identical and given in Table 162.

Table 162 5960 IP-to-SDI Block Control Interface Default IP Address

IP-to-SDI Block of 5960	Default Control IP Address
Top, CTRL A	10.54.31.60
Bottom, CTRL B	10.54.31.60
Note:	The *default* IP Addresses are the same.

F.1.1 5960 IP-to-SDI Initial Setup

The first step is to set up IP addresses of each IP interface of the IP-to-SDI blocks, changing from their shipping default settings to unique, working addresses for a target house IT network. This is set up via **CTRL A** and **CTRL B**.

For each CTRL control interface, see:

1. *Prerequisites:* on page 440.
2. *RollCall Control Panel Connection* on page 441.
3. *Initial Setup (5960 or 5970)* on page 444.

When this is done, the CTRL and LINK interfaces can be connected into a target house IT system for further Video IP Input configuration and operation.

F.1.2 5960 IP-to-SDI Configuration

The 5960-1824/25 combination contains two IQMIX40-like IP-to-SDI blocks. Each is configured separately to the router and independently. The following interfaces can be used to access control screens and configure:

- Upper IP-to-SDI block - **CTRL A**, or media interfaces **LINK 1A** or **LINK 1B**.
- Lower IP-to-SDI block - **CTRL B**, or media interfaces **LINK 2A** or **LINK 2B**.

Note: While an IP-to-SDI block is being reconfigured, all router sources from that block are temporarily lost.

Configuration screens for each multi-channel IP-to-SDI block are the similar to those for an IQMIX40 card. For the IP-to-SDI block, only 12 spigots are shown on control screens.

Control screens (RollCall templates) are described in *Introduction to Configuration Screens (5960 or 5970)* on page 448.

Note: **IQMIX40 Configuration Screen Terminology:**

The terminology used on IQMIX40 configuration screens is 'SDI-centric'. This means that a spigot is described as having an:

- "Output" direction when its associated SDI signal forms an output.
- "Input" direction when its associated SDI signal forms is an input.

Therefore, (counter-intuitively), for the case of the ***5960 Video IP Input*** *module*, ***spigots*** must be configured for ***"Output"* direction**.

F.2 5970-1832

The 5970-1832 Video IP Output module combination contains two IQMIX40-like SDI-to-IP blocks. Each must be configured separately to the router and independently.

The default control interface IP addresses for the two SDI-to-IP blocks on the 5970-1832 combination are identical and given in Table 162.

Table 163 5970 SDI-to-IP Block Control Interface Default IP Address

SDI-to-IP Block of 5970	Default Control IP Address
Top, **CTRL A**	10.54.31.70
Bottom, **CTRL B**	10.54.31.70
Note:	The *default* IP Addresses are the same.

F.2.1 5970 SDI-to-IP Initial Setup

The first step is to set up IP addresses of each of the SDI-to-IP blocks, changing from their shipping default setting to unique, working addresses for a target house IT network. This is set up via **CTRL A** and **CTRL B**.

For each CTRL control interface, see:

1. *Prerequisites:* on page 440.
2. *RollCall Control Panel Connection* on page 441.
3. *Initial Setup (5960 or 5970)* on page 444.

When this is done, the CTRL and LINK interfaces can be connected into a target house IT system for further Video IP Output configuration and operation.

F.2.2 5970 SDI-to-IP Configuration

The 5970-1832 combination contains two IQMIX40-like SDI-to-IP blocks. Each is configured separately to the router and independently. The following interfaces can be used to access control screens and configure:

- Upper SDI-to-IP block - **CTRL A**, or media interfaces **LINK 1A** or **LINK 1B**.
- Lower SDI-to-IP block - **CTRL B**, or media interfaces **LINK 2A** or **LINK 2B**.

Note: While a SDI-to-IP block is being reconfigured, all router IP streams from that block are temporarily lost.

Configuration screens for each multi-channel SDI-to-IP block are the similar to those for an IQMIX40 card. For the SDI-to-IP block, only 12 spigots are shown on control screens.

Control screens (RollCall templates) are described in *Introduction to Configuration Screens (5960 or 5970)* on page 448.

Note: **IQMIX40 Configuration Screen Terminology:**

The terminology used on IQMIX40 configuration screens is 'SDI-centric'. This means that a spigot is described as having an:

- "Output" direction when its associated SDI signal forms an output.
- "Input" direction when its associated SDI signal forms is an input.

Therefore, (counter-intuitively), for the case of the ***5970 Video IP Output** module*, ***spigots*** must be configured for ***"Input"* direction**.

F.3 Preparing for Initial Setup (5960 or 5970)

Note:

Initial Setup:

When initially connecting RollCall Control Panel, the client computer should be connected *directly* to the rear control interface.

Further configuration:

For full and further configuration, control interfaces may be connected into a target house system IT network.

Prerequisites:

- Either:
  - 5960 module and 1824/25 rear panel installed in a Sirius 800 router frame (See Section 6 *Module Locations* on page 94); or
  - 5970 module and 1832 rear panel installed in a Sirius 800 router frame (See Section 6 *Module Locations* on page 94).
- A 'direct' CAT 5 Ethernet cable.
  (**Note:** Depending on the computer's network interface, a normal, non-crossover cable may suffice.)
- A laptop, or some client computer, with an RJ45 Ethernet port and with Grass Valley RollCall Control Panel software installed.

Prepare Computer:

To prepare a client computer for control connection to the Sirius Video IP Input/Output modules:

1. Select which computer Ethernet RJ45 port to use
   and set the port to a fixed IP address on the same network sub-net of the Sirius module's CTRLA or CTRL B interface.

   (For example, use 10.54.31.50 for the computer port when connecting to a interface with default IP address of 10.54.31.60.)
2. Disable any WiFi connections on the computer.
   (These may interfere with the wired RJ45 port.)
3. Directly connect the computer RJ45 port to the chosen module control interface using the 'direct' Ethernet cable.

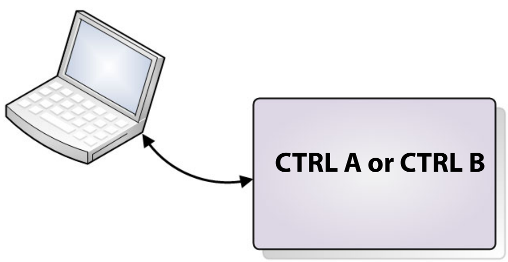


Figure 269 Initial Configuration, separate from House IT System

F.4 RollCall Control Panel Connection

To connect RollCall Control Panel:

1. Open the RollCall Control Panel application from:

   `Start > All Programs > SAM > RollCall > Control Panel`

   The RollCall application starts and the initial screen is displayed.

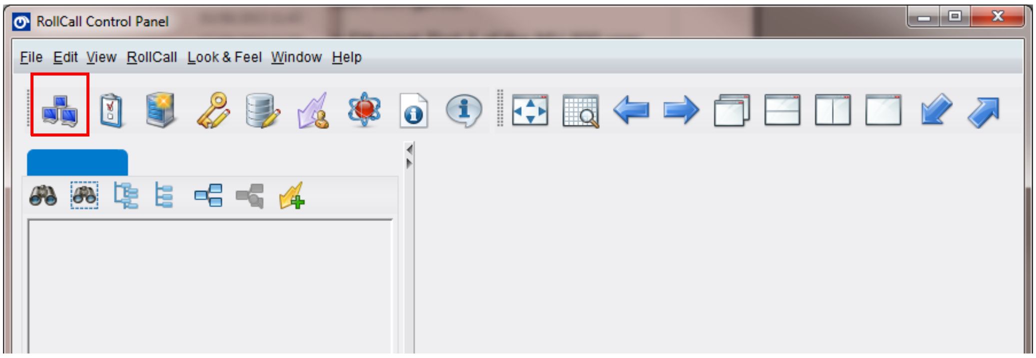


Figure 270 RollCall Control Panel Initial Screen

2. Click on the **Build Network**  icon in the RollCall tool bar to display the **Build Network** dialog. See Figure 271.

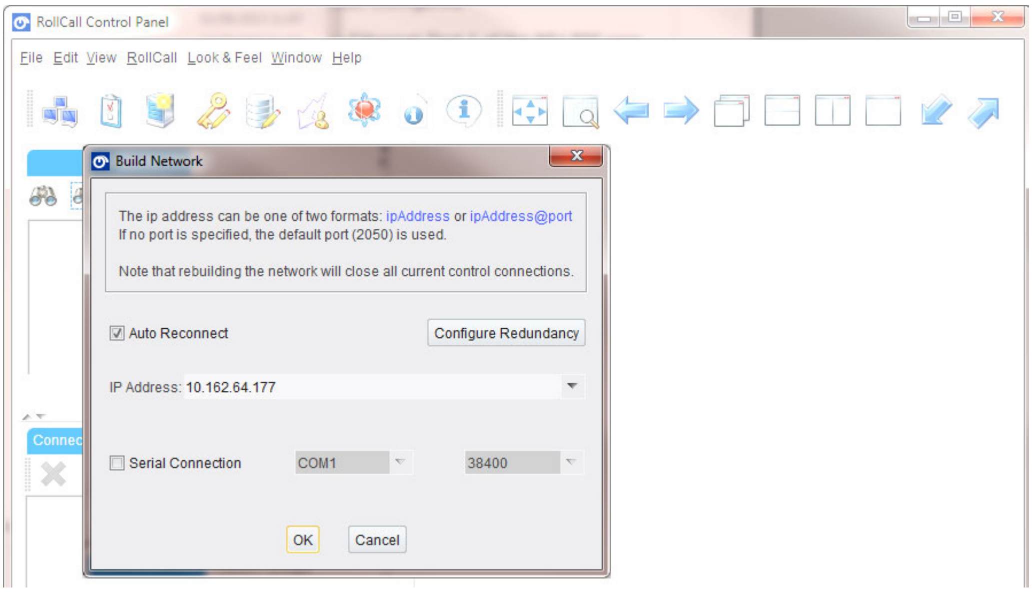


Figure 271 Build Network Dialog

3. Enter the IP address of the interface to connect to and click **OK** to connect.

   (See Table 162 on page 438 or Table 163 on page 439 for default shipping IP addresses.)

