grass valley
A BELDEN BRAND

GV K-FRAME X

VIDEO PRODUCTION FRAMES

Installation Planning Guide

13-00010-000AA

2/22/18

www.grassvalley.com

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Important Safeguards and Notices

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

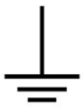
Symbols and Their Meanings

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

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

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

Identifies a protective grounding terminal which must be connected to earth ground prior to making any other equipment connections.



Identifies an external protective grounding terminal which may be connected to earth ground as a supplement to an internal grounding terminal.

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

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

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

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

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

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

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

Warnings

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

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

Cautions

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

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

  Note: Limited access restrictions apply to Video Processor Frames and Servers, not to operator controlled equipment such as Control Panels, Menus, Aux Panels, etc.

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

Electrostatic Discharge (ESD) Protection

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

- Ensure that the frame is electrically connected to earth ground through the power cord or any other means if available.
- Wear an ESD wrist strap ensuring that it makes good skin contact. Connect the grounding clip to an *unpainted surface* of the chassis frame to safely ground unwanted ESD voltages. If no wrist strap is available, ground yourself by touching the *unpainted* metal part of the chassis.
- For safety, periodically check the resistance value of the antistatic strap, which should be between 1 and 10 megohms.
- When temporarily storing a card make sure it is placed in an ESD bag.

- Cards in an earth grounded metal frame or casing do not require any special ESD protection.

Battery Handling

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

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.

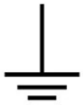
Signification des symboles utilisés

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.

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

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

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

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

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

Avertissements

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

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

- La protection de ce produit contre les courts-circuits (surintensités) dépend de l'installation électrique du bâtiment. Assurez-vous qu'un fusible ou un disjoncteur pour 120 V CA ou 240 V CA est utilisé sur les conducteurs de phase.
- Dans le présent manuel, toutes les instructions qui nécessitent d'ouvrir le couvercle de l'équipement sont destinées exclusivement au personnel technique qualifié.
- N'utilisez pas cet appareil dans un environnement humide.
- Cet équipement est mis à la terre par le conducteur de mise à la terre des cordons d'alimentation. Pour éviter les chocs électriques, branchez les cordons d'alimentation sur une prise correctement câblée avant de brancher les entrées et sorties de l'équipement.
- Acheminez les cordons d'alimentation et autres câbles de façon à ce qu'ils ne risquent pas d'être endommagés. Supportez correctement les enroulements de câbles afin de ne pas endommager les connecteurs.
- Coupez l'alimentation avant de nettoyer l'équipement. Ne pas utiliser de nettoyants liquides ou en aérosol. Utilisez uniquement un chiffon humide.
- Des tensions dangereuses peuvent exister en plusieurs points dans cet équipement. Pour éviter toute blessure, ne touchez pas aux connexions ou aux composants exposés lorsque l'appareil est sous tension.
- Avant de procéder à toute opération d'entretien ou de dépannage, enlevez tous vos bijoux (notamment vos bagues, votre montre et autres objets métalliques).
- Pour éviter tout risque d'incendie, utilisez uniquement les fusibles du type et du calibre indiqués sur l'équipement ou dans la documentation qui l'accompagne.
- Ne pas utiliser cet appareil dans une atmosphère explosive.
- Présence possible de courants de fuite. Un raccordement à la masse est indispensable avant la mise sous tension.
- Après tout travail d'entretien ou de réparation, faites effectuer des contrôles de sécurité par le personnel technique qualifié.

Mises en garde

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

- L'appareil est conçu pour être installé dans un endroit à accès restreint.

  Remarque: Les restrictions d'accès s'appliquent aux châssis et serveurs de traitement vidéo, et non aux équipements contrôlés par l'opérateur tels que les panneaux de contrôle, les menus, les panneaux auxiliaires, etc.
- Au moment d'installer l'équipement, ne fixez pas les cordons d'alimentation aux surfaces intérieures de l'édifice.
- Les produits qui n'ont pas d'interrupteur marche-arrêt et qui disposent d'une source d'alimentation externe doivent être installés à proximité d'une prise de courant facile d'accès.

- Si l'équipement n'est pas pourvu d'un modules d'alimentation auto-adaptables, vérifiez la configuration de chacun des modules d'alimentation avant de les mettre sous tension.
- Assurez une ventilation adéquate. Pour éviter toute surchauffe du produit, assurez une ventilation de l'équipement conformément aux instructions d'installation.
- N'utilisez pas l'équipement si vous suspectez un dysfonctionnement du produit. Faites-le inspecter par un technicien qualifié.
- Pour réduire le risque de choc électrique, n'effectuez pas de réparations autres que celles qui sont décrites dans le présent manuel, sauf si vous êtes qualifié pour le faire. Confiez les réparations à un technicien qualifié. La maintenance doit se réaliser dans un milieu libre d'électricité statique.
- L'appareil peut comporter plus d'un cordon d'alimentation. Afin de prévenir les chocs électriques, débrancher tous les cordons d'alimentation avant toute opération d'entretien.
- Veillez à toujours prendre les mesures de protection antistatique appropriées quand vous manipulez l'équipement.

Protection contre les décharges électrostatiques (DES)

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

- Assurez-vous que le châssis est relié électriquement à la terre par le cordon d'alimentation ou tout autre moyen disponible.
- Portez un bracelet antistatique et assurez-vous qu'il est bien en contact avec la peau. Connectez la pince de masse à une *surface non peinte* du châssis pour détourner à la terre toute tension électrostatique indésirable. En l'absence de bracelet antistatique, déchargez l'électricité statique de votre corps en touchant une surface métallique *non peinte* du châssis.
- Pour plus de sécurité, vérifiez périodiquement la valeur de résistance du bracelet antistatique. Elle doit se situer entre 1 et 10 mégohms.
- Si vous devez mettre une carte de côté, assurez-vous de la ranger dans un sac protecteur antistatique.
- Les cartes qui sont reliées à un châssis ou boîtier métallique mis à la terre ne nécessitent pas de protection antistatique spéciale.

Remplacement et élimination des piles

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

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.

Recycling

Visit www.grassvalley.com for recycling information.

Certification and Compliance

Safety Compliance

This equipment complies with the requirements of CSA/UL/IEC/EN 60950-1, 2nd Ed. + AM1: 2009, AM2:2013, AM22014, Safety of information technology equipment.

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

Restriction on Hazardous Substances (RoHS)

Restriction of Hazardous Substances (RoHS)

KAYN-2-25-2M-KC, KAYN-2-25-3M-KC, KAYN-3-35-3M-KC, KAYN-3-35-4M-KC, KAYN-3-35-4M-KS, KAYN-3-35-5M-KS, KAYN-4-35-4M-KC, KAYN-4-35-5M-KS, KAYN-PNL-100-15, KAYN-PNL-200-25, KAYN-PNL-200-35, KAYN-PNL-300-25, KAYN-PNL-300-35, KAYN-PNL-400-25, KAYN-PNL-400-35, KOR-1-15-1M-KCS, KOR-2-20-2M-KCS, KRR-2-25-2M-KC, KRR-2-25-C-2M-KC, KRR-2-25-C-2M-KCS, KRR-2-25-2M-KCS, KRR-2-25-3M-KC, KRR-3-35-3M-KCS, KRR-2-25-C-3M-KC, KRR-3-35-3M-KC, KRR-3-35-4M-KC, KRR-3-35-4M-KS, KRR-3-35-5M-KS, KRR-PNL-200-25, KRR-PNL-200-25-C and KRR-PNL-300-35 部件名称 Part name	有毒有害物质或元素 (Toxic or hazardous Substances and Elements)					
	铅 (Pb)	汞(Hg)	镉(Cd)	六价铬 (Cr6)	多溴联苯 (PBB)	多溴二苯 (PBDE)
电缆及电缆组件 Cables and Cable Assemblies	X	O	O	O	O	O
电路模块 Circuit Modules	X	O	O	O	O	O
显示装置 Display Assemblies	X	O	O	O	O	O
组装风扇 Fan Assemblies	X	O	O	O	O	O
金属零件 Metal Parts	X	O	O	O	O	O
塑料和聚合物零件 Plastic and Polymeric Parts	X	O	O	O	O	O
KOR-PNL-100-15, KOR-PNL-200-20KRR-ELITE-25-PS and KRR-ELITE-35-PS 部件名称 Part name	有毒有害物质或元素 (Toxic or hazardous Substances and Elements)					
	铅 (Pb)	汞(Hg)	镉(Cd)	六价铬 (Cr6)	多溴联苯 (PBB)	多溴二苯 (PBDE)
电缆及电缆组件 Cables and Cable Assemblies	X	O	O	O	O	O
电路模块 Circuit Modules	X	O	O	O	O	O
显示装置 Display Assemblies	X	O	O	O	O	O
金属零件 Metal Parts	X	O	O	O	O	O
塑料和聚合物零件 Plastic and Polymeric Parts	X	O	O	O	O	O
K-FRM-100C, K-FRM-100CS and K-FRM-PSU 部件名称 Part name	有毒有害物质或元素 (Toxic or hazardous Substances and Elements)					
	铅 (Pb)	汞(Hg)	镉(Cd)	六价铬 (Cr6)	多溴联苯 (PBB)	多溴二苯 (PBDE)
电缆及电缆组件 Cables and Cable Assemblies	X	O	O	O	O	O
电路模块 Circuit Modules	X	O	O	O	O	O
组装风扇 Fan Assemblies	X	O	O	O	O	O
金属零件 Metal Parts	X	O	O	O	O	O
KSP-PNL-1ME-KBD 部件名称 Part name	有毒有害物质或元素 (Toxic or hazardous Substances and Elements)					
	铅 (Pb)	汞(Hg)	镉(Cd)	六价铬 (Cr6)	多溴联苯 (PBB)	多溴二苯 (PBDE)
电缆及电缆组件 Cables and Cable Assemblies	X	O	O	O	O	O
电路模块 Circuit Modules	X	O	O	O	O	O
金属零件 Metal Parts	X	O	O	O	O	O
塑料和聚合物零件 Plastic and Polymeric Parts	X	O	O	O	O	O
K-FRM-100S, K-FRM-100SX, K-FRM-100SX-I and KOR-PNL-PSU 部件名称 Part name	有毒有害物质或元素 (Toxic or hazardous Substances and Elements)					
	铅 (Pb)	汞(Hg)	镉(Cd)	六价铬 (Cr6)	多溴联苯 (PBB)	多溴二苯 (PBDE)

电缆及电缆组件 Cables and Cable Assemblies	X	O	O	O	O	O
电路模块 Circuit Modules	X	O	O	O	O	O
金属零件 Metal Parts	X	O	O	O	O	O
KAYN-ELITE-PS, KAYN-PRO-PS, K-FRM-100CS-KIT, K-FRM-CTRL-CS, K-FRM-INPUT, K-FRM-IO, K-FRM-IO-10GE, K-FRM-ME-DPM-S, K-FRM-OUTPUT and KRR-PRO-PS 部件名称 Part name	有毒有害物质或元素 (Toxic or hazardous Substances and Elements)					
	铅 (Pb)	汞(Hg)	镉(Cd)	六价铬 (Cr6)	多溴联苯 (PBB)	多溴二苯 (PBDE)
电路模块 Circuit Modules	X	O	O	O	O	O
金属零件 Metal Parts	X	O	O	O	O	O
KOR-PNL-LAN-20 部件名称 Part name	有毒有害物质或元素 (Toxic or hazardous Substances and Elements)					
	铅 (Pb)	汞(Hg)	镉(Cd)	六价铬 (Cr6)	多溴联苯 (PBB)	多溴二苯 (PBDE)
电缆及电缆组件 Cables and Cable Assemblies	X	O	O	O	O	O
KOR-PNL-KIT 部件名称 Part name	有毒有害物质或元素 (Toxic or hazardous Substances and Elements)					
	铅 (Pb)	汞(Hg)	镉(Cd)	六价铬 (Cr6)	多溴联苯 (PBB)	多溴二苯 (PBDE)
电路模块 Circuit Modules	X	O	O	O	O	O

O: 表示该有毒有害物质在该部件所有均质材料中的含量均在 SJ/T 11364-2014 规定的限量要求以下。

O: Indicates that this toxic or hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement in GB/T 26572-2011.

X: 表示该有毒有害物质至少在该部件的某一均质材料中的含量超出 SJ/T 11364-2014 规定的限量要求。

X: Indicates that this toxic or hazardous substance contained in at least one of the homogeneous materials for this part is above the limit requirement in GB/T 26572-2011.

技术条款解释：

此声明所依据之数据由 Grass Valley 环境管理部门向我们的部件供应商获取。Grass Valley 公司相信此信息的正确性，但由于数据来源于公司外部，我们无法保证它的完整和准确。所有这些特性可能在未获通知的情况下更改。

Technical explanations:

This statement is based on the information provided by our suppliers of components and collected through our Grass Valley's environmental management system. Grass Valley believes this environmental information to be correct but cannot guarantee its completeness or accuracy as it is based on data received from sources outside our company. All specifications are subject to change without notice.

Registration, Evaluation Authorisation and Restriction of Chemicals (REACH)

Product may contain the following Substances of Very High Concern (SVHCs) above the threshold of 0.1% w/w per article.