   After a short period displaying the message "Connecting", RollCall Control Panel will connect to the interface.

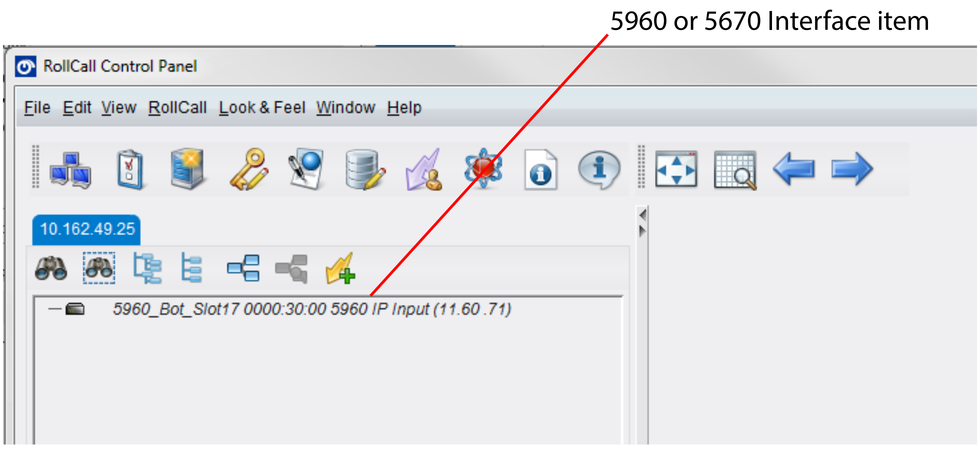


Figure 272 Connected to a CTRL Interface of a 5960or 5970 Module

4. In RollCall Control Panel, double-click on the 5960/5970 item in the left-hand pane.

   Configuration screens (RollCall templates) are downloaded.

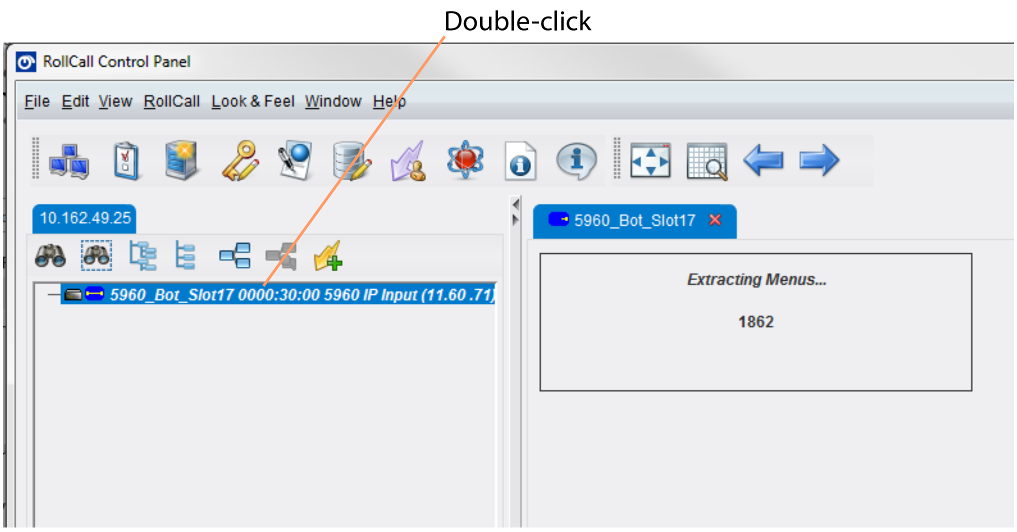


Figure 273 RollCall Template Downloading

5. The RollCall templates of the circuit block are automatically downloaded and then displayed in the pane on the right. See Figure 274.

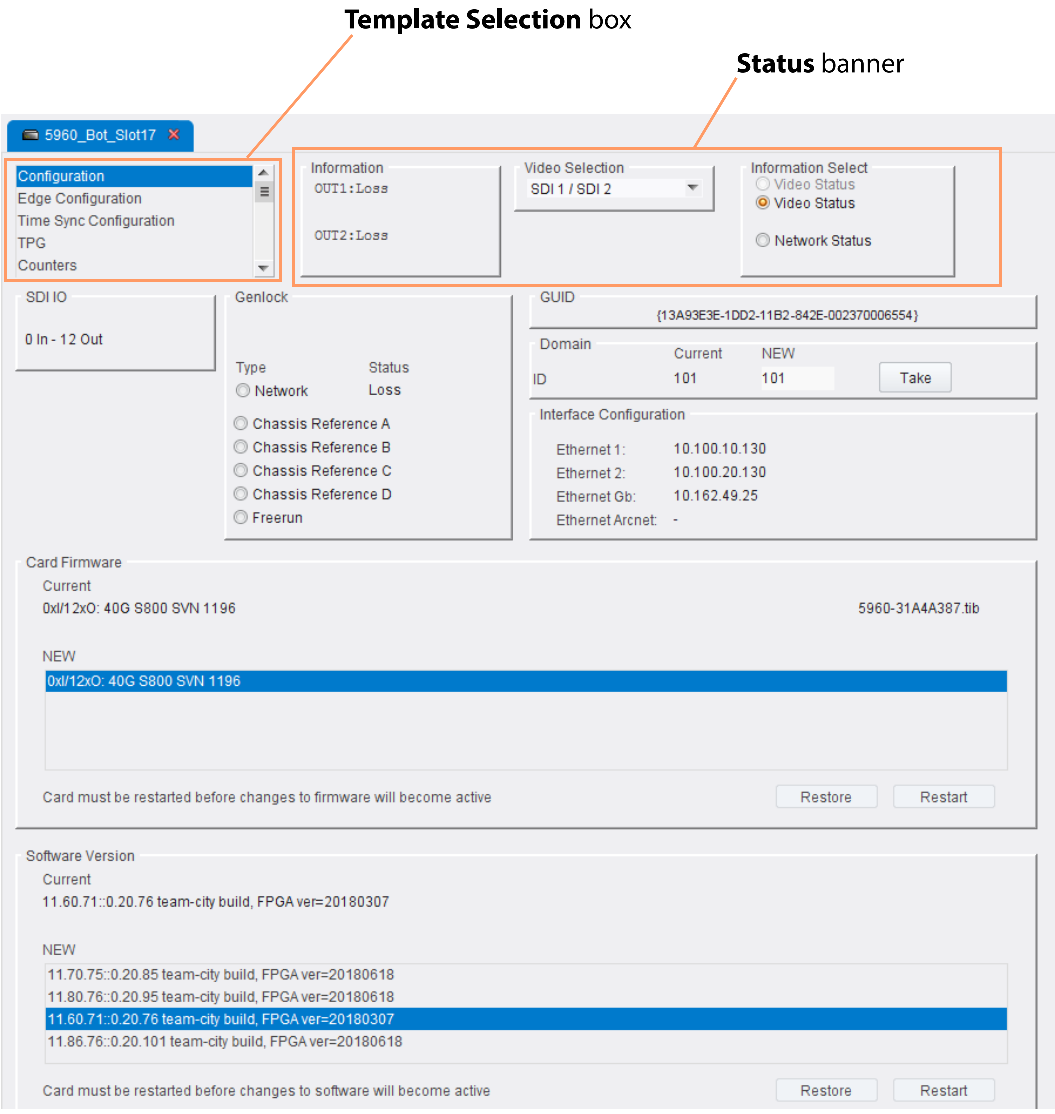


Figure 274 RollCall Template Example (5960 shown)

RollCall Control Panel has now connected to the module.

F.5 Initial Setup (5960 or 5970)

> **Note:** This section applies to both IP blocks on:
> - 5960-1824/25 module combinations (referred to here as “5960”).
> - 5970-1832 module combinations (referred to here as “5970”).

In this sub-section, the IP addresses of various IP interfaces are set up. For:

- **In-band control** - use this section to set up IP addresses for:
  - media link interfaces (**LINK 1A** and **LINK 1B**, and **LINK 2A** and **LINK 2B**).

  Note: CTRL A and **CTRL B** can remain at their default IP addresses if not normally connected.
- **Out-of-band control** - use this section to set up IP addresses for:
  - control interfaces (**CTRL A** and **CTRL B**); and
  - media link interfaces (LINK 1A and LINK 1B, and LINK 2A and LINK 2B).

Do the following sub-section(s) for *each* of the two control interfaces, **CTRL A** and **CTRL B**. (I.e. set up both IP blocks on the module.)

F.5.1 Setting up Control Interface

To set up the IP address etc. for a control interface, with a RollCall Control Panel connection made and RollCall templates open:

1. In the **Template Selection** box,
   scroll down to the ‘**Ethernet Gb**’ item and
   double-click on it to open the RollCall template.

   See Figure 275.

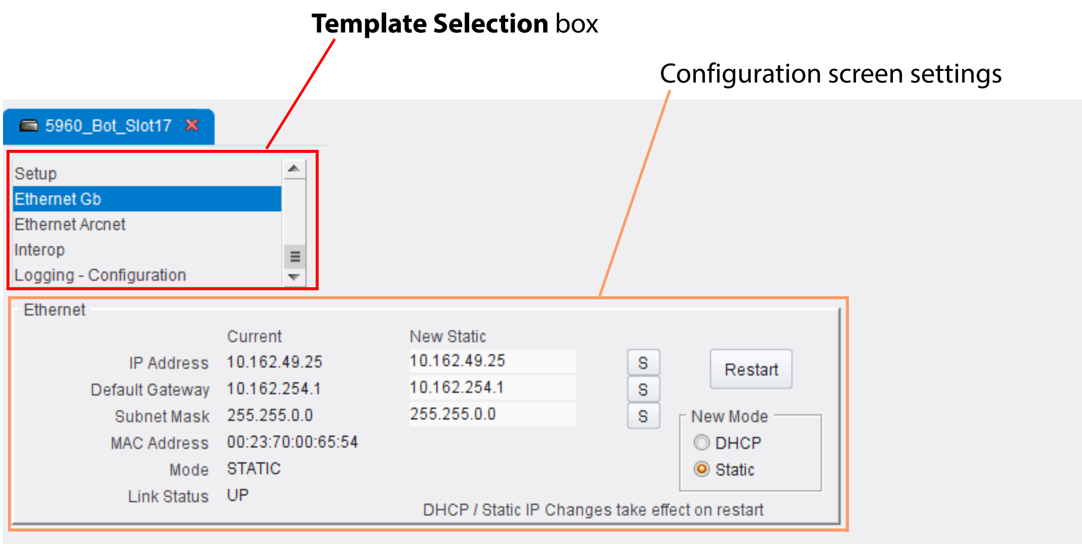


Figure 275 Ethernet Gb Template (5960 shown)

2. At the **New Mode** radio button control,
   select either ‘DHCP’ or ‘Static’ IP addressing mode.
3. If static IP address,
   enter the new **IP Address**. (Must be unique)
   Press **S** to save this new setting on the template.