CAS #	Substance Name	Where Used
110-71-4	1,2-dimethoxyethane; ethylene glycol dimethyl ether (EGDME)	Battery
1303-86-2	Diboron trioxide	Crystal
1317-36-8	Lead monoxide (lead oxide)	Crystal
1317-36-8	Lead monoxide (lead oxide)	Fan
110-71-4	1,2-dimethoxyethane; ethylene glycol dimethyl ether (EGDME)	Integrated Circuit
117-81-7	Bis (2-ethylhexyl)phthalate (DEHP)	Integrated Circuit
12060-00-3	Lead titanium trioxide	Integrated Circuit
12626-81-2	Lead titanium zirconium oxide	Integrated Circuit
12060-00-3	Lead titanium trioxide	Power Supply
1303-86-2	Diboron trioxide	Power Supply
1317-36-8	Lead monoxide (lead oxide)	Power Supply

Waste Electrical and Electronic Equipment (WEEE)

End-user must dispose of any Waste Electrical and Electronic Equipment (WEEE) separately. Dispose equipment according to your local environmental laws and guidelines.

Battery Disposal

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.

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

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

WARNING: Be careful not to short-circuit the batteries by adhering to the appropriate safe handling practices. Do not dispose of batteries in a fire as they may explode. Batteries may explode if damaged or overheated. Do not 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.

General Caveat

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

Electromagnetic Compatibility

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

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

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

- EN 55022 Class A Radiated and conducted emissions
- EN 61000-3-2 Limits for harmonic current emissions
- EN 61000-3-3 Limitation of voltage fluctuations and flicker
- EN 61000-4-2 Electrostatic discharge immunity
- EN 61000-4-3 Radiated, radio-frequency, electromagnetic field immunity
- EN 61000-4-4 Electrical fast transient immunity
- EN 61000-4-5 Surge transient immunity
- EN 61000-4-6 Conducted disturbances immunity
- EN 61000-4-8 Power frequency magnetic field immunity
- EN 61000-4-11 Voltage dips, short interruptions and voltage variations immunity

Table of Contents

1 Introduction

Overview

The Grass Valley GV K-Frame X family of multi-format digital production switchers provide powerful, groundbreaking features designed to meet the widest range of requirements for live studio, mobile, and post-production applications.

The GV K-Frame X Video Processors are the heart of the system, providing extensive video switching and signal processing capabilities.

Grass Valley Control Panels

The GV K-Frame X Video Processing Frame can be used with any Control Surface:

- Kayenne,
- Karrera,
- GV Korona,
- the Soft Panel (KSP option), and/or
- the Menu application running on a PC (Menu on PC).

In addition, the GV K-Frame X system supports direct control of external devices (DDRs, Servers) and bi-directional control to and from routing and automation systems.

Features

General

- Fully digital 10-bit 4:2:2 video switcher including 4K, HDR (HLG and PQ), and1080p support:
  - SDI—1080p level-A or level-B
  - IP I/O—1080p level-A
- The optional IP I/O board for the GV K-Frame X video processing engine offers Video-Over-IP connectivity, using either uncompressed SMPTE 2022-6 or 4K 1-wire compressed IP.
- 4K UHD processed using 2SI (2 Sample Interleave) or SDQS (Square Division Quad Split).
- Integrated Macro Builder/Editor allows users to edit macros online or offline on a PC running the menu application.
- Optional DoubleTake™ (split M/E mode) effectively increases the number of M/Es and adds flexibility to Suites operation while FlexiKey™ programmable clean feed mode supports separately programmable configurations of keyers from four M/E outputs.

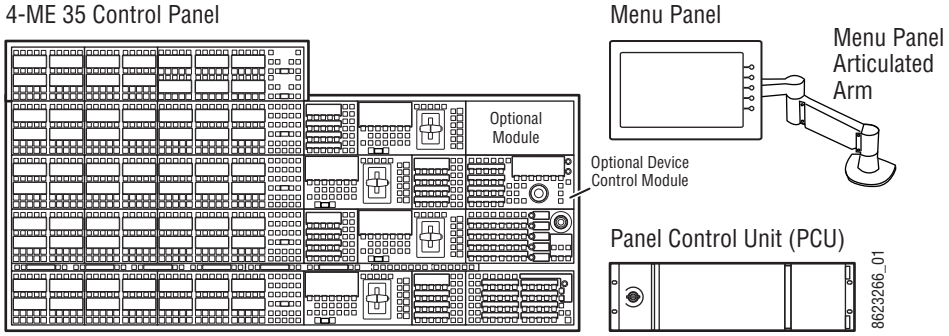
- Aux bus transitions for dissolves and wipes on aux bus outputs.
- Interfaces with Grass Valley routers supporting Native Protocol.
- Optional Integrated 10 Channel Image Store capable of delivering up to 64 GB storage of Stills (3,000 images) or "Movies" (up to 50 seconds) of 1080p video.
- LDK Series and LDX Series camera control with Ethernet tally via Connect Gateway.
- Optional integrated external ClipStore provides multiple channels of video/key pairs for up to 10+ hours of nonvolatile video/key/audio clip content.
- 999 macros with many new to recall macros from the Control Panel.
- 1,000 E-MEM registers with Define E-MEM for fine control in creation and editing of effects.
- Optional M/E Previewer provides a method to check and monitor any input to an M/E.
- VDCP Serial and Ethernet connection.
- Ethernet tally connection for integration with external tally systems.
- Optional RGB color correction on M/E buses and aux bus outputs.
- Source Rules:
  - Links keyers to sources.
  - Settings for On/Off/As Is on every M/E.
  - Full look-ahead preview of rules.
- Hot-swappable, front/rear removable modules and power supplies.
- Optional multiple Multiviewer capability with 5 pre-configured layouts (maximum 14 panes per layout) with On-Air and Preview tally.

GV K-Frame X Standard Frame

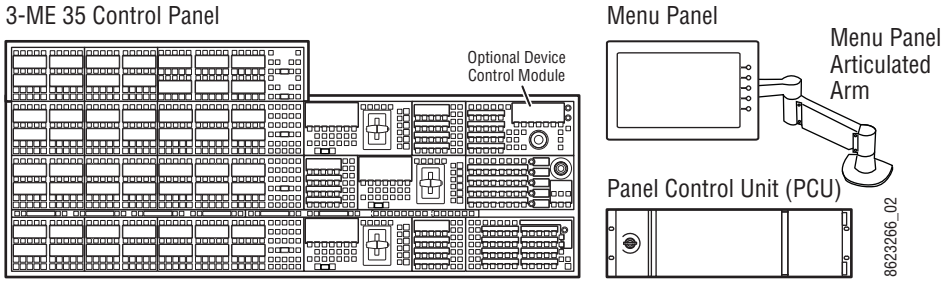
- Up to 192 inputs and 96 outputs.
- Up to 9 M/Es, accessible across two suites—by using DoubleTake this may be increased to 18 virtual M/Es.
- Every M/E has six keyers with standard keying modes including Chroma Key, two frame stores per keyer—every keyer except for Controller M/E can use the pool of floating 3D iDPMs.
- 2D-DPMs (resizers) on every keyer, with 6 Video/Key pairs per M/E so iDPMs can be utilized for more complex effects.
- The Controller M/E has a complement of 6 full keyers with Chroma Key and 2D-DPMs.
- Up to 16 iDPMs (Integrated Digital Picture Manipulators), assigned as either floating iDPMs or within an eDPM at user's discretion.

Kayenne Control Surface

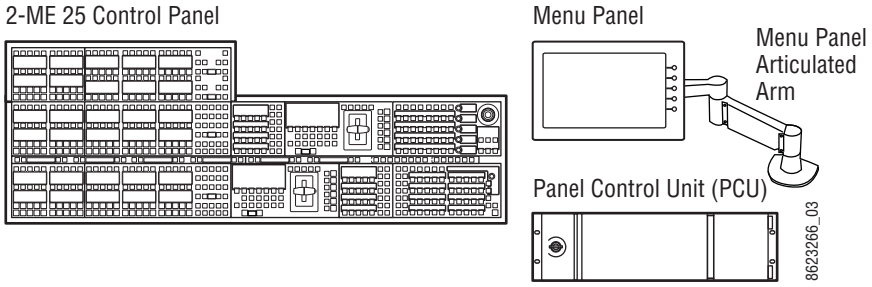
A Kayenne control surface typically consists of a Control Panel, a Menu Panel with an included articulated support arm, a Panel Control Unit (PCU) frame, and optional Satellite Panels. This control surface has an innovative modular design.



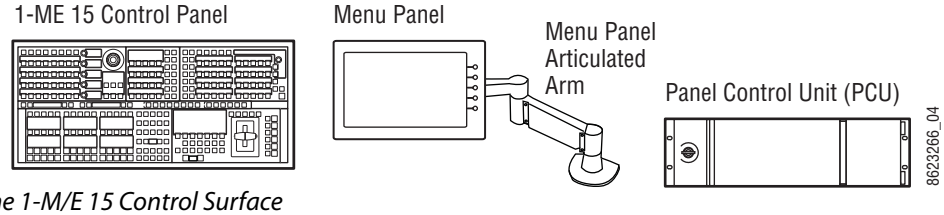
Kayenne 4-M/E 35 Control Surface



Kayenne 3-M/E 35 Control Surface



Kayenne 2-M/E 25 Control Surface



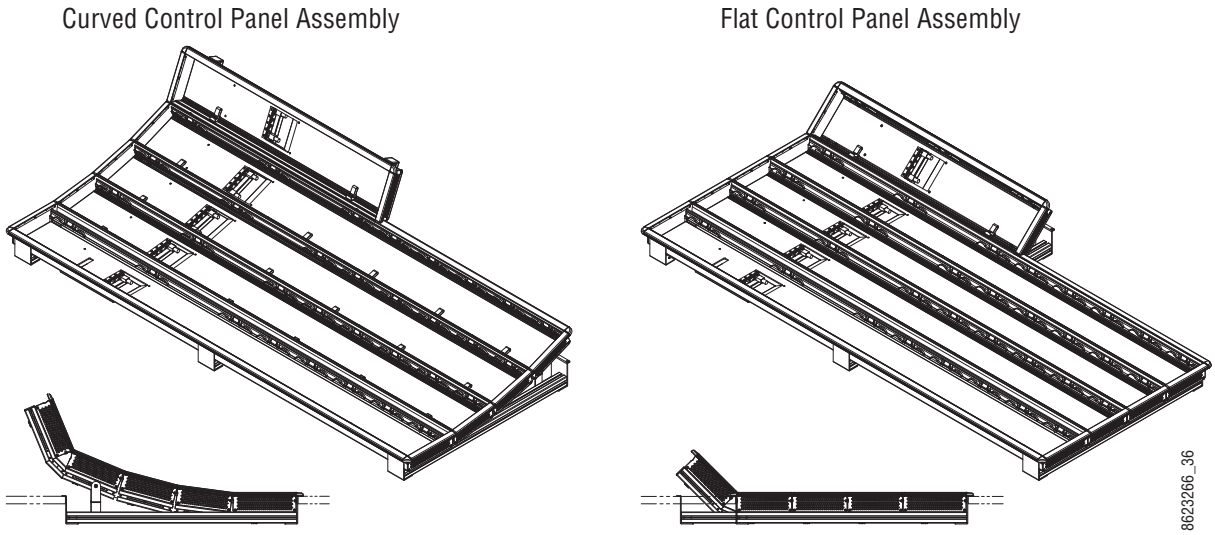
Kayenne 1-M/E 15 Control Surface

The modular design and use of a separate PCU supports the hot-replacement of individual Control Panel components, if necessary, while the rest of the system remains operational.

CAUTION: Do not connect or disconnect the PCU to Control Panel cables while the system is powered on.

Flat or Curved Control Panel Orientation

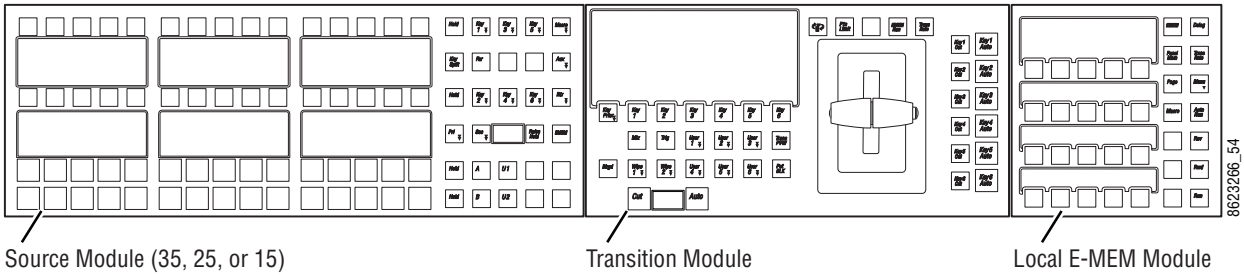
The main Kayenne Control Panel supports different physical orientations. Besides a conventional flat surface, a special support design permits a curved working surface, where the M/Es progressively tilt for improved ergonomics.



Curved and Flat Control Surface Installations

Control Panel Stripes

The main Kayenne Control Panel is organized into from one to five Stripes. Each Stripe consists of a tray and its complement of drop-in modules. An M/E Stripe has a module for Source Selection, Transition, and individual E-MEM control. Additional Master E-MEM, Machine Control, Multi-Function, and Local Aux modules are populated to complete the control surface functionality.

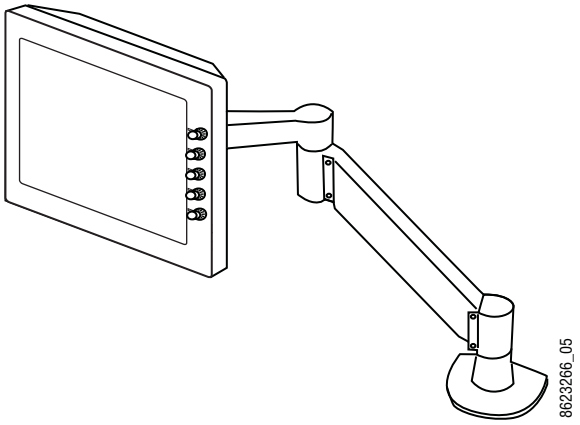


Portion of Control Panel M/E Stripe

Touch Screen Menu Panel

Each Kayenne control surface includes a Menu Panel that features a wide format 15 in. touch screen display. An articulated arm is also included, offering a wide variety of installation options. The Menu Panel has a standard VESA-75 hole pattern and M4 threads, compatible with this and many other mounting devices.