4. Enter the new **Default Gateway** IP address.
   Press **S** to save this new setting on the template.
5. Enter the new **Subnet Mask**.
   Press **S** to save this new setting on the template.

This has completed *entering* the settings changes for the control interface.
(**Note**: To make the settings changes take effect, a restart is required.)

Now proceed to *Setting Up Media Interfaces* on page 445 to set up the media interfaces, otherwise proceed to *Finishing Initial Setup* on page 446 to apply the new settings.

F.5.2 Setting Up Media Interfaces

In this sub-section, the media interfaces of the IP block (**LINK 1A** and **LINK 1B**, or **LINK 2A** and **LINK 2B**) are set up.

With a RollCall Control Panel connection made and RollCall templates open:

1. In the **Template Selection** box,
   scroll down to the '**Ethernet 1**' item and
   double-click on it to open the RollCall template.

   See Figure 276.

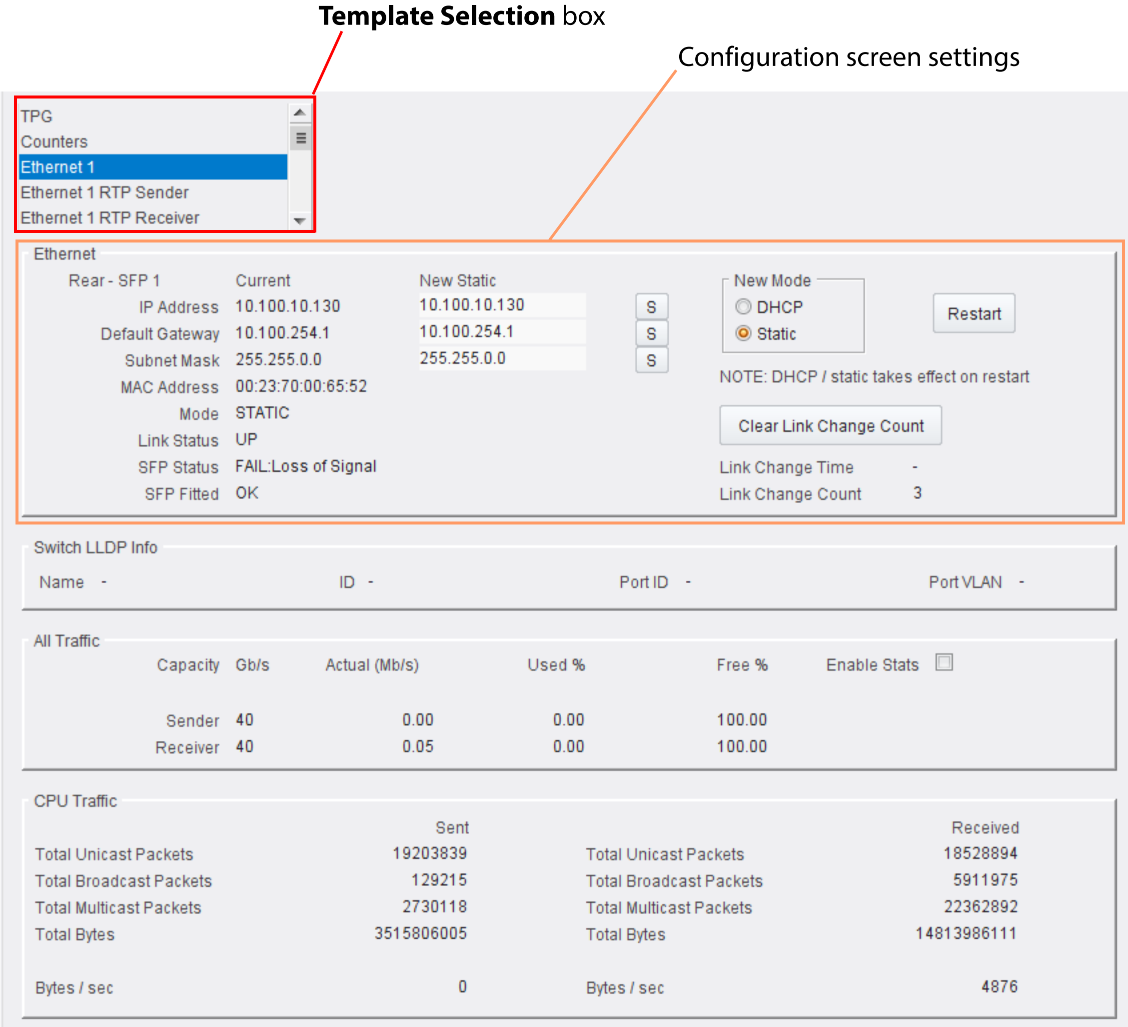


Figure 276 Ethernet Template (Ethernet 1 Template of 5960 shown)

2. At the **New Mode** radio button control, select either 'Static' addressing mode.
3. Enter the new **IP Address**. (Must be unique) Press **S** to save this new setting on the template.
4. Enter the new **Default Gateway** IP address. Press **S** to save this new setting on the template.
5. Enter the new **Subnet Mask**. Press **S** to save this new setting on the template.

This has completed entering settings for one media link (LINK 1A or LINK 2A). To set up the other media link:

6. In the **Template Selection** box, scroll down to the '**Ethernet 2**' item and double-click on it to open the RollCall template. (It is similar to the 'Ethernet' 1 template shown in Figure 276.)
7. Repeat steps 2 to 5, using a unique IP address.

This has completed entering the settings for the second media link of the IP block (LINK 1B or LINK 2B).

Settings have been entered for both media links.
Proceed to *Finishing Initial Setup* on page 446 to apply these new settings.

F.5.3 Finishing Initial Setup

To apply the new settings:

1. Click the **Restart** button on the template.

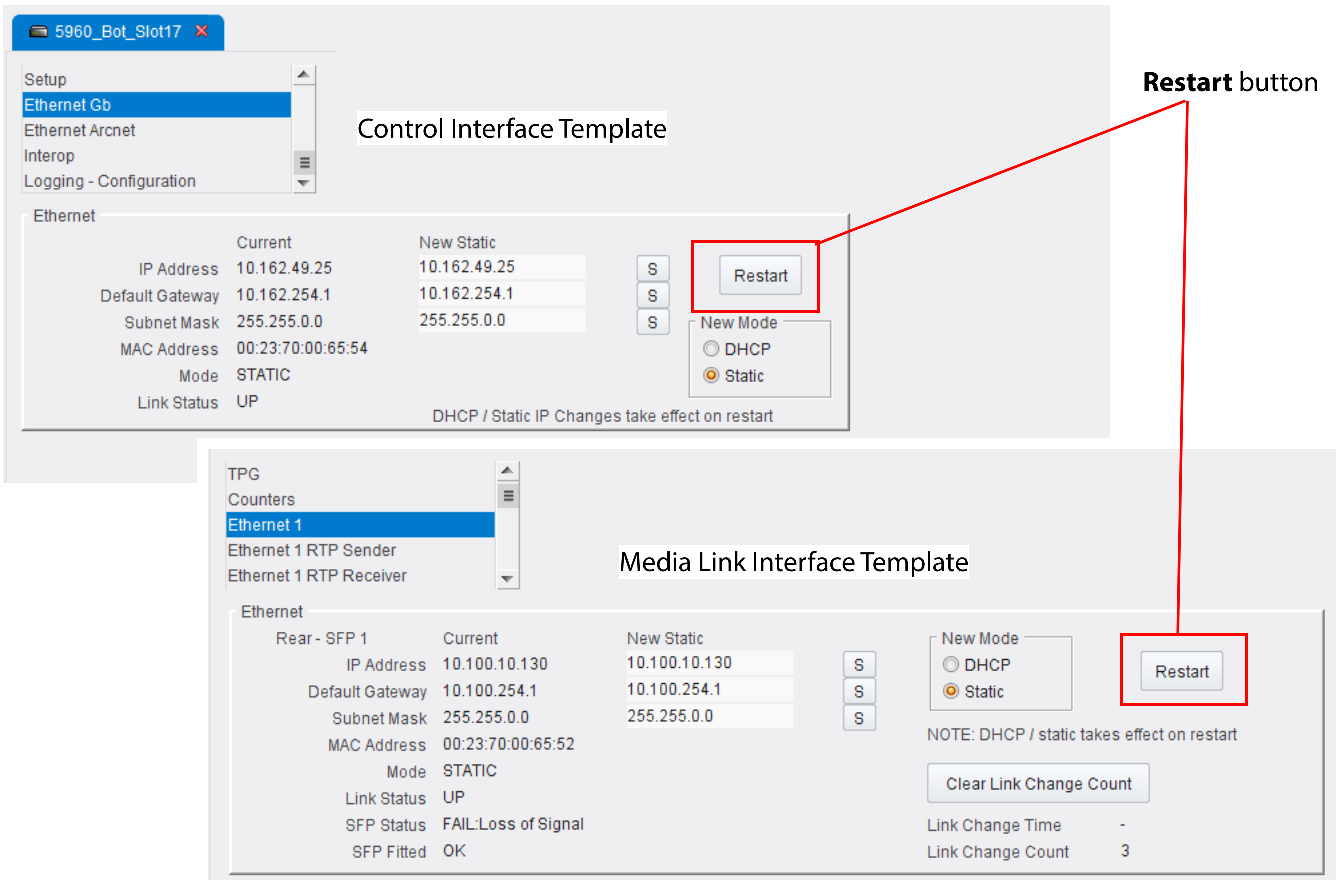


Figure 277 Restart Buttons on Templates

2. When the module has re-booted and restarted, the new IP address settings will be adopted.
3. Disconnect the client computer from the module's CTRL interface.