The Menu Panel has four USB ports, two on the right side edge of the panel and two on the back for keyboard and mouse (wired or wireless are supported).



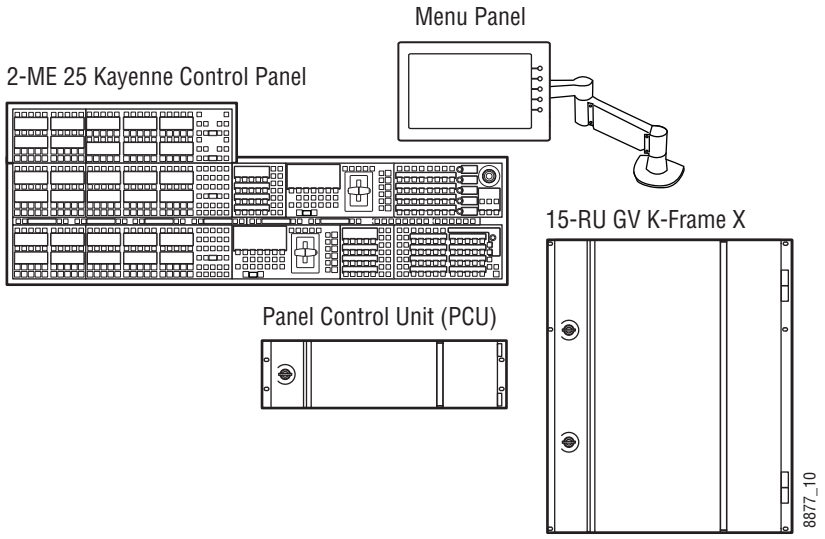
Menu Panel with Articulated Arm

Menu Application

The Menu application software provided with every K-Frame system can be run on a standard PC. This software accesses all the system's functionality, permitting mouse and keyboard control from a laptop, or remote control from any location on the network.

Basic Single Suite Kayenne Panel System

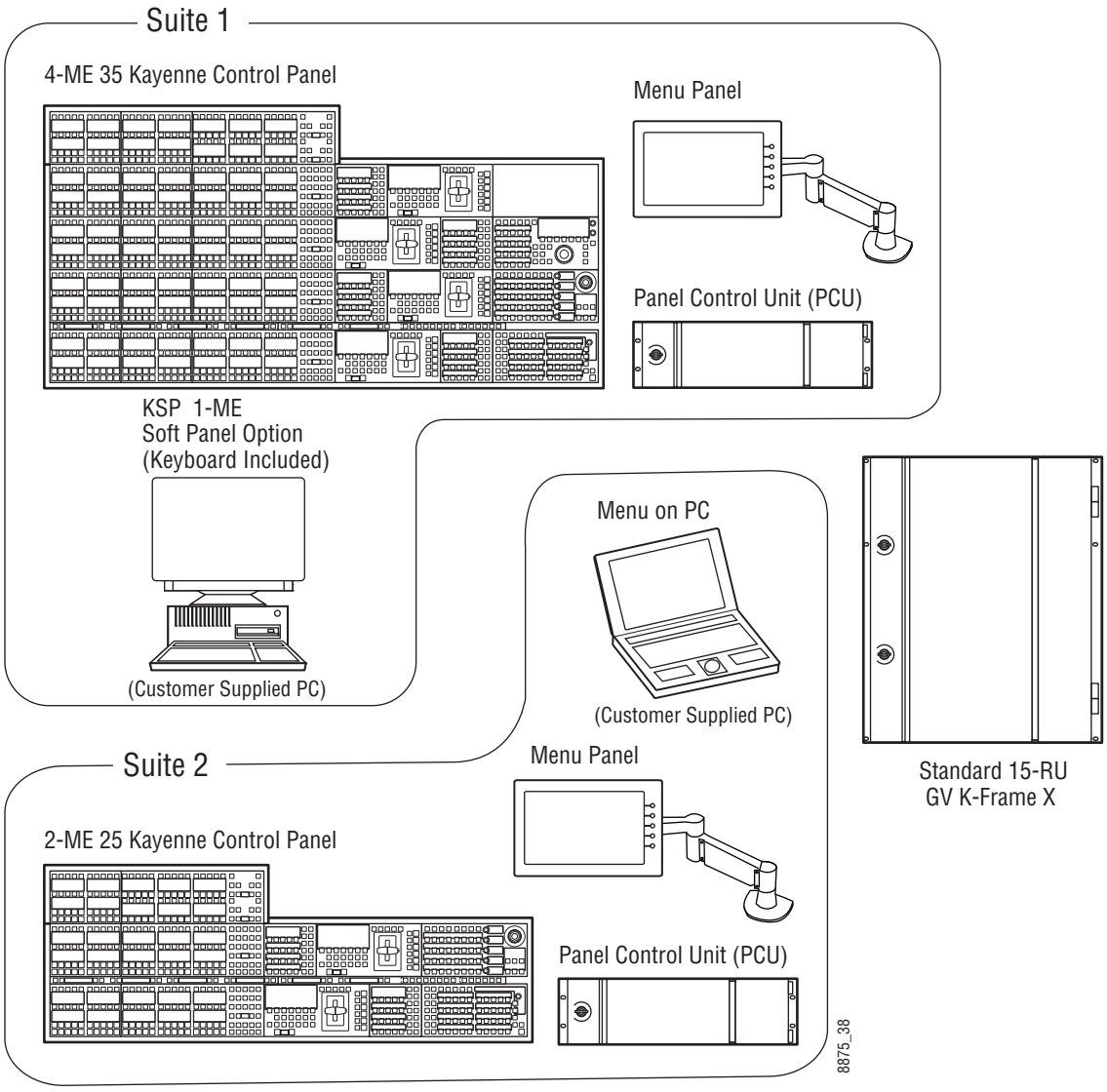
A basic K-Frame system consists of a Control Panel, a Menu application running on a touch screen Menu Panel, and a Video Processor Frame. The Control Panel and Menu application make up a control surface associated with that frame. The Kayenne Control Panel and Menu Panel have associated active electronics housed in the Panel Control Unit (PCU).



Kayenne Control Panel Single Suite Example

Multiple Suite Kayenne Panel System

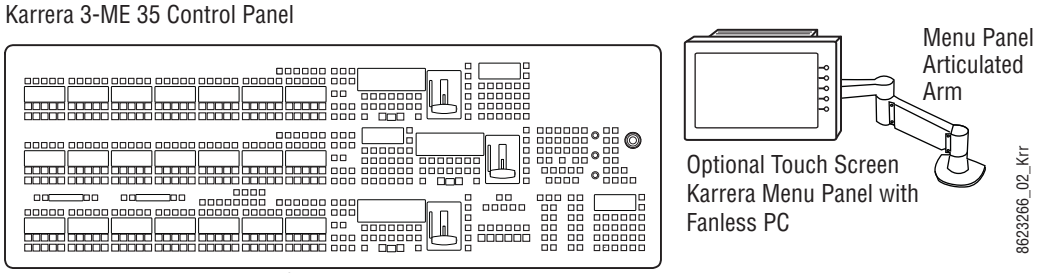
A K-Frame system can be subdivided into two suites, if desired, each of which can have two control surfaces (Surface A and Surface B). Each surface has it's own set of Panel Preferences for configuration of the control panel behavior and independent macro systems to allow for independent building and running of macros by each operator at the control surface. Hardware resources in the Video Processor Frame can be assigned to an individual suite during configuration, essentially creating two separate switchers sharing one frame.



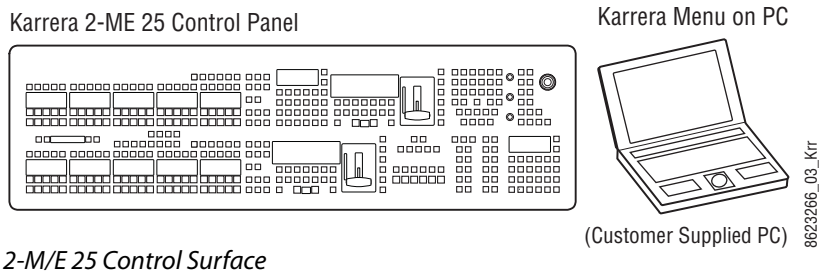
Kayenne Control Panel Multi-Suite Standard Frame Example

Karrera Control Surface

A Karrera control surface typically consists of a Control Panel and a Menu application. Representative Karrera control surfaces are shown in the following illustrations.



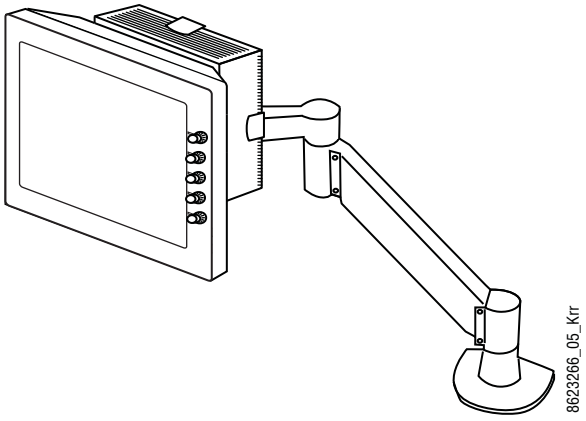
Karrera 3-M/E 35 Control Surface



Karrera 2-M/E 25 Control Surface

Touch Screen Menu Panel Option

A hardware Karrera Menu Panel is available as an option, which features a wide format 15 inch touch screen display. An articulated arm is also included, offering a wide variety of installation options.



Menu Panel with Articulated Arm

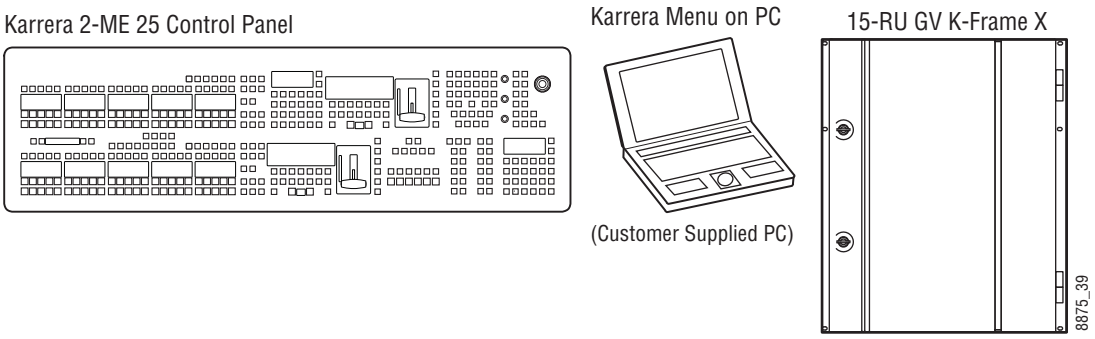
The Menu Panel has a standard VESA-75 hole pattern and M4 threads, compatible with this and many other mounting devices. The Menu Panel also has four USB ports, two on the right side edge of the panel and two on the back for keyboard and mouse (wired or wireless are supported).

A fanless PC, running Windows OS, is available which mounts behind the Menu Panel.

Karrera K-Frame System Examples

Basic Single Suite Karrera Panel System

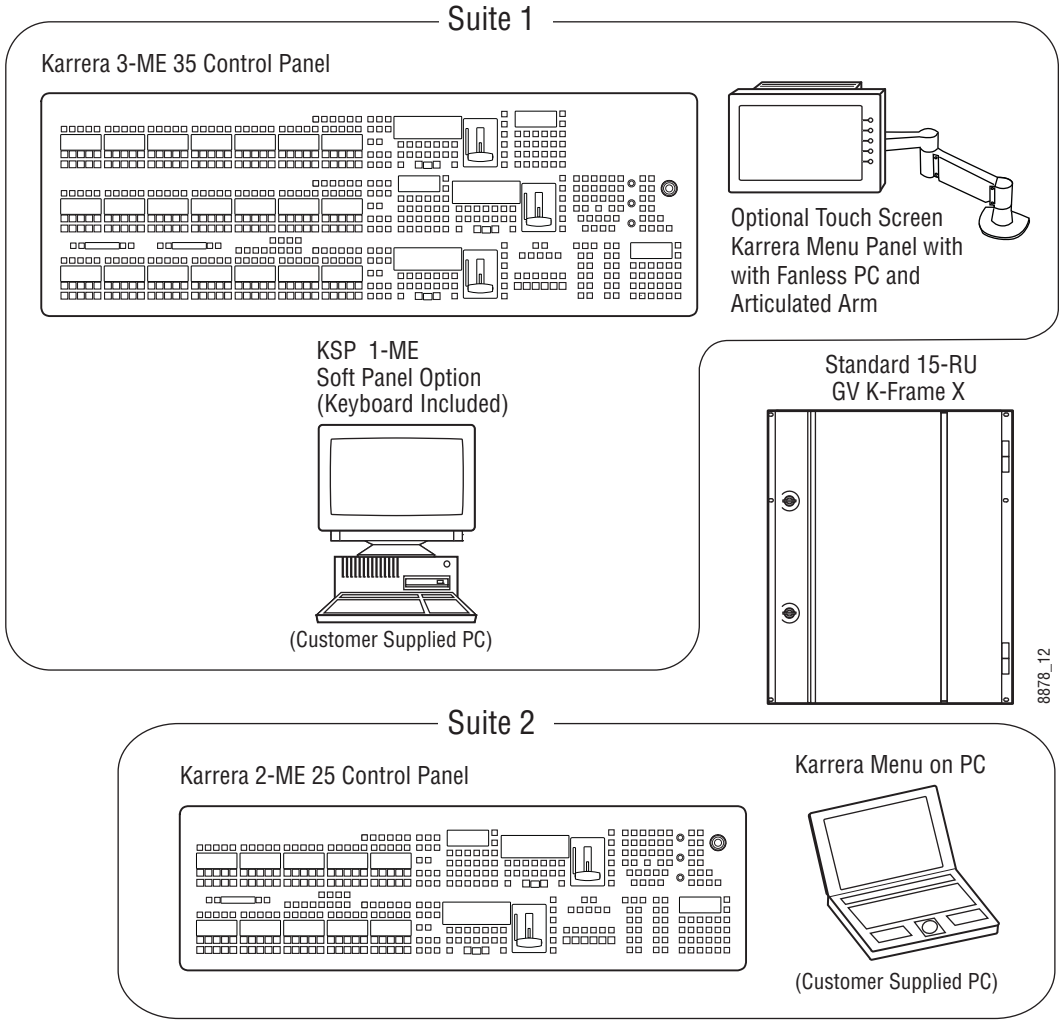
A basic K-Frame system consists of a Control Panel, a Menu application running on a PC, and a Video Processor Frame. The Control Panel and Menu application make up a control surface associated with that frame.



Karrera Single Suite Compact Frame Example

Multiple Suites and Control Surfaces

A K-Frame system can be subdivided into two suites, if desired, each of which can have two control surfaces. Hardware resources in the Video Processor Frame can be assigned to an individual suite during configuration, essentially creating two separate switchers sharing one K-Frame.



Karrera Multi-Suite Standard Frame Example

GV Korona Control Surface

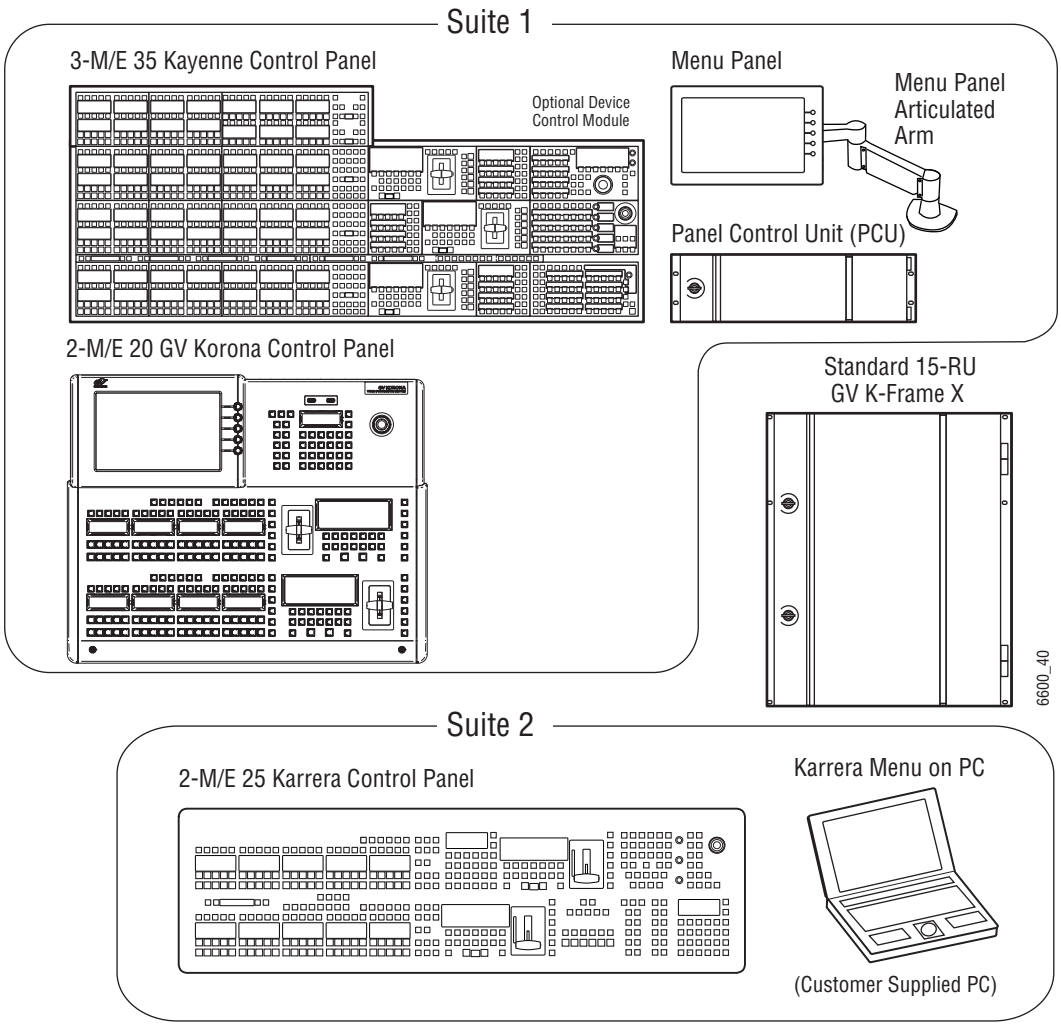
A GV Korona control surface consists of:

- A Control Panel with stripes of buttons,
- System Control area with a Device Control area,
- Switched preview,
- Alternate bus and Aux bus delegation,
- Macro controls,
- Controls for background and keyer source selection,
- Multi-Function and E-MEM area,
- Horizontal keyer cut/mix,
- Multi-function keypad and display, and
- Includes a built-in multi-touch display and menu system.

GV Korona Control Surfaces

Multiple Suites and Control Surfaces Example

Any Kayenne, Karrera, or GV Korona Control Panel can be configured with any GV K-Frame X Video Processor. The system can be subdivided into two suites and each suite can have up to two control surfaces. Hardware resources in the Video Processor Frame can be assigned to an individual suite during configuration, essentially creating two separate switchers sharing one Frame. See the *K-Frame Installation & Service Manual* for suite configuration information.



GV Korona Control Panel Multi-Suite Frame Example

Soft Panel (KSP) Option

Soft Panel Application

The KSP is an optional 1-M/E Soft Panel GUI which provides direct control of switching crosspoints, recalling effects and macros together with an integrated version of the Menu application. A customized PC keyboard is included with the option for users who like quick cut and mix action from a hard-button interface. The KSP can be used as an adjunct to a main panel, providing a second seat (second control surface) in a Suite.

The KSP GUI application is designed to run on a PC platform. The screen must be 1920x1080 resolution or better (which is common in professional video environments). A touchscreen is not required, but can be very useful.

The KSP software is included with the switcher application software. Purchasing the option provides a software license that enables the interface for the selected switcher, and includes a customized PC keyboard. The license activates an unlimited number of KSP applications associated with the licensed video processor frame. Additional customized PC keyboards are also available for purchase.

Menu Application

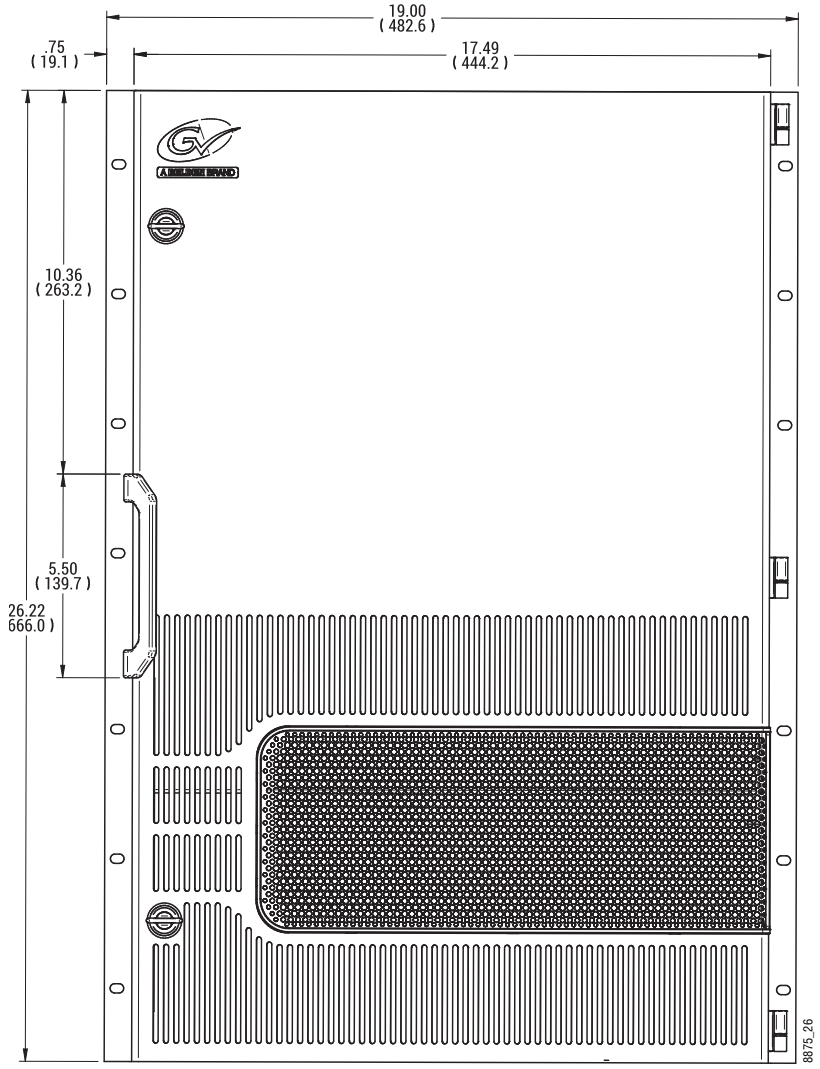
The Menu application software provided with every GV K-Frame X system can be run on a standard PC. This software accesses all the system's functionality, permitting mouse and keyboard control from a laptop, or remote control from any location on the network.

Supported Control Protocols

- PBus II
- Grass Valley CPL (Control Point Language) for Control Panel, Menu, Frame, and Automation systems
- GPI Inputs and Outputs
- Serial BVW-75 for VTR control
- AMP (advanced media protocol) for Profile PVS, Profile XP Media Platform, K2, M-Series, Turbo iDDR, and T2 iDDR systems over Ethernet
- Odetics protocol for VTR control
- Serial and Ethernet VDCP
- Grass Valley Native Protocol for routers/routing control systems (Trinix/Trinix NXT, Venus™, Triton™, and third-party routers; Jupiter NV9000 and NV920, and Encore router control systems)
- Tally (contact closure)
- GV K-Frame X Ethernet Tally protocol
- SNMP system monitoring
- LDK Series & LDX Series™ camera control with tally via Connect Gateway
- RossTalk for XPression control