One IP block has been initially set up.

To set up the second IP block:

4. Connect the client computer to control interface **CTRL B**.
5. Connect RollCall Control Panel to the IP block. (See *RollCall Control Panel Connection* on page 441.)
6. Carry out:
   - *Setting up Control Interface* on page 444;
   - *Setting Up Media Interfaces* on page 445; and
   - *Finishing Initial Setup* on page 446

   Note: Configure this other IP block with unique IP addresses.

When the module has re-booted a second time, the new settings will be adopted on the second IP block.

The 5960/70 module's interfaces can then be connected to the target house IP network and then any further module configuration can be carried out on the control screens. (See *Introduction to Configuration Screens (5960 or 5970)* on page 448 and *Configuration Screens (RollCall Templates)* on page 452.)

F.6 Introduction to Configuration Screens (5960 or 5970)

Note: This section applies to:

- 5960-1824/25 module combinations (referred to here as “5960”).
- 5970-1832 module combinations (referred to here as “5970”).

Note: **Initial Setup:**

When initially connecting RollCall Control Panel, the client computer should be connected *directly* to the rear control interface.
See *Preparing for Initial Setup (5960 or 5970)* on page 440.

Further configuration:

For full and further module configuration, after initial setup, the control interfaces may be connected into a target house system IT network.

F.6.1 IP Blocks and IQMIX40 (5960 or 5970)

The 5960 or 5970 module contains two ‘IQMIX40-like’ IP circuit blocks.

Each IP circuit block must be configured separately to the router and independently:

- control interface CTRL A is used to configure the IP block at the top; and
- control interface CTRL B is used for the bottom IP block.

Note: While an IP circuit block is being reconfigured, all router sources or IP streams from that block are temporarily lost.

Accessing the configuration screens (RollCall templates) is done with Grass Valley’s RollCall Control Panel tool. See *RollCall Control Panel Connection* on page 441 for information on connecting to the CTRL A or CTRL B control interfaces.

F.6.2 Configuration Screen Differences/Similarities Etc.

Configuration screens for each multi-channel IP block are similar to those for an IQMIX40 card in most cases. Configuration screens for a 5960 and for a 5970 module are also similar to one another. Some of the screens have minor differences and these are described in *Notes for IQMIX40 Templates* on page 452.

Note: **IQMIX40 User Manual:**

Information on IQMIX40 RollCall Templates is found in the
“**IQMIX25/26 IQMIX40/41**“ User Manual, available from the *Grass Valley website*.
(The current document revision is Issue 1 Revision 5)

A few configuration screens are not covered by the IQMIX40 user manual, these screens are explicitly presented below, including:

- *Audio V Fade Template* on page 457;
- *Input Loss Control Template* on page 458;
- *Logging SDI Info Template* on page 459; and
- *Logging Configuration Template* on page 460.)

Note:

IQMIX40 Configuration Screen Terminology:

The terminology used on IQMIX40 configuration screens is 'SDI-centric'. This means that a spigot is described as having an:

- "Output" direction when its associated SDI signal forms an output.
- "Input" direction when its associated SDI signal forms is an input.

Therefore, for:

- ***5960 Video IP Input*** *module*: ***spigots*** must be configured for "***Output***" direction.
- ***5970 Video IP Output*** *module*: ***spigots*** must be configured for "***Input***" direction.

For the configuration screens of IP blocks, the:

- **5960-1824/25 modules** (Video IP Inputs) - only 12 'Output' spigots are shown.
- **5970-1832 modules** (Video IP Outputs) - only 12 'Input' spigots are shown.

The configuration screens are listed in Figure 278 and in Table 164.

The configurations screens are described in *Configuration Screens (RollCall Templates)* on page 452.

F.6.3 Configuration Screen List

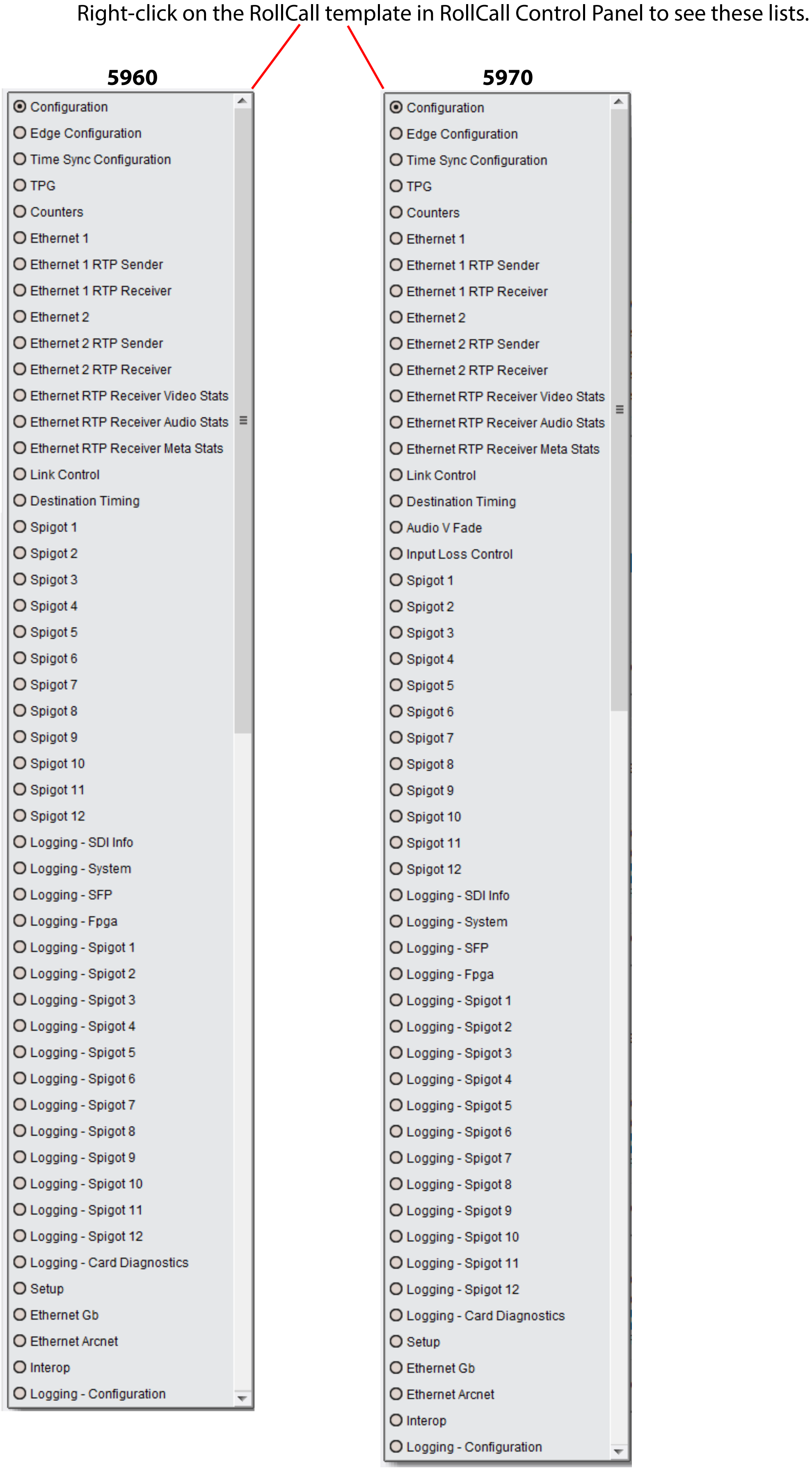


Figure 278 List of 5960 and 5970 Templates

Table 164 List of 5960 and 5970 Configuration Screens (Templates)

Configuration Screen Name (See *Configuration Screens (RollCall Templates)* on page 452.)	**Sirius Module** 5960	5970	**Reference**	**Comment**
Configuration	✓	✓	IQMIX40	
Edge Configuration	✓	✓	**Note:** Template is not applicable to 5960/70.	
Time Sync Configuration	✓	✓	IQMIX40	
TPG	✓	✓	IQMIX40	
Counters	✓	✓	IQMIX40	
Ethernet 1	✓	✓	IQMIX40	
Ethernet 1 RTP Sender	✓	✓	IQMIX40	
Ethernet 1 RTP Receiver	✓	✓	IQMIX40	
Ethernet 2	✓	✓	IQMIX40	
Ethernet 2 RTP Sender	✓	✓	IQMIX40	
Ethernet 2 RTP Receiver	✓	✓	IQMIX40	
Ethernet RTP Receiver Video Stats	✓	✓	IQMIX40	
Ethernet RTP Receiver Audio Stats	✓	✓	IQMIX40	
Ethernet RTP Receiver Meta Stats	✓	✓	IQMIX40	
Link Control	✓	✓	IQMIX40	
Destination Timing	✓	✓	IQMIX40	
Audio V Fade	✓	no	See *Audio V Fade Template* on page 457.	
Input Loss Control	✓	no	See *Input Loss Control Template* on page 458.	
Spigot 1 to Spigot 12	✓	✓	IQMIX40	
Logging - SDI Info	✓	✓	See *Logging SDI Info Template* on page 459.	
Logging - System	✓	✓	IQMIX40	
Logging - SFP	✓	✓	IQMIX40	
Logging - FPGA	✓	✓	IQMIX40	
Logging - Spigot 1 to Spigot 12	✓	✓	IQMIX40	
Logging - Card Diagnostics	✓	✓	IQMIX40	
Setup	✓	✓	IQMIX40	
Ethernet Gb	✓	✓	IQMIX40	**Ethernet Front** on IQMIX40
Ethernet Arcnet	✓	✓	IQMIX40	
Interop	✓	✓	IQMIX40	
Logging Configuration	✓	✓	See *Logging Configuration Template* on page 460.	
Note:	Most "IQMIX40" templates are to be found in the "**IQMIX25/26 IQMIX40/41**" User Manual, available from the *Grass Valley website*. (The current document revision is Issue 1 Revision 5)			

F.7 Configuration Screens (RollCall Templates)

F.7.1 Notes for IQMIX40 Templates

Configuration screens (RollCall templates) are outlined in Table 165 for:

- 5060 (and its accompanying 1824/25 rear panel).
- 5070 (and its accompanying 1832 rear panel).

General points:

- **Ethernet Gb** on 5960/70 templates is the control interface (CTRL A or CTRL B) and is shown as “Ethernet Front” on IQMIX40 templates.

Table 165 5960 and 5970 Configuration Screens (Templates)

5960/70 RoilCall Template Name	Reference	Template Notes
Configuration	IQMIX40	Displays basic module parameters, some of which may be set. **For 5960**: **SDI I/O**: “0 In - 12 Out”. **Genlock**: Choice of 4 chassis (router frame analog video references) or IP network. **Card Firmware**: “0xI/12xO 40G S800 xxx” **For 5970**: **SDI I/O**: “12 In - 0Out”. **Genlock**: Choice of 4 chassis (router frame analog video references) or IP network. **Card Firmware**: “12xI/0xO 40G S800 xxx”
Edge Configuration	The **Edge Configuration** template is **not applicable to 5960/70**.	
Time Sync Configuration	IQMIX40	Select time synchronization source.
TPG	IQMIX40	Select and enable video test patterns to be applied on a spigot-by-spigot basis. **For 5960 (Video IP Input)**: The **TPG** template is blank and not applicable. (Test patterns are only generated for output IP spigots. **For 5970 (Video IP Output)**: The **TPG** template allows a video test pattern to be set up at each spigot and, thus, on each sent video IP stream.
Counters	IQMIX40	Clear various counters.

Table 165 5960 and 5970 Configuration Screens (Templates) (Continued)

5960/70 RoilCall Template Name	Reference	Template Notes
Ethernet 1	IQMIX40	Configuration for a high-performance network interface, rear panel LINK A.
Ethernet 1 RTP Sender	IQMIX40	Displays amount of data sent out on rear panel LINK A. **For 5960 (Video IP Input)**: Only the overall amount of traffic sent is shown. No spigot data is shown because, for 5960, no video data is sent from spigots (it is only received). **For 5970 (Video IP Output)**: The overall data traffic amount traffic sent is shown and a breakdown of the figures for each spigot.
Ethernet 1 RTP Receiver	IQMIX40	Displays amount of data received on rear panel LINK A.
Ethernet 2	IQMIX40	Configuration for a high-performance network interface, rear panel LINK B.
Ethernet 2 RTP Sender	IQMIX40	For rear panel Link B.
Ethernet 2 RTP Receiver	IQMIX40	For rear panel Link B.
Ethernet RTP Receiver Video Stats	IQMIX40	Displays statistics of video data packets received via RTP at each Link interface.
Ethernet RTP Receiver Audio Stats	IQMIX40	Displays statistics of audio data packets received via RTP at each Link interface.
Ethernet RTP Receiver Meta Stats	IQMIX40	Displays statistics of metadata data packets received via RTP at each Link interface.
Link Control	IQMIX40	Define any quad-link associations on video inputs. **For 5960 and 5970**: Only spigots 1 to 12 are shown because the modules only use 12 spigots.

Table 165 5960 and 5970 Configuration Screens (Templates) (Continued)

5960/70 RoilCall Template Name	Reference	Template Notes
Ethernet 1	IQMIX40	Configuration for a high-performance network interface, rear panel LINK A.
Ethernet 1 RTP Sender	IQMIX40	Displays amount of data sent out on rear panel LINK A. **For 5960 (Video IP Input)**: Only the overall amount of traffic sent is shown. No spigot data is shown because, for 5960, no video data is sent from spigots (it is only received). **For 5970 (Video IP Output)**: The overall data traffic amount traffic sent is shown and a breakdown of the figures for each spigot.
Ethernet 1 RTP Receiver	IQMIX40	Displays amount of data received on rear panel LINK A.
Ethernet 2	IQMIX40	Configuration for a high-performance network interface, rear panel LINK B.
Ethernet 2 RTP Sender	IQMIX40	For rear panel Link B.
Ethernet 2 RTP Receiver	IQMIX40	For rear panel Link B.
Ethernet RTP Receiver Video Stats	IQMIX40	Displays statistics of video data packets received via RTP at each Link interface.
Ethernet RTP Receiver Audio Stats	IQMIX40	Displays statistics of audio data packets received via RTP at each Link interface.
Ethernet RTP Receiver Meta Stats	IQMIX40	Displays statistics of metadata data packets received via RTP at each Link interface.
Link Control	IQMIX40	Define any quad-link associations on video inputs. **For 5960 and 5970**: Only spigots 1 to 12 are shown because the modules only use 12 spigots.

Table 165 5960 and 5970 Configuration Screens (Templates) (Continued)

5960/70 RoilCall Template Name	Reference	Template Notes
Destination Timing	IQMIX40	Adjust genlock timing at each spigot. **For 5960**: 12 spigot timings may be adjusted. **For 5970**: Destination timing is *not applicable* because spigots are all output spigots (i.e. sources of video IP streams). Controls are grayed-out in the template.
Audio V Fade	Configure and audio V-fade for each received video IP stream for smoother audio switch-over. **5960 only.** See *Audio V Fade Template* on page 457.	
Input Loss Control	Configure video what to provide in event of loss of SDI video. **5960 only.** See *Input Loss Control Template* on page 458.	
Spigot 1 to Spigot 12	IQMIX40	Set the multicast settings for each of the 12 received video IP streams etc. Includes selecting 'Make-before-Break' and 'Break-before-Make' modes. Select 'Break-before-Make' when using redundant network or when using one high-performance interface. (**Note:** These parameters may be controlled automatically by an IP routing system.) **For 5960 (Video IP Input)**: Spigot direction is "Output". They are receivers. The multicast settings determine which IP streams are received at the spigot (video, audio, metadata). **For 5970 (Video IP Output)**: Spigot direction is "Input". They are senders. The multicast settings identify the streams sent (video, audio, metadata).
Logging - SDI Info	Displays information for SDI inputs to the IP block. Applies to **5970 only**. See *Logging SDI Info Template* on page 459.	
Logging - System	IQMIX40	Select RollCall log fields to be enabled for RollCall network status.

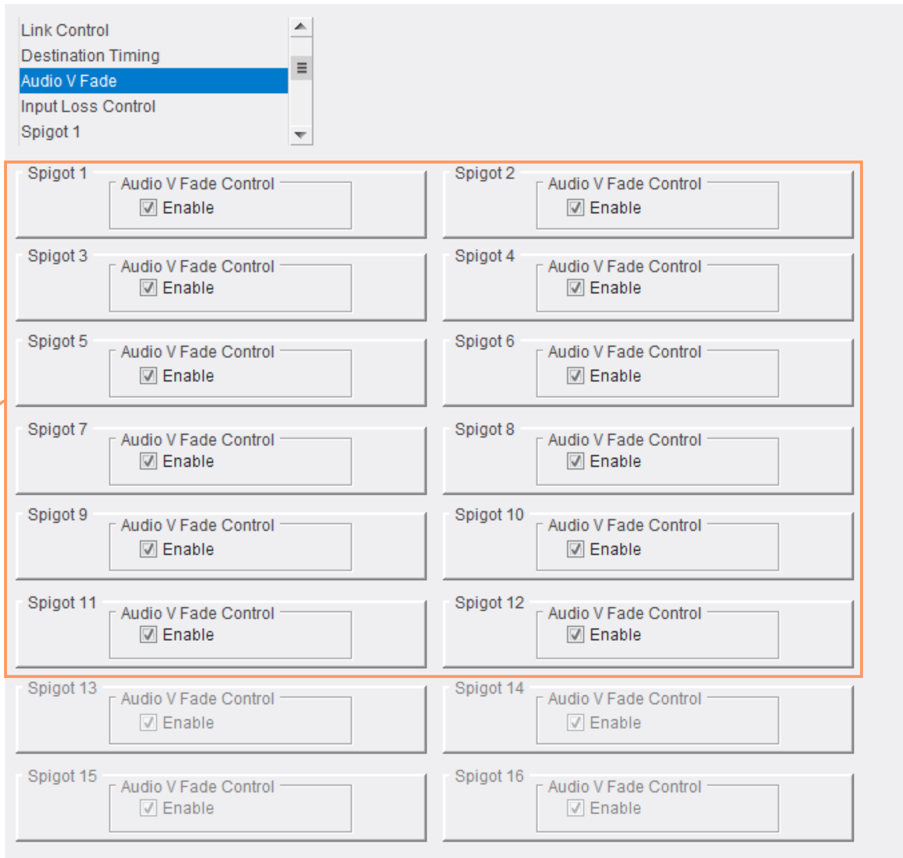
Table 165 5960 and 5970 Configuration Screens (Templates) (Continued)

5960/70 RoilCall Template Name	Reference	Template Notes
Logging - SFP	IQMIX40	Select RollCall log fields to be enabled for SFP transceiver module status.
Logging - FPGA	IQMIX40	Select RollCall log fields to be enabled for FPGA status.
Logging - Spigot 1 to Spigot 12	IQMIX40	Select RollCall log fields to be enabled for each spigot. **For 5960 (Video IP Input)**: An "Output Logging" pane is shown which shows log information about the video IP streams *received* by the module. **For 5970 (Video IP Output)**: An "Input Logging" pane is shown which shows log information about the video IP streams *sent out* by the module.
Logging - Card Diagnostics	IQMIX40	The template shows logged key parameters for diagnostics of the 5960/70 IP block circuitry.
Setup	IQMIX40	The Setup template displays basic information about the module, such as software and firmware versions.
Ethernet Gb	IQMIX40	This is called "**Ethernet Front**" on IQMIX40. Configures the control interface of the IP block being configured (CTRL A or CTRL B of 5960/70).
Ethernet Arcnet	IQMIX40	**Not applicable to 5960/70.**
Interop	IQMIX40	The template permits some parameters to be adjusted to improve interoperability with third-party equipment.
Logging Configuration	Configure connection to a RollCall LogServer. See *Logging Configuration Template* on page 460.	

F.7.2 Audio V Fade Template

Applies to **5960** Video IP Input **only**.