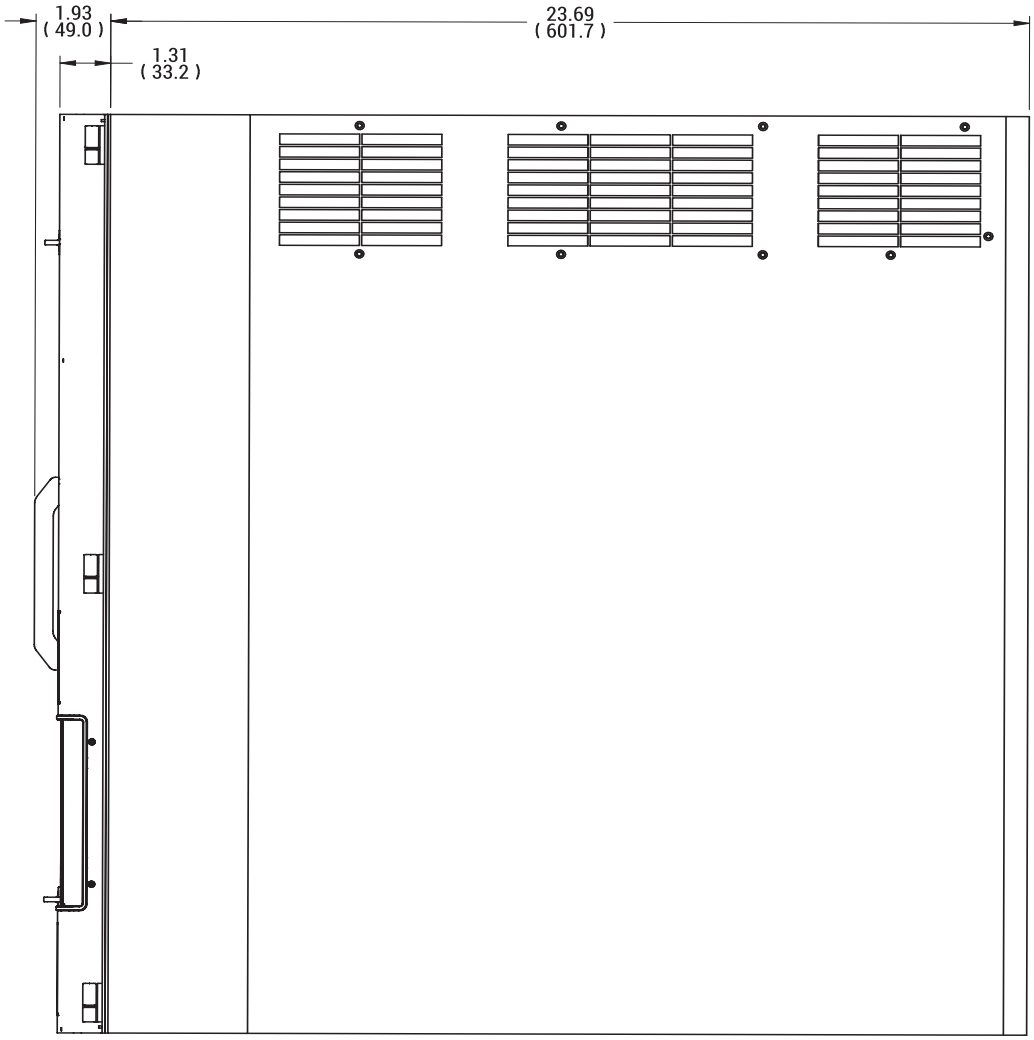
2 Frame Installation

15-RU Video Processor Dimensions



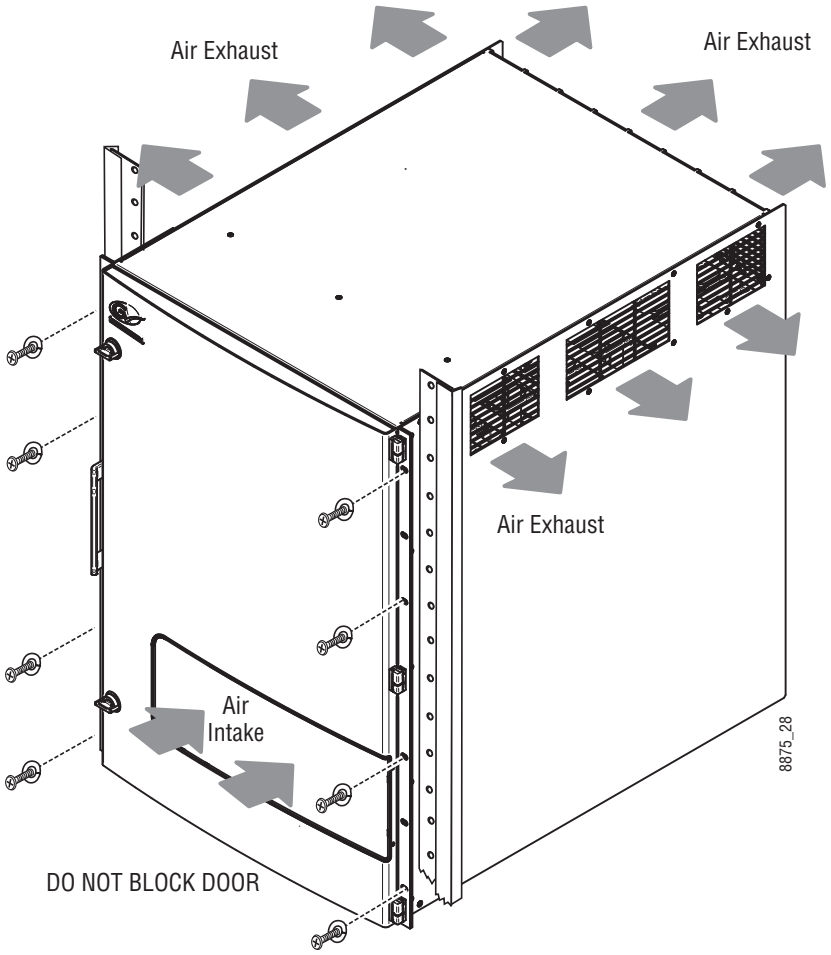
15-RU Dimensions (Front View)

CAUTION: Mounting a GV K-Frame X in a rack immediately below equipment that extends forward from the rack may not provide enough clearance to completely remove the door.



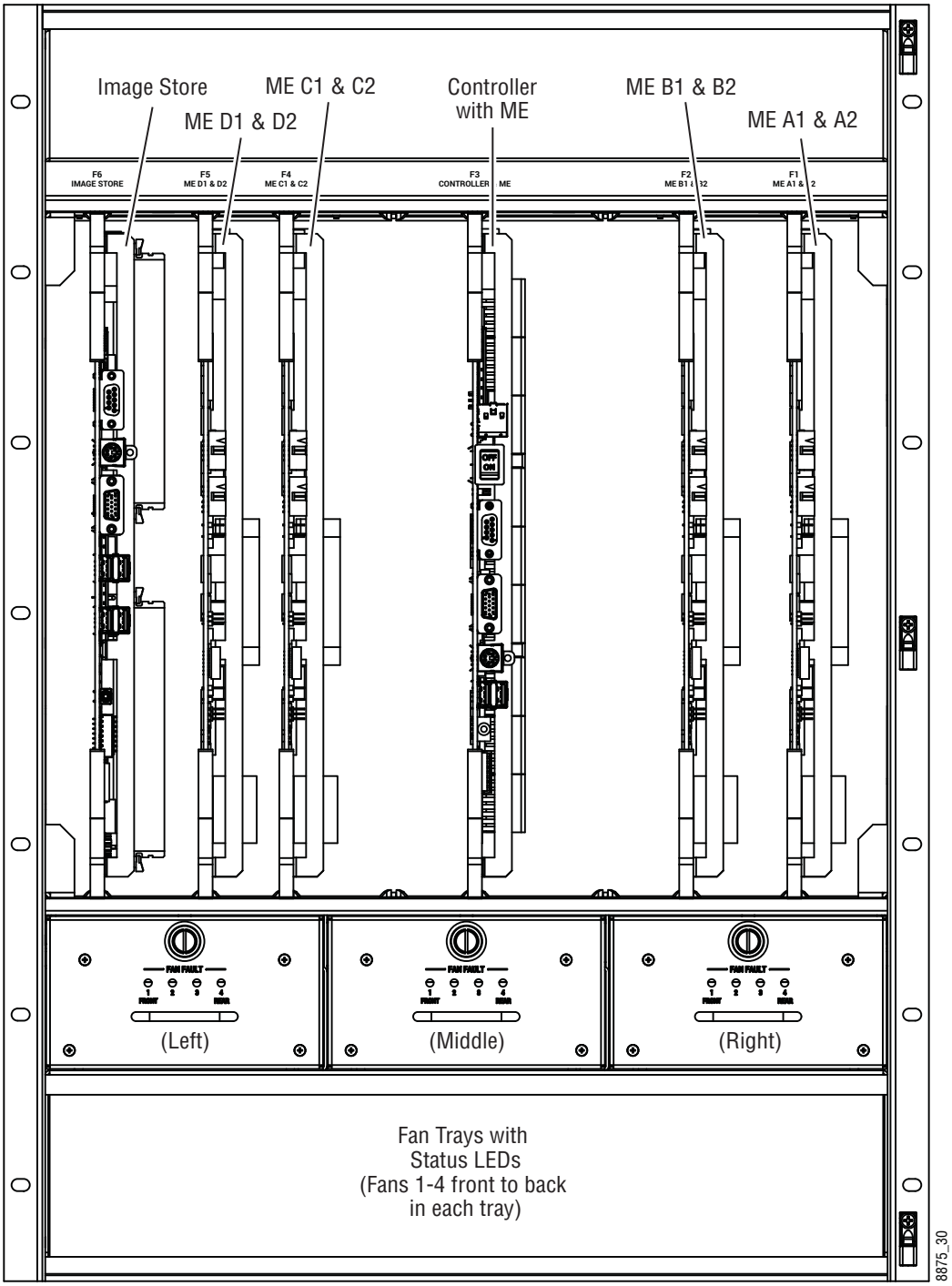
15-RU Dimensions (Side View)

15RU Video Processor Installation and Airflow

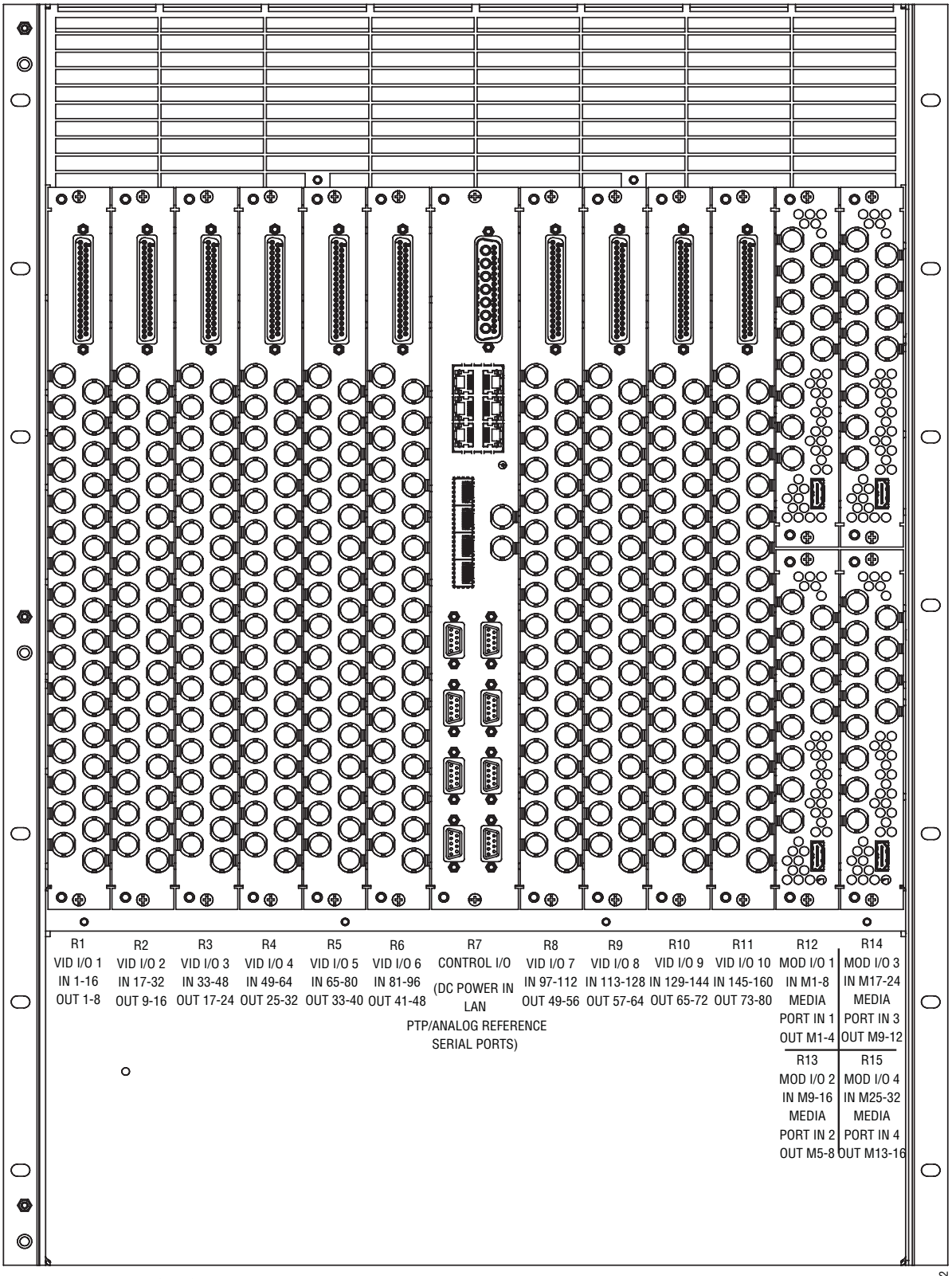


15-RU Rack Mounting and Cooling Airflow

15RU Video Processor Views



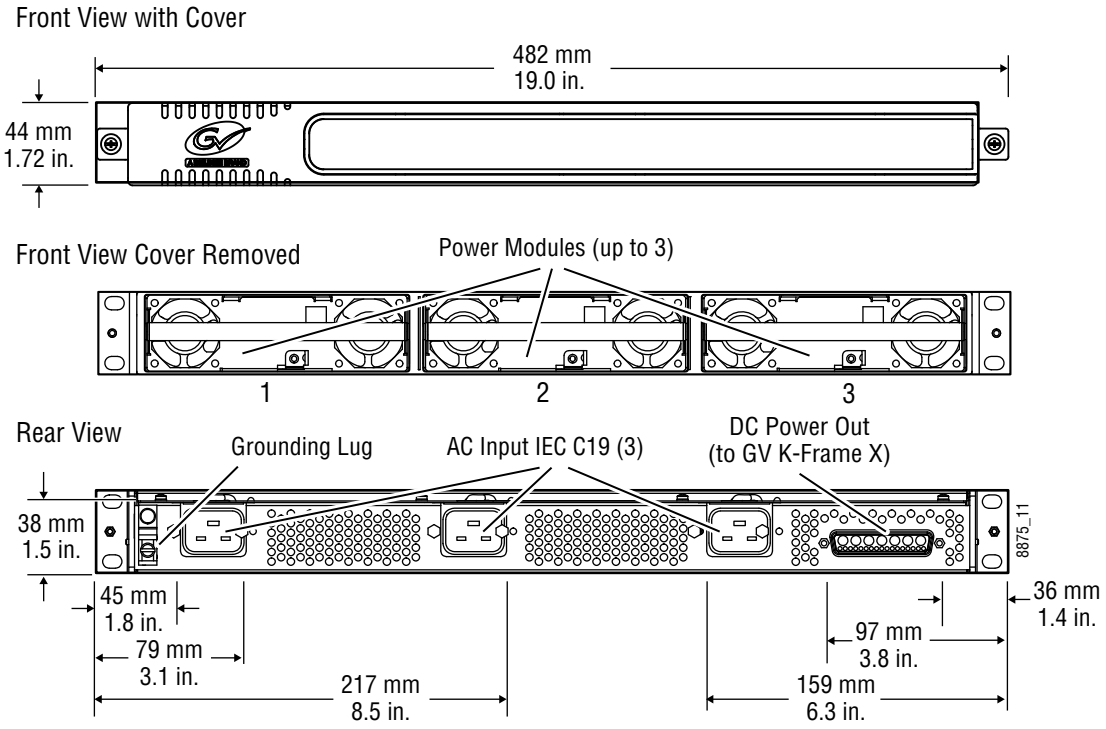
15-RU, Front View with Door Removed



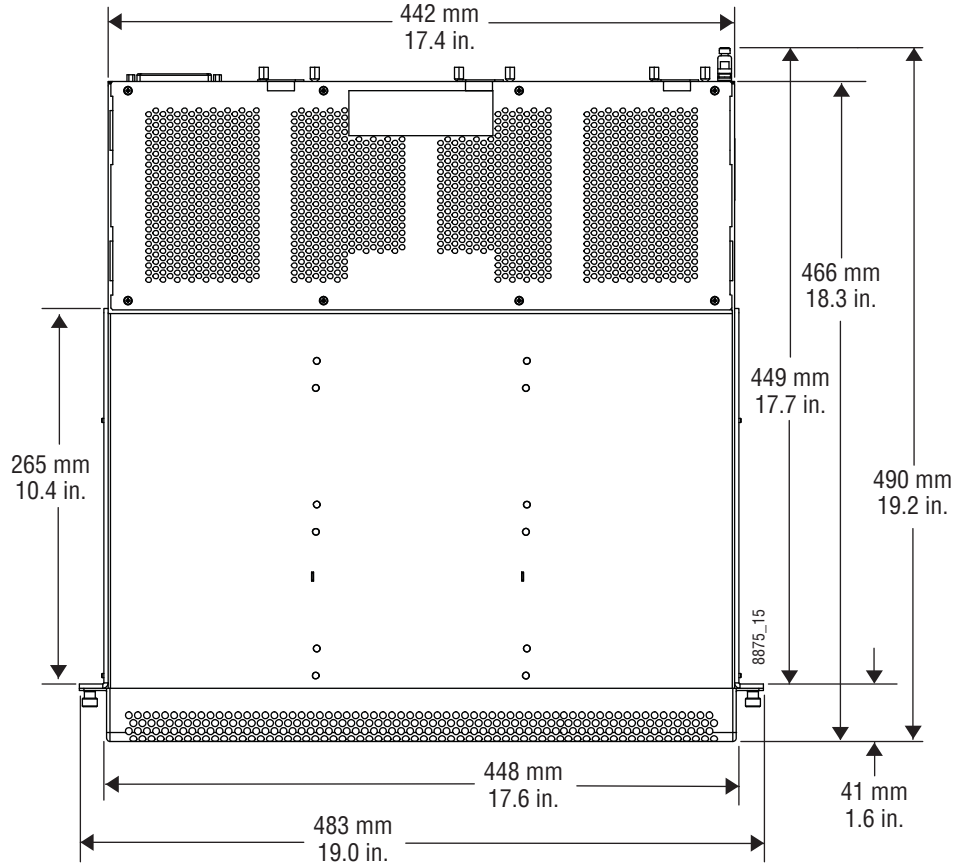
15-RU, Rear View

Power Supply Views

A 1-RU Power Supply Frame provides DC power for the 15-RU Video Processor Frame.



Power Supply Frame Dimensions (Front and Rear Views)



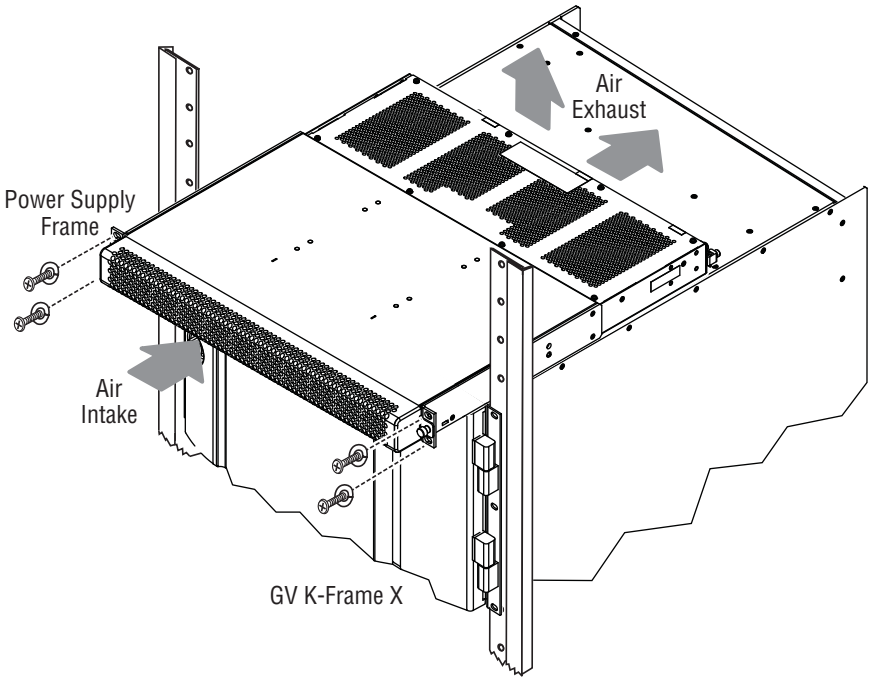
Power Supply Frame Dimensions (Top View)

Power Supply Frame Rack Installation and Airflow

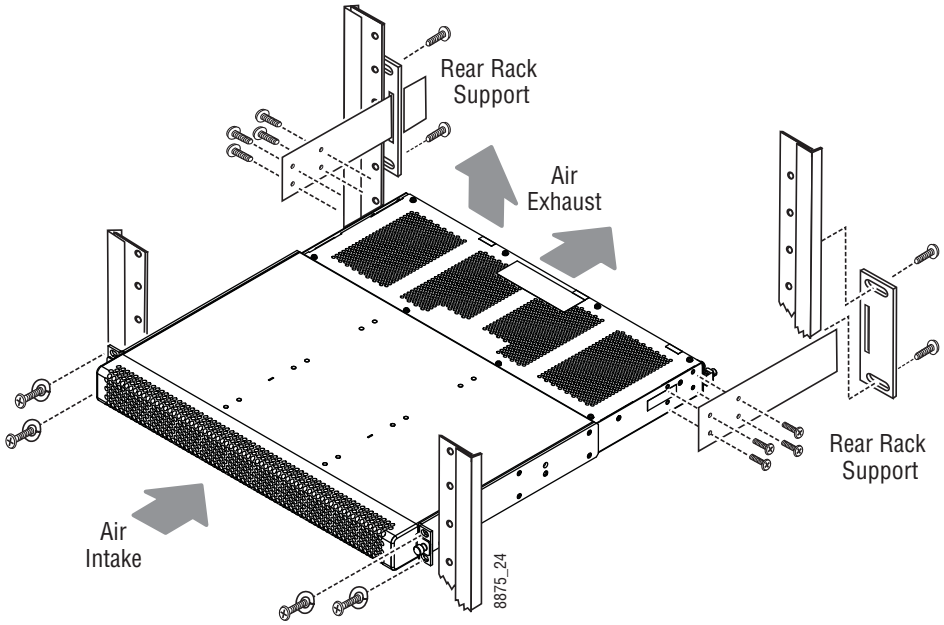
The power supply frame used with the 15-RU GV K-Frame X is ideally rack mounted immediately above the Video Processor chassis. The power supply frame is then supported by the lower chassis and eliminates the need for power supply rear rack supports.

In addition, this placement allows removal of the GV K-Frame X front door.

If the power supply frame is not mounted above the GV K-Frame X chassis, rear rack supports are required. If mounting in an alternative location, allow for the 34" DC interconnect cable length.



Power Supply Rack Installation and Cooling Airflow



Power Supply Rack Installation

Power Supply Cooling

The top surface of the rear of the GV K-Frame X Power Supply Frame has air holes and is slightly recessed, which permits air flow even if equipment is mounted in the rack directly

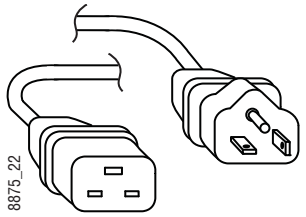
above. These top recessed air holes must remain open for proper cooling. Ensure paper or other obstructions do not block these air holes.

Power Supply AC Requirements

The GV K-Frame X 15-RU Power Supply Frame has provision to support up to three hot swappable power modules. These convert the AC line input to 48V DC for the Video Processor Frame. The cells for the three modules (referred to as left, center, right) are identical and any or all cells can have a module installed. Each cell has its own AC line cord. The supplies are power factor corrected and automatically accommodate low line (120V nominal) or high line (240V nominal). The power supply frame has a rating of 100 – 240 volts, although it is designed and tested for a range of 90 to 264 volts to accommodate under and over voltage conditions. A 15-RU GV K-Frame X is supplied with two power modules. A third power module can be fitted as a redundant (n+1) power supply option.

Supplied Power Cables

The GV K-Frame X Power Supply Frame has IEC C19 sockets, instead of the more common C13 style, to accommodate potentially higher currents. Cables provided with GV K-Frame X systems are matched to the destination country's standard. For example, in the USA C19 to NEMA 5-20P cables are provided.



USA Power Cable Example

About High Line (208V-240V) Versus Low Line (120V) Operations

North American users usually have a choice to use low line (120 volts) or high line (208-240 volts) as the AC source. If Low line is used, a 15-RU GV K-Frame X with all options installed and running at 120 volts will draw a total of approximately 15 amps from the line cords. At 100 volts, this increases to approximately 18 amps. This load will be evenly distributed among the line cords.

> IMPORTANT: Each line cord must be serviced by a dedicated 20 amp circuit. Two power supplies on the same circuit could exceed 20 amps. With a fully loaded system, a third power supply is needed for redundancy.

The possibility of drawing as much as 15 amps from a line cord explains the 20 amp (NEMA 5-20P) plug on the line cords supplied. The NEC in the US specifies that the ubiquitous 15 amp outlet be de-rated to 12 amps for continuous loads. A 20 amp outlet is needed for the rare case of a 15 amp load experienced during a fault condition.

Most of the above is not an issue if high line (240V) operation is used. Since AC line currents are approximately half of those at low line, exceeding the current rating of a circuit should not be a problem. In areas where there is a choice between high line or low line operation, the user should consider the advantages and disadvantages of each power sourcing scheme.

About Low Line (120V) Operational Considerations

If low line (120V) operation is used (mostly in North America) three characteristics of the switcher should be kept in mind when provisioning AC power for the system, which will result in the most reliable system possible:

- Consider brown-out—Modern switching power supplies are constant power devices and as such, unlike resistive loads, the input current increases as the input voltage decreases.
- Consider power supply failure—If two or three power modules are present, they will load share. For instance, if two modules are fitted and the total AC line current is 10 amps, each of the two line cords will draw about 5 amps. If one supply fails, the other supply takes up the entire load. At this point, one line cord will draw 0 amps and the other cord will draw 10 amps.
- Consider future options—The total AC power consumption is significantly influenced by the number and type of hardware options installed. This includes the number of MEs, I/O boards, and Modular I/O boards.

3 System Cabling

About the GV K-Frame X System Cabling Section

This section provides overview information that is common to all GV K-Frame X systems as well as information specific to Kayenne, Karrera, and GV Korona Control Panels and components.

System Cabling Overview

The GV K-Frame X systems use Ethernet, serial, and USB connections and custom multi-pin cables for Kayenne. The Video Processors have built-in Ethernet switches. Each Video Processor has Tally outputs and GPI I/O (General Purpose Interface Input/Output) control available.

Ethernet Tally Versus Serial Tally

Our GV K-Frame X tally system provides significantly more information than the bandwidth of the serial connection allows. Therefore, we support Ethernet tally only. However, many tally vendors do support our Ethernet tally system so contact your tally vendor for GV K-Frame X Ethernet tally support information.

Suites and Control Surfaces

A GV K-Frame X system can be divided into two suites. The Video Processor resources (M/Es, eDPMs, external devices, etc.) can be assigned to each suite, creating two switchers with one Video Processor Frame. Each suite can be subdivided into two control surfaces, using Kayenne, Karrera, GV Korona Control Panels and Soft Panels and Menu on PC. Each control surface is intended for use by a single operator. The Control Panel system flexibility permits locating these control surfaces in physically separate locations.

Ethernet Switches

The Ethernet switches built into the GV K-Frame X Video Processor and PCU (Kayenne only) auto-detect speed and polarity, and are 10/100/1000 Mbps capable. Either straight-through or crossover Ethernet cabling can be used. Available Ethernet connectors may be connected to the Facility LAN or other devices, as needed. However, should the GV K-Frame X Video Processor or PCU power down, the internal Ethernet switches will also power down, interrupting communication to devices connected to that Frame's or PCU's internal Ethernet switches. Only connect devices that are GV K-Frame X system related.

Customer Supplied Ethernet Routers and Switches

Existing facility Ethernet switches can be used in conjunction with a GV K-Frame X system. If connecting to a network area outside that is used by the GV K-Frame X, use of an appropriately configured Ethernet Router is strongly advised. This reduces network traffic on the GV K-Frame X network and keeps it isolated. Any Ethernet switches added specifically for use with the GV K-Frame X should be 1000 Mbps capable for the most efficient operation.