The **Audio V Fade** template configures an audio V-fade for each spigot's received video input. When a video input stream switches to another source stream, an audio V-fade can be used to reduced audio disturbances at the switch-over.



Notes:
Spigots 1 to 12 are active on 5960.

Spigots 13 to 16 are not active and are grayed out.

Figure 279 Audio V Fade Template

The template shows a panel of settings for each receiving spigot, see Table 166.

Table 166 Audio V Fade - per Spigot

Item	Description
Audio V Fade Control:	
Enable	Check box. Select to enable audio V-fade on video inputs.

F.7.3 Input Loss Control Template

Applies to **5960** Video IP Input **only**.

The **Input Loss Control** template configures which video signal to use if a source video IP stream to a spigot is lost.

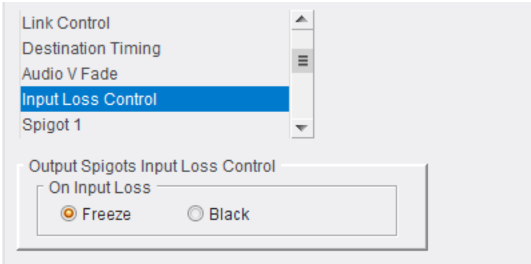


Figure 280 Input Loss Control Template

Table 167 Input Loss Control Settings

Item	Description
Output Spigots Input Loss Control:	
	Radio buttons. Select what to do when receiving spigots lose their video IP stream source.
Freeze	Select to freeze video.
Black	Select to use video black.

F.7.4 Logging SDI Info Template

Applies to **5970** Video IP Input **only**.

The **Logging - SDI Info** template enables and shows SDI log message types: Log field names and current log values are listed. To enable a log message type:

- Select the log message in the template.

Figure 281 shows an example template.

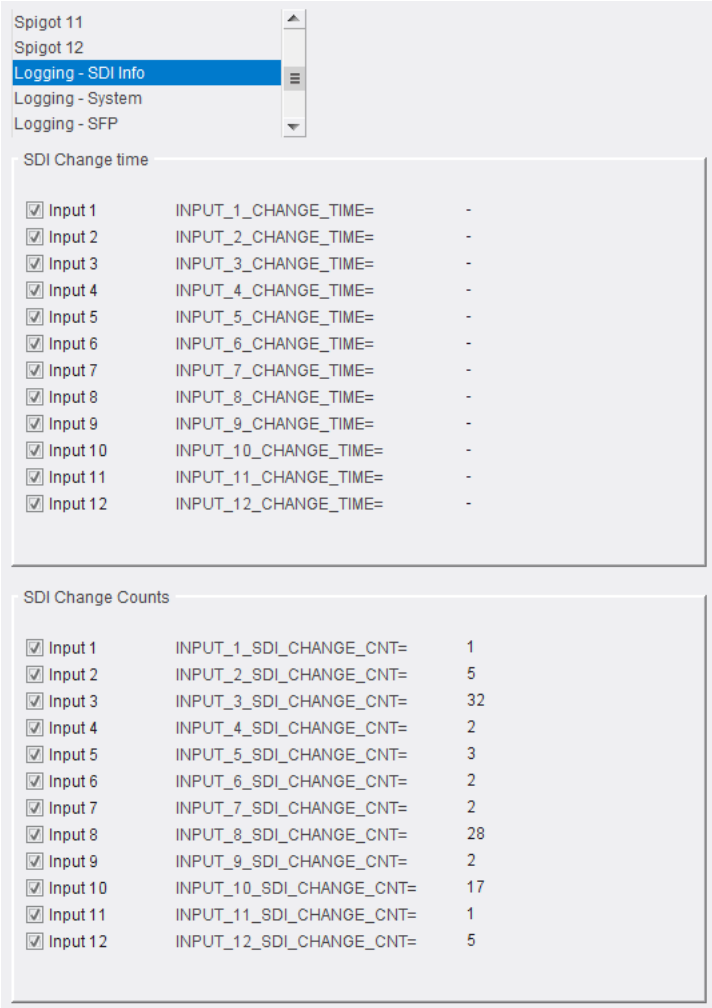


Figure 281 Logging - SDI Info Template

Table 168 Logging - SDI Info Template Settings

Log Message	Description
SDI Change Time **INPUT_N_CHANGE_TIME**	The time when the state of the SDI input to the IP block changed. (I.e. input lost or input standard changed.)
SDI Change Count **INPUT_N_CHANGE_CNT**	The number of times the state of the SDI input to the IP block has changed.
Where: **N** is the input number.	

F.7.5 Logging Configuration Template

The **Logging Configuration** template configures a connection to a RollCall LogServer. Figure 282 shows an example template. Logging connection is typically made via the IP block's control interface (referred to as '1G' on the template), but the high-performance Ethernet links may also be selected.

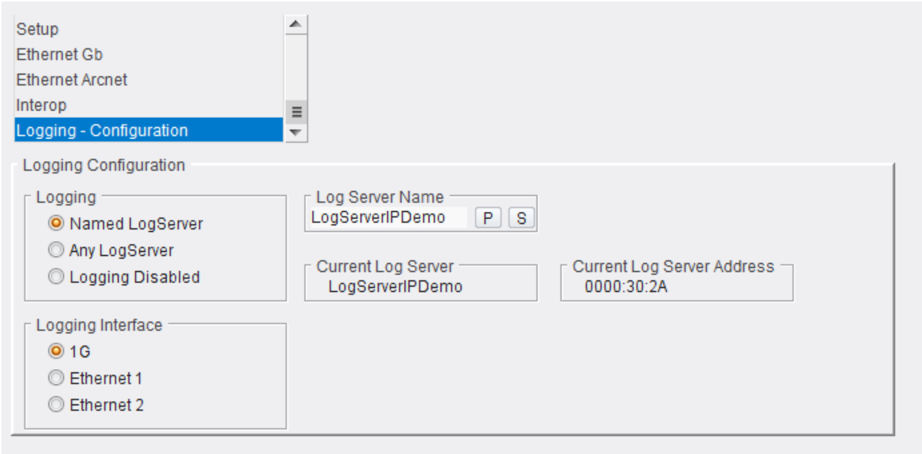


Figure 282 Logging Configuration Template

Table 169 Logging Configuration Template Settings

Logging Configuration Item	Description
Logging:	Radio buttons.
Named LogServer	Select to log to a named RollCall log server device.
Any LogServer	Select to log to any discovered RollCall log server device.
Logging Disabled	Select to disable logging.
Log Server Name	Text. Enter the log server host name. (Click **S** or press the enter key to set the name. Click **P** to set the default name.)
Current Log Server	Shows the current log server name.
Current Log Server Address	Shows the current log server's RollCall address.

Appendix G End User License Agreement

This Sirius 800 router product is subject to an end user license agreement, listed below. and available on the router controller device's 'EULA' web page.

G.1 EULA

GRASS VALLEY, A BELDEN BRAND

SOFTWARE LICENSE AGREEMENT
TERMS AND CONDITIONS

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Each party acknowledges that during the term of this Agreement, each party and its Representatives (as defined herein) may be exposed to information of a confidential or proprietary nature which is either marked as confidential or provided under circumstances reasonably indicating it is ("Confidential Information"). Each party agrees to (i) hold such Confidential Information in confidence using the same degree of care normally used to protect its own proprietary and/or confidential information within its own organization, but not less than a reasonable degree of care; (ii) use such Confidential Information only for the purpose of performing under this Agreement and for no other purposes; (iii) restrict disclosure of such Confidential Information solely to its Representatives with a need to know in connection with the performance of this Agreement (and provided that such persons are advised of the obligations assumed herein and are bound by obligations of confidentiality and non-use to protect the disclosing party's rights and interest hereunder), and (iv) shall not disclose such Confidential Information to any third party that is not a Representative of receiving party, without prior written approval of the disclosing party. "Representative(s)" of a party means that party's (and such party's Affiliates') directors, officers, partners, employees, contractors, consultants, agents, advisors, attorneys, potential financing sources, and potential joint venturers. The forgoing restrictions on the use and/or disclosure of Confidential Information shall not apply to any portion of the Confidential Information: (i) that is independently developed by the receiving party without any use of and/or access to the disclosing party's Confidential Information, or received free of restriction from a third party not known by the receiving party to be in breach of any confidentiality obligation owed to the disclosing party with respect to such Confidential Information, (ii) that is publicly known at the time of disclosure or which thereafter becomes publicly known through no wrongful act of the receiving party as of the date such information becomes publicly known, (iii) that at the time of disclosure to the receiving party was known to such party free of restriction; or (iv) that the disclosing party agrees in writing is free of such restrictions. Notwithstanding anything to the contrary in this Agreement, the restrictions on the use or disclosure of Confidential Information shall expire three (3) years after termination or expiration of this Agreement. Notwithstanding the forgoing, the receiving party may disclose Confidential Information as required by law. If the receiving party is required by law or by interrogatories, requests for information or documents, subpoena, civil investigative demand or similar process to disclose any Confidential Information, to the extent permitted by applicable law such party will provide the disclosing party with prompt, prior written notice of such request or requirement so that the disclosing party may seek an appropriate protective order and/or the receiving party's compliance with the provisions of this Agreement. In no event shall this Agreement be construed to prohibit and Grass Valley shall be entitled to use or develop for any purpose, including without limitation, use in development, manufacture, promotion, sale and maintenance of its own or its customers' products and services any information which may be retained as general, non-party specific, know-how, ideas, processes or expertise in the unaided memories of its personnel.

5. INDEMNIFICATION AND LIMITATION OF LIABILITY

5.1 Subject to the limitation on liability in Section 5.4, Grass Valley, at its own expense, shall defend any suit brought against Licensee insofar as it is based upon a claim that one or more of the Software, as and in the form provided by Grass Valley and in the territory where such Software is installed, directly infringe any third party's copyright, and shall indemnify Licensee against any final award of damages or costs by a court of competent jurisdiction in any such suit that are attributable to such claim or will pay the part of any settlement that is attributable to such claim. This indemnity is conditional upon (i) Licensee giving Grass Valley prompt notice in writing of any suit for such infringement, and full assistance and cooperation in the defense, including all documents and information reasonably requested by Grass Valley, and (ii) Grass Valley, at its option, having sole control and authority over such claim and the defense and any settlement thereof.