Ethernet Specifications

Cables	**Type**	10BaseT, 100BaseT, 1000BaseT compatible Category 5 cable, 8 conductor twisted pair The system will work at lower ratings with reduced performance. 1000BaseT components are highly recommended.
	Connectors	RJ-45 male connector at each end of cable.
	Length	100BaseT, 1000BaseT: 328 ft. (100 m) maximum. 10BaseT: 984 ft. (300 m) maximum. Use additional switches to exceed maximum cable runs.
Switch	**Speed**	10/100/1000 Mbps
	Ports	RJ-45 auto-negotiating 10/100/1000 Mbps; number of ports required is dependent upon system size. Frame and PCU ports are capable of 1000 Mbps. Using a 1000 Mbps Ethernet switch enhances Image Store transfer speeds.
	Unmanaged	Recommended. Configuration not required, but does not provide remote monitoring capability.
	Managed	May be used. Requires configuration, but offers remote monitoring capability.

To integrate GV K-Frame X devices into an existing network, ask the local network administrator for that network's subnet mask. Before changing IP addresses always set the subnet masks of the GV K-Frame X devices to the mask of the local network.

Factory Default Network Settings

GV K-Frame X System Default IP Addresses

Devices	IP Address
Video Processor Frame CPU	192.168.0.170
Image Store CPU	192.168.0.171
Control Panel Surface 1A	192.168.0.173
Touch Screen Menu Panel 1 (Kayenne/Karrera)	192.168.0.175
Touch Screen Menu Panel 2 (Kayenne/Karrera)	192.168.0.176

GV K-Frame X System Default IP Addresses

Devices	IP Address
Control Panel Surface 1B	192.168.0.177
Control Panel Surface 2A	192.168.0.178
Control Panel Surface 2B	192.168.0.179
Clip Store	192.168.0.180
32-Crosspoint Remote Aux Panels: Kayenne Karrera S25 S50 V1.6.5 and higher software: (hard reset with the front panel buttons)	IP Address: 192.168.1.2 Frame IP: 192.168.1.1 Gateway IP: 192.168.1.1 Subnet Mask 255.255.255.0 Note: 32-Crosspoint Remote Aux Panel default settings must be changed to operate with a GV K-Frame X whose other components are configured with their default IP addresses.
All Subnet Masks)	255.255.255.0
All Gateways (except V1.6.5 software Remote Aux panel)	192.168.0.1
Following Reserved For Future Use	CAUTION: Do not connect any devices configured with the following IP addresses to a network reserved for a GV K-Frame X connected to a Kayenne Control Panel.
Video Processor Frame Gigabit Ethernet	192.168.0.172
PCU Panel Reserved LAN Port	192.168.0.174

Note: Customer orders with multiple Control Panels will be pre-configured to the listed IP addresses. However, if one of these additional Control Panels is reset to factory defaults, it will be given the standard 1A default 192.168.0.173 address.

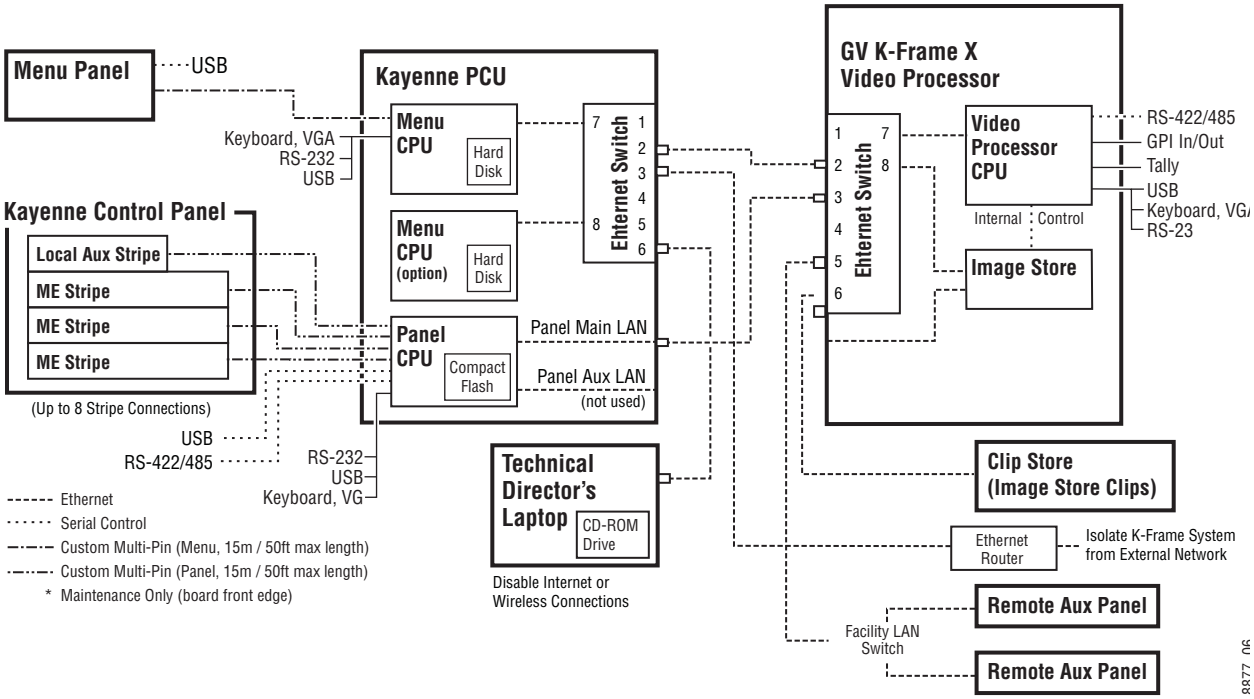
To integrate GV K-Frame X system devices into an existing network, ask the local network administrator for that network's subnet mask. Before changing IP addresses always set the subnet masks of the devices to the mask of the local network.

System Cabling for Kayenne Control Panels

USB, Ethernet, and custom multi-pin cabling is used to connect the Video Processing Frame, Panel Control Unit (PCU), Control Panel, and Menu Panel components.

In addition to the Video Processing Frame, the PCU also includes a built-in Ethernet Switch.

CAUTION: The facility network used for your GV K-Frame X system (and other video production equipment) should be kept separate from any external network, to prevent network traffic from adversely affecting system operation.

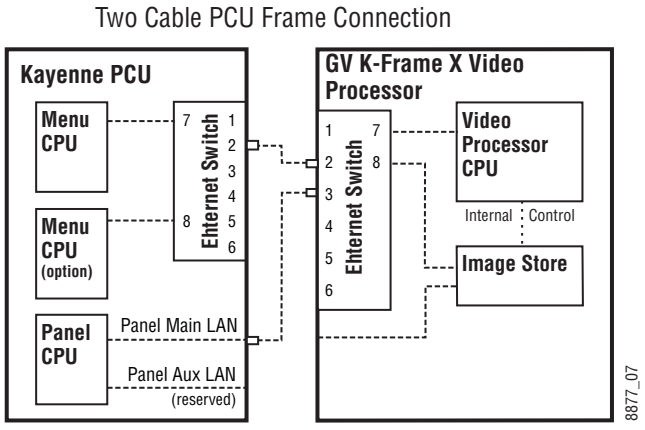


GV K-Frame X/Kayenne System Communications Overview

Network Cabling

Network connections are required between the GV K-Frame X Video Processor and the Kayenne PCU. The PCU routes network communications to and from the Control Panel Stripes and Menu Panels, using custom multi-pin cables.

The use of two Ethernet cables to connect the PCU to the Frame is recommended.



PCU to Kayenne Network Connection Methods

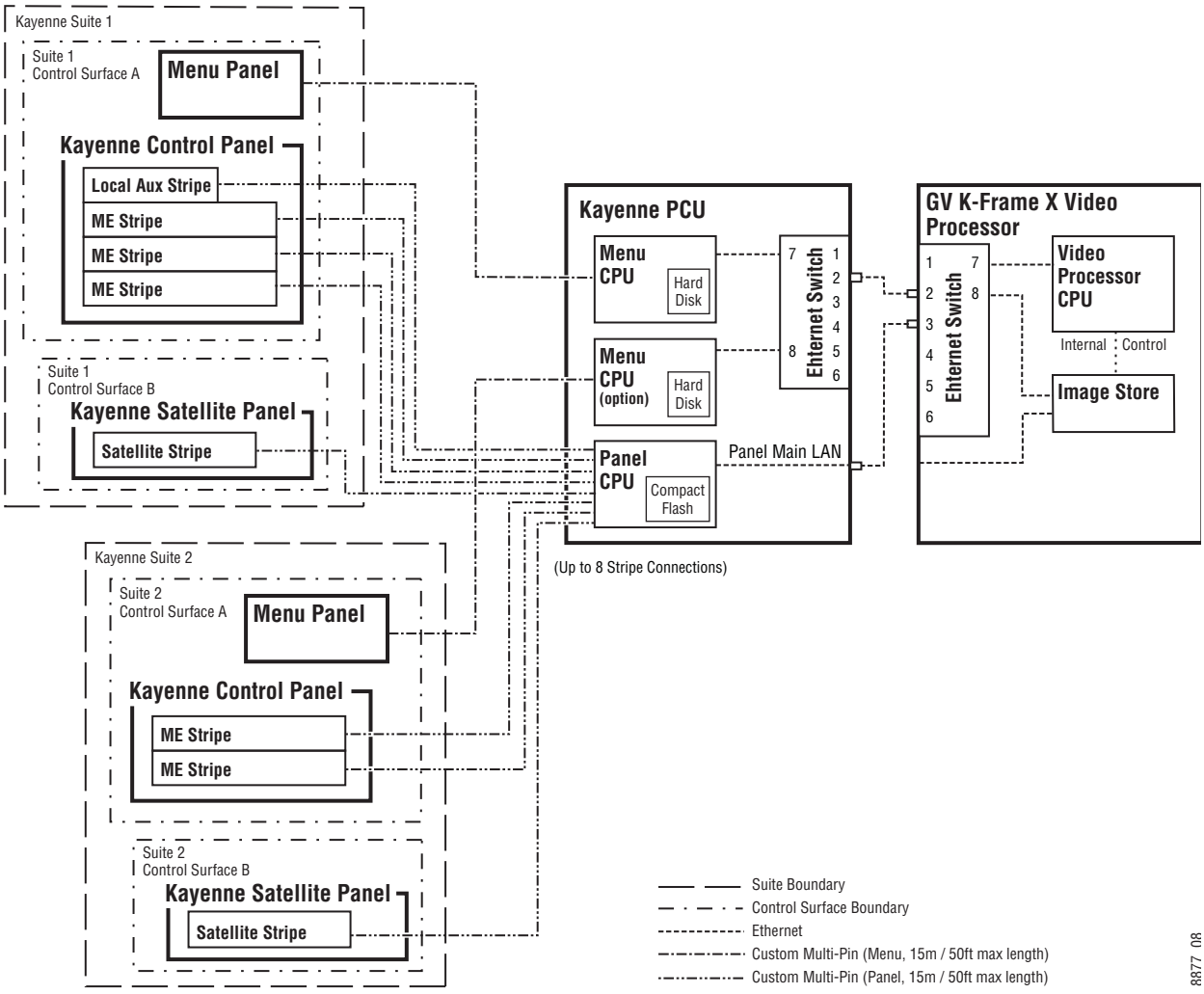
The PCU Ethernet switch to Frame Video Processor Ethernet switch cable connection is used for Menu Panel communications. The second cable connects the Panel PCU directly to the Frame Ethernet switch. Using two cables provides additional Ethernet communications

throughput (to support Image Store file operations) and also offers redundancy. Because the Menu Panel and the Control Panel have independent cable connections, failure of one of these cables will not completely disable the system. Either the Menu Panel or the Control Panel will remain operational after a single network cable failure.

Suites and Control Surfaces

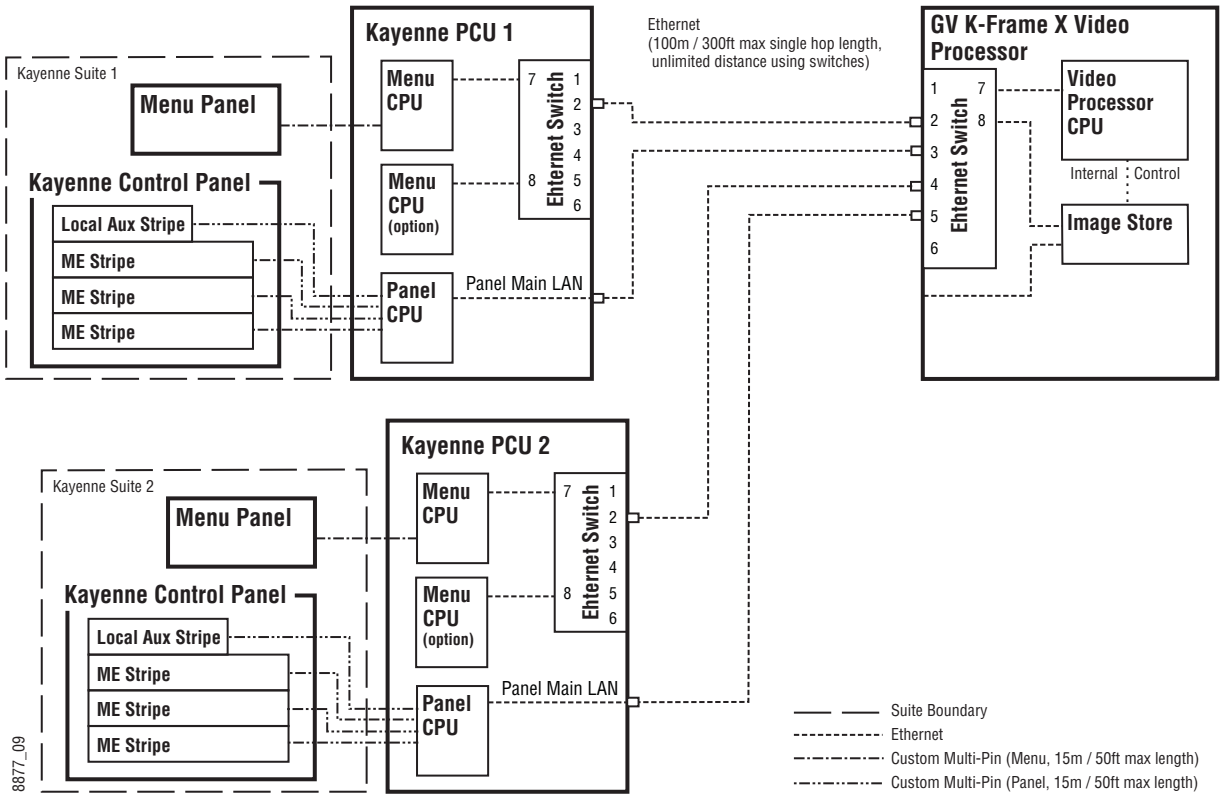
The GV K-Frame X Control Panel system flexibility allows you to locate control surfaces in physically separate locations.