5.2 In its defense or settlement of any claim, Grass Valley at its own election and expense may (i) procure for Licensee the right to continue using the Software or any infringing part thereof, (ii) modify such Software or any infringing part thereof so as to become non-infringing, (iii) replace the Software or any infringing part of the same with other software, as the case may be, of substantially similar capability or (iv) provide Licensee an opportunity to return the Software for a refund of the depreciated purchase price provided that the Licensee shall thereafter cease using the Software. The depreciation will be calculated at a rate of twenty-five percent (25%) per year on a straight-line basis.

5.3 Grass Valley and its Affiliates shall have no obligation and liability if the action or claim for infringement is due to (i) a Software designed, manufactured, or modified to the requirements of Licensee, (ii) Licensee's use of the Software in combination with other equipment or software other than the equipment and/or software with which the Software was intended to be used; (iii) Licensee's modification of the Software without Grass Valley's prior written consent; (iv) the use of third party software, (v) the use of Open Source software, (vi) any unauthorized use of the Software by Licensee or any third party, (vii) use of the Software, other than the most recent version of the Software with all Updates, if such infringement or misappropriation would have been avoided by the use of the most recent version with all Updates and such Updates were made available to Licensee; or (viii) use of the Software after notice of the alleged or actual infringement, from Grass Valley or any appropriate authority.

5.4 IN NO EVENT SHALL GRASS VALLEY AND/OR ITS AFFILIATES BE LIABLE FOR ANY INCIDENTAL, INDIRECT, SPECIAL OR CONSEQUENTIAL DAMAGES BY REASON OF ANY ACT OR OMISSION OR ARISING OUT OF OR IN CONNECTION WITH THE SOFTWARE OR ITS SALE, DELIVERY, INSTALLATION, WARRANTY, MAINTENANCE, OPERATION, PERFORMANCE OR USE, INCLUDING WITHOUT LIMITATION ANY LOSS OF USE, LOSS OF DATA, BUSINESS OR GOODWILL, INTERRUPTION IN USE OR AVAILABILITY OF DATA, STOPPAGE OF WORK OR IMPAIRMENT OF OTHER ASSETS, DIMINUTION OF VALUE, LOST REVENUES, INCOME OR PROFITS, COSTS OF CAPITAL, DAMAGE TO ASSOCIATED PRODUCTS OR EQUIPMENT OR TO FACILITIES, COSTS OF SUBSTITUTE PRODUCTS, FACILITIES OR SERVICES, COSTS ASSOCIATED WITH DOWN TIME, COSTS OF REPLACEMENT POWER, AND ANY SIMILAR OR DISSIMILAR LOSSES, COSTS OR DAMAGES. FURTHERMORE, GRASS VALLEY AND ITS AFFILIATES' LIABILITY TO LICENSEE FOR ANY CLAIM OR RECOVERY OF ANY KIND HEREUNDER SHALL IN NO EVENT EXCEED THE PURCHASE PRICE PAID FOR THE SOFTWARE, OR FEES PAID FOR SERVICES AND/OR SUPPORT SERVICES WITH RESPECT TO WHICH SUCH A CLAIM OR RECOVERY IS MADE. THIS LIMITATION SHALL NOT APPLY TO LIABILITY THAT BY LAW CANNOT BE SO RESTRICTED.

5.5 THE FOREGOING SECTIONS SET FORTH LICENSEE'S SOLE AND EXCLUSIVE RIGHT AND REMEDY, AND GRASS VALLEY'S SOLE AND EXCLUSIVE OBLIGATION AND LIABILITY, WITH RESPECT TO LICENSEE, ANY PURCHASE ORDER, THE PURCHASE, SALE AND USE OF ANY SOFTWARE, SERVICES AND/OR SUPPORT SERVICES AND ANY ACTUAL OR ALLEGED INFRINGEMENT, MISAPPROPRIATION, OR OTHER VIOLATION OF ANY INTELLECTUAL PROPERTY OR OTHER RIGHTS OF ANY THIRD PARTY.

6. WARRANTY

6.1 Standard Limited Warranty for Standalone Software and Application Software provided with IT Hardware.

6.1.1 Warranty for Standalone Software and Application Software provided with IT Hardware. Grass Valley warrants to Licensee that for a period of ninety (90) days following the date of shipment from the factory (the "Standalone Software and/or Application Software provided with IT Hardware Warranty Period"): (i) the tangible media on which the Standalone Software or Application Software is furnished, if applicable, will be free of material defects in materials and workmanship under normal use; (ii) the Standalone Software or Application Software conforms to its published Specifications, if any; (iii) in no event does Grass Valley warrant that the Standalone Software or Application Software is error free or that Licensee will be able to operate the Standalone or Application Software without problems or interruptions.

6.1.2 In order to exercise rights under the above warranty Licensee shall provide to Grass Valley within the applicable warranty period (i) written notice setting forth in detail the defect in the Standalone or Application Software, and (ii) proof of purchase of the Standalone or Application Software. If any such Standalone or Application Software is defective under the above warranty, Grass Valley shall, in its sole discretion, replace the Standalone or Application Software or repair such Software through a Software Update otherwise commercially released and generally available. If Grass Valley determines, in its sole discretion, that it is unable to repair through an Update or replace the Software, Grass Valley will refund to Licensee the fees paid to Grass Valley for the affected Standalone or Application Software and such refund shall be Licensee's sole and exclusive remedy in respect of any defective Standalone or Application Software.

6.1.3 During the Standalone Software and Application Software provided with IT Hardware Warranty Period, Licensee is eligible to download Updates (as defined herein) commercially released and generally made available by Grass Valley, but Licensee is not eligible to download Upgrades (as defined herein) unless Licensee has separately purchased from Grass Valley the appropriate Support Agreement allowing for the same. After such Warranty Period, Licensee is not eligible to download either Updates or Upgrades unless, in each case, Licensee has separately purchased from Grass Valley the appropriate Support Agreement allowing for the same. For purposes of this warranty, "Update" means any bug fixes and minor enhancements to the Software that are commercially released and generally made available by Grass Valley in the form of an update. "Upgrade" means enhancements to the Software in the form of new or improved functionality or features, to the extent made available by Grass Valley in the form of an upgrade. For Licensee convenience, Grass Valley may provide a list of software and/or hardware requirements for satisfactory operation of its Updates or Upgrades. Nothing stated herein, entitles Licensee to free integration services, or to free hardware or software products or improvements (whether from Grass Valley or a third party manufacturer) which may be required for the satisfactory operation of any related Update or Upgrade. Such services or improvements, if available, may be purchased separately for the applicable fee. Notwithstanding the foregoing, if the license is a term license as described in Section 2.2 hereof, Licensee is not entitled to Updates or Upgrades beyond the term of the license.

6.2 Standard Limited Warranty for Embedded Software. Warranty for Embedded Software. Grass Valley warrants to Licensee that for a period of fifteen (15) months following the date of shipment from the factory (the "Embedded Software Warranty Period"): (i) the tangible media on which the Embedded Software is furnished, if applicable, will be free of material defects in materials and workmanship under normal use; (ii) the Embedded Software conforms to its published Specifications, if any; (iii) in no event does Grass Valley warrant that the Embedded Software is error free or that Licensee will be able to operate the Embedded Software without problems or interruptions.

6.2.1 In order to exercise rights under the above warranty Licensee shall provide to Grass Valley within the applicable warranty period (i) written notice setting forth in detail the defect in the Embedded Software, and (ii) proof of purchase of the Hardware containing the Embedded Software. If any Embedded Software is defective under the above warranty, Grass Valley shall, in its sole discretion, replace the Embedded Software or repair the Embedded Software through an Update otherwise commercially released and generally available. If Grass Valley determines, in its sole discretion, that it is unable to repair through an Update or replace the Embedded Software, Grass Valley will refund to Licensee the fees paid to Grass Valley for the affected Hardware in which the Software is Embedded.

6.2.2 For Embedded Software, Licensee is entitled to Updates only but not Upgrades during the Warranty Period.

6.3 Warranty Exclusions. In order to obtain service under the applicable warranty above, Licensee must notify Grass Valley of the defect before the expiration of the applicable warranty period and make suitable arrangements for the performance of service. The above warranty shall not apply to any defect, failure or damage caused by improper use or improper or inadequate maintenance and care.

The warranties do not extend to any defect, failure or damage caused by (i) use of the Software in violation of the license granted by Grass Valley or in a manner inconsistent with the Software instructions; (ii) use of non-Grass Valley furnished equipment, software, or facilities with Software; (iii) failure to follow installation, operation, maintenance or care instructions; (iv) failure to permit Grass Valley timely access, remote or otherwise, to Software; (v) failure to implement all new Updates to Software to the extent such Updates are made available to Licensee; or (vi) virus or malware that comes into contact with the Software after the date of shipment. Grass Valley shall not be obligated, in any event, to reimburse Licensee for service provided by personnel other than Grass Valley representatives or to furnish service under the applicable warranty: (a) to repair damage resulting from attempts by personnel other than Grass Valley representatives to install, repair or service the Software; (b) to repair damage resulting from improper use or connection to incompatible equipment; or (c) to service a Software that has been modified or integrated with other products without Grass Valley's written approval. It is expressly understood and agreed that the Products will be maintained at operational condition, taking into account its age and normal wear and tear and nothing herein obligates Grass Valley to maintain the Products in new or like new condition. Grass Valley does not guarantee backwards compatibility of Updates and/or Upgrades with respect to all prior Software versions. THIS WARRANTY IS PROVIDED IN LIEU OF ALL OTHER RIGHTS, CONDITIONS AND WARRANTIES. GRASS VALLEY MAKES NO OTHER EXPRESS OR IMPLIED WARRANTY WITH RESPECT TO THE SOFTWARE, HARDWARE, PRODUCTS, DOCUMENTATION OR GRASS VALLEY SERVICE, INCLUDING, WITHOUT LIMITATION, ANY WARRANTY OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND NON-INFRINGEMENT OF THIRD PARTY RIGHTS. GRASS VALLEY'S RESPONSIBILITY TO REPAIR OR REPLACE DEFECTIVE SOFTWARE IS THE SOLE AND EXCLUSIVE REMEDY PROVIDED TO LICENSEE FOR BREACH OF STANDARD LIMITED WARRANTY FOR SOFTWARE. GRASS VALLEY DOES NOT WARRANT THAT ANY PRODUCTS WILL BE ERROR-FREE, OR THAT ANY DEFECTS THAT MAY EXIST IN ITS PRODUCTS CAN BE CORRECTED.

6.4 Third Party Products. Notwithstanding anything to the contrary in this Agreement, Grass Valley provides third party products (including hardware and software) on an "AS IS" BASIS WITHOUT WARRANTIES OF ANY KIND unless Grass Valley specifies otherwise. However, such third party products may carry their own warranties and Grass Valley shall pass through to Licensee any such warranties to the extent authorized. Exercise of such warranty shall be directly between Licensee and the third party provider.

7. EXPORT RESTRICTIONS.

Licensee shall not export, re-export, or transfer, directly or indirectly any product or technical data received hereunder, to any country or user to which such export, re-export or transfer is restricted by United States or local country law or regulation without first obtaining any required governmental license, authorization, certification or approval. If Licensee resells or otherwise disposes of any product or technical data purchased hereunder, it will comply with any export restrictions applicable to such transfer and Licensee hereby agrees to indemnify and hold Grass Valley harmless against any and all losses, damages and costs resulting from any non-compliance by Licensee. Grass Valley shall have no liability for delayed delivery or non-delivery resulting from denial, revocation, suspension or governmental delay in issuance, of any necessary export license or authority. By accepting this Agreement, Licensee confirms that it is not located in (or a national resident of) any country under U.S., EU or Canadian Economic embargo or sanction, not identified on any U.S. Department of Commerce Denied Persons List, Entity List of proliferation concern, on the US State Department Debarred Parties List or Treasury Department Designated Nationals exclusion list, and not directly or indirectly involved in the financing, commission or support of terrorist activities or in the development or production of nuclear, chemical, biological weapons or in missile technology programs, and hardware, software, technology, or services may not be exported, re-exported, transferred or downloaded to any such entity.

8. FORCE MAJEURE.

No party shall be liable for any failure to perform or delay in the performance of its obligations if the same is partly or wholly delayed or prevented by an event of force majeure, defined as an event which is beyond the reasonable control of the parties, such as but not limited to Acts of God (e.g. floods, earthquakes, hurricane), epidemics, fires, explosions, strikes, riots, war, rebellions, sabotage, act or threat of terrorism, shortage in supplies from normally reliable sources, embargo, governmental act or omission (e.g. delay or failure to issue, suspension or withdrawal of any license, permit or authorization), labor disputes, delay from a subcontractor caused by an event of force majeure as defined herein or other similar occurrence beyond the control and without the fault or negligence of the affected Party. Any such delay or failure shall suspend the project schedule until the delay or failure ceases, and the project schedule shall be deemed extended accordingly.

9. WAIVER.

The failure of either party to enforce any provision of this Agreement shall not be construed as a waiver of such provision or the right thereafter to enforce each and every provision. No waiver by either party, express or implied, of any breach of this Agreement shall be construed as a waiver of any other breach of such term or condition.

10. ASSIGNMENT.

Licensee may not assign or otherwise transfer its rights or obligations under this Agreement without the prior written consent of Grass Valley. No attempt to assign or transfer in violation of this provision will be binding upon Grass Valley. Any proposed assignee or transferee must agree in writing to be bound by all the terms, conditions, and obligations of this Agreement. Notwithstanding Grass Valley's agreement to any such assignment, Licensee shall remain subject to the obligations of confidentiality set forth in this Agreement. Grass Valley may assign or otherwise transfer its rights and obligations under this Agreement and any Purchase Order.

11. APPLICABLE LAW.

Except for purchases made in Japan of Software which will be installed and/or used in Japan, this Agreement will be construed and interpreted in accordance with the laws of the State of Delaware, without regard to principles of choice of law. For purchase made in Japan of Software which will be installed and/or used in Japan the laws of Japan will apply. For Licensees located in the Asia Pacific region of the world, any dispute arising out of or in connection with this Agreement, including any question regarding its existence, validity or termination, shall be referred to and finally resolved by arbitration in Singapore in accordance with the Arbitration Rules of the Singapore International Arbitration Centre for the time being in force, which rules are deemed to be incorporated by reference in this clause. The tribunal shall consist of one arbitrator. The language of the arbitration shall be English. For all other Licensees, the parties hereby consent to the non-exclusive jurisdiction of and venue in the Superior Court of the State of Delaware and the United States District Court for the adjudication of any disputes arising under this Agreement, and will not assert as a defense lack of personal jurisdiction or forum non conveniens. This Agreement shall not be governed by the United Nations Convention on Contracts for the International Sale of Goods, the application of which is hereby expressly excluded. Each of the parties consent the jurisdiction of the courts of State of Delaware, United States.

12. NOTICES.

All notices shall be given in writing and deemed effective upon receipt. Notices to Licensee will be sent to the ordering office or other address shown on the Purchase Order. Notices to Grass Valley should be sent to the Grass Valley entity identified on the Proposal/Contract for Grass Valley direct customer and all other customers should send notices to Grass Valley at 400 Providence Mine Road, Nevada City CA 95959 Attention: Legal Department.

13. SEVERABILITY.

If any provision of this Agreement is determined to be unenforceable or invalid by court decision, this Agreement will not be rendered unenforceable or invalid as a whole, and the provision will be changed and interpreted so as to best accomplish the objectives of the original provision within the limits of applicable law and the remainder of the agreement shall remain in full force and effect.

14. LANGUAGE.

This Agreement may be provided in multiple languages. The governing language shall be the English language and any translation is provided solely for information only. In the event of a conflict between the English language and its translation, the English language shall prevail. For sales in Canada, the parties declare that they have requested, and hereby confirm their request, that this Agreement be drafted in the English language. Les parties déclarent qu'elles ont exigé, et par les présentes, confirment leur demande que ce contrat soit rédigé en anglais.

15. AUDIT RIGHTS.

Upon reasonable notice from Grass Valley to Licensee, Licensee will provide Grass Valley or its agents access to, from time to time, Licensee's facilities and records in order for Grass Valley to determine whether Licensee is in compliance with the provisions of this Agreement, provided, however, such audit or inspection shall be exercised so as not to unreasonably interfere with Licensee’s business. If such inspection discovers a material breach of this Agreement by Licensee, then Licensee shall pay the reasonable cost of the audit and inspection.

16. DISPUTE RESOLUTION.

Disputes, controversies or claims may arise between the Parties. To minimize the expense to and impact on each Party of formally resolving such disputes, controversies and claims in accordance with the Applicable Law Section above, the Parties will first attempt to resolve any controversy or claim arising out of or relating to any Proposal/Contract or Purchase Order.

17. INTEGRATION.

Except for Licensees purchasing under Grass Valley’s Global Terms and Conditions of Sale, this Agreement is the complete and exclusive statement of the mutual understanding between Grass Valley and Licensee and supersedes all previous written and oral agreements and communications relating to the subject matter hereof. If Licensee has purchased the Software under Grass Valley’s Global Terms and Conditions of Sale, this Agreement is meant to be consistent with and of the same force and effect as Section 6 of those Global Terms and Conditions of Sale. For Licensees purchasing under Grass Valley’s Global Terms and Conditions of Sale, in the event of any conflict between this Agreement and the Global Terms and Conditions of Sale, the Global Terms and Conditions of Sale shall control.

18. INJUNCTIVE RELIEF.

Each party acknowledges and agrees: (A) the restrictions set forth in the provisions of this Agreement dealing with Confidentiality and protection of IP Rights, if any, are reasonable in the circumstances and all defenses to the strict enforcement thereof by the injured party are hereby waived; (B) a violation of any of the provisions of this Agreement dealing with Confidentiality or protection of IP Rights will result in immediate and irreparable harm and damage to the disclosing party or licensor; and (C) in the event of any violation of any of the provisions of this Agreement dealing with Confidentiality and protection of IP Rights, the injured party will, in addition to any other right to relief hereunder, be entitled to equitable relief by way of temporary or permanent injunction and to such other relief as any court of competent jurisdiction may deem just and proper.

19. NATURE OF THE RELATIONSHIP.

No agency, partnership, joint venture, or other business organization is created by this Agreement. Neither party will have the right or authority to make commitments of any kind for, or on behalf of, the other party without prior written consent of the party to be bound. Licensee and Grass Valley shall be independent contractors and each will conduct its business at its own cost and expense. Nothing in this Agreement will be construed as a commitment by Grass Valley to engage in any further business with Licensee beyond the scope of this Agreement (except as otherwise agreed to by the parties by means of a separate agreement) or after the expiration or earlier termination of this Agreement. Grass Valley may refer to Licensee as a customer reference in business dealings with potential customers, Grass Valley financing matters and in press releases.

20. INTERPRETATION.

In this Agreement, (A) the insertion of headings is for convenience of reference only and will not affect the construction or interpretation of this Agreement; (B) words or abbreviations that have well known or trade meanings are used herein in accordance with their recognized meanings; and (C) terms and conditions hereof are the result of negotiations between the parties and this Agreement will not be construed in favor of or against any party by reason only that a party or its professional advisors participated in the preparation of this Agreement.

21. COUNTERPARTS AND FACSIMILE SIGNATURE.

This Agreement may be executed in counterparts, all of which when executed and delivered, will constitute one single agreement between the parties. This Agreement may be executed by facsimile or e-mailed PDF.

22. ELECTRONIC COMMUNICATIONS.

The parties may do business electronically, including order placement and acceptance. Once accepted, such orders will create fully enforceable obligations subject to this Agreement. Such orders and acceptances will be deemed for all purposes to be an original signed writing. Parties will adopt commercially reasonable security measures for password and access protection.

Contact Us

Grass Valley Technical Support

For technical assistance, contact our international support center, at
1-800-547-8949 (US and Canada) or +1 530 478 4148.

To obtain a local phone number for the support center nearest you, please consult the Contact Us section of Grass Valley's website (www.grassvalley.com).

An on-line form for e-mail contact is also available from the website.

https://www.grassvalley.com/contact/support/

Corporate Head Office

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