Custom multi-pin cable runs are limited to 15 meters (50 ft.) If this length is sufficient, a single PCU can be used for an entire multi-suite K-Frame system.



GV K-Frame X/Kayenne Two Suites with Two Control Surfaces Using One PCU

Using a second Kayenne PCU, GV K-Frame X suites can be located anywhere on the network, permitting system control from different rooms, floors, or even different buildings.



GV K-Frame X/Two Suites Using Two Kayenne PCUs

Kayenne Control Panel Cables

Connectors on the outside bottom of the Control Panel tray connect to numbered ports on the PCU, using special multi-pin cables that carry both power and communications signals. Special cables are also used to connect the Menu Panels to the PCU.

> CAUTION: Do not connect or disconnect the multi-pin cables linking a Kayenne Control Panel tray or Menu Panel to the PCU while the PCU is powered up. Damage to the equipment can result.

Kayenne M/E and Local Aux Stripe Connections

It is recommended that the PCU numbered ports be connected to Control Panel Stripes in ascending M/E order, followed by the Local Aux Stripe. PCU port connections can be re-

mapped, but this order matches the default configuration. The table below shows the connections for various Kayenne Control Panel models used in a single suite.

PCU Port to Control Panel Stripe Connections, Single Suite

Control Panel Model	PCU Port	Panel Stripe
4-M/E with Local Aux	1	M/E 1 (top Stripe)
	2	M/E 2 (second Stripe)
	3	M/E 3 (third Stripe)
	4	M/E 4 (bottom Stripe)
	5	Local Aux Stripe
3-M/E with Local Aux	1	M/E 1 (top Stripe)
	2	M/E 2 (second Stripe)
	3	M/E 3 (bottom Stripe)
	4	Local Aux Stripe
2-M/E with Local Aux	1	M/E 1 (top Stripe)
	2	M/E 2 (bottom Stripe)
	3	Local Aux Stripe
1-M/E (without Local Aux)	2	Master EMEM, MFM (top tray)
	1	M/E (bottom tray)

Kayenne Satellite Panel Cabling

PCU Cabling

CAUTION: Do not connect or disconnect multi-pin PCU cables while the PCU is powered up. Damage to the equipment can result.

Each Satellite Panel has a standard multi-pin cable for connection to the PCU. Modules independent of a particular Stripe (for example Device Control or Master E-MEM modules) can use any available PCU connector.

Modules to be associated with a particular Stripe (like a Transition Module) must be connected to the next higher PCU port for that Stripe. For example, if you wish to use a Transition Module with M/E 4 that uses PCU Port 4, plug the Satellite Panel into PCU Port 5, and move the Local Aux Stripe connector (if used) to PCU Port 6.

Internal Cabling

CAUTION: The RJ-45 connectors inside the Satellite Panel trays are used for proprietary communications only. Ethernet devices may be damaged if plugged into these connectors.

The RJ-45 connectors inside the Satellite Panel trays are used for proprietary communications only. Ethernet devices may be damaged if plugged into these connectors.

The Single Module Satellite Panel has internal module cabling the same as the other Stripes. Simply plug the module into a port using the provided cable.

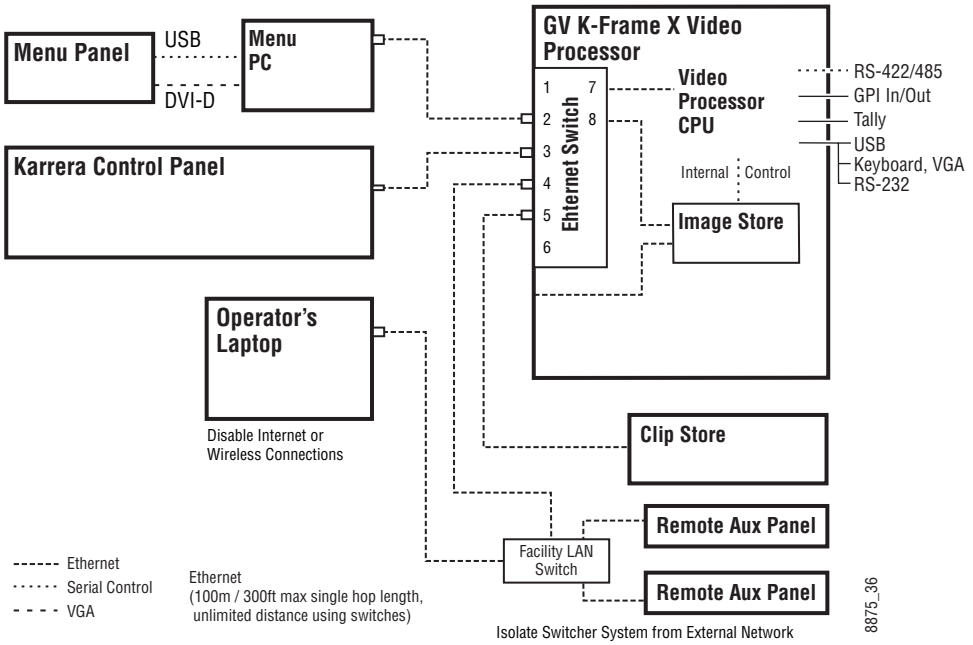
The Double Module Satellite Panel has a similar internal cabling arrangement, but one cable passes through a hole to the other tray.

Kayenne Touch Screen Menu Panels (Used with PCU)

Connect a single or primary Menu Panel to the PCU **Menu 1** connector, using the supplied custom multi-pin cable. Connect an optional second Menu Panel to the **Menu 2** connector. Menu Panels are assigned to suites during system configuration.

System Cabling for Karrera Control Panels

The Karrera Control Panel uses Ethernet, serial, DVI, and USB connections for system communications.

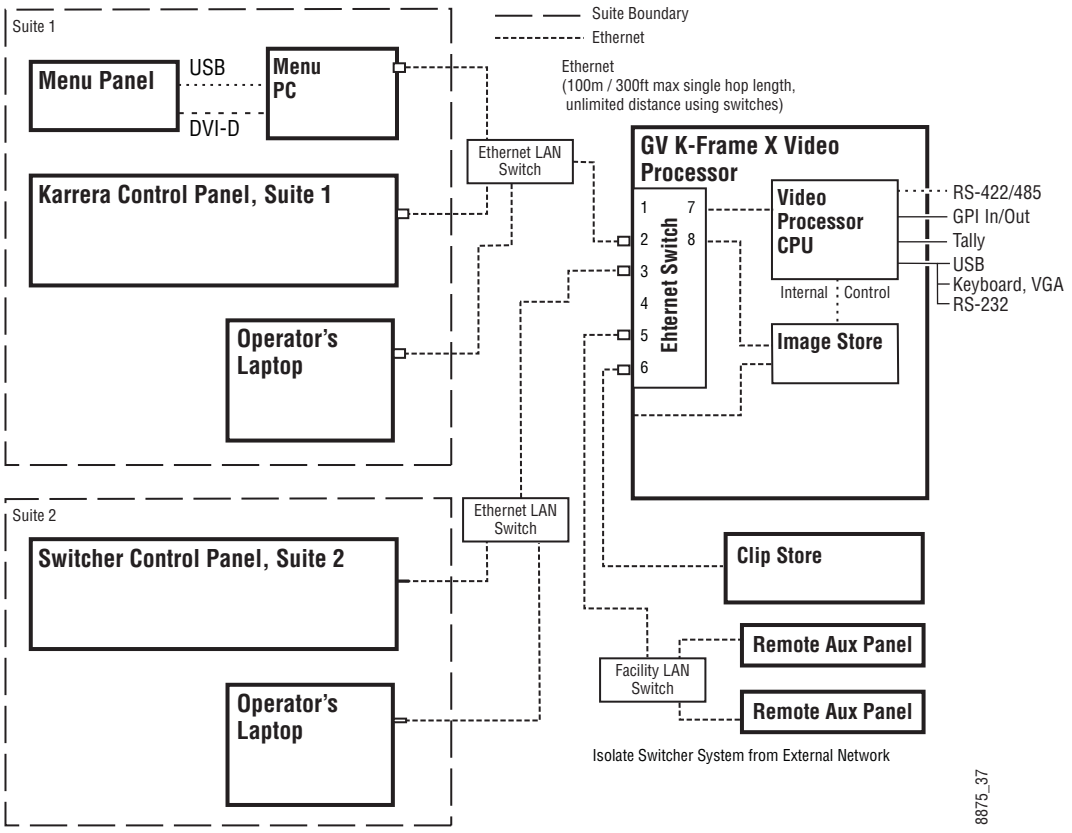


GV K-Frame X/Karrera System Communications Overview

CAUTION: The facility network used for your GV K-Frame X system (and other video production equipment) should be kept separate from any external network, to prevent network traffic from adversely affecting system operation.

Suites and Control Surfaces

The GV K-Frame X Control Panel system flexibility allows you to locate control surfaces in physically separate locations. Two dedicated, customer supplied Ethernet switches may be required when multiple suites are being used.



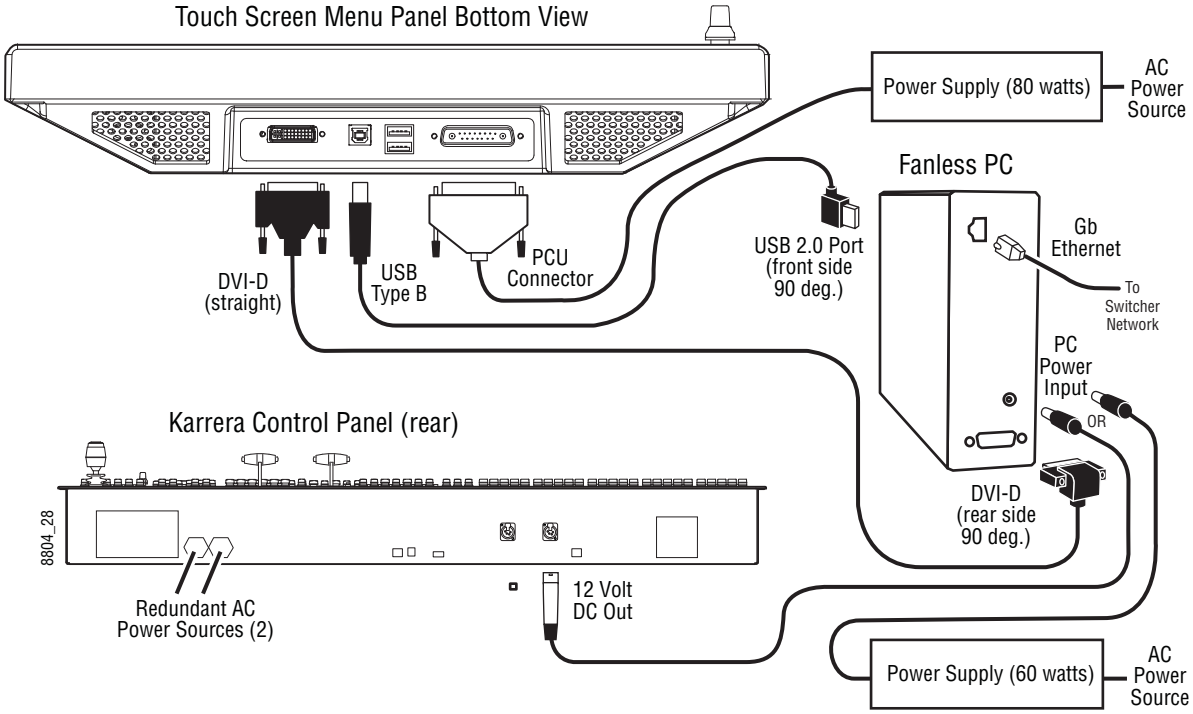
GV K-Frame X/Karrera Two Suite K-Frame System

Network Cabling for the Karrera Control Panel

Ethernet, USB, and DVI-D connections are used between the GV K-Frame X Video Processor, Control Panel, and optional Menu Panel PC.

Optional Touch Screen Menu Panel Cabling

Five connections are required for the Touch Screen Menu option. If the articulated arm is used, some of these cables can be routed through channels in the arm that have covers that snap into place.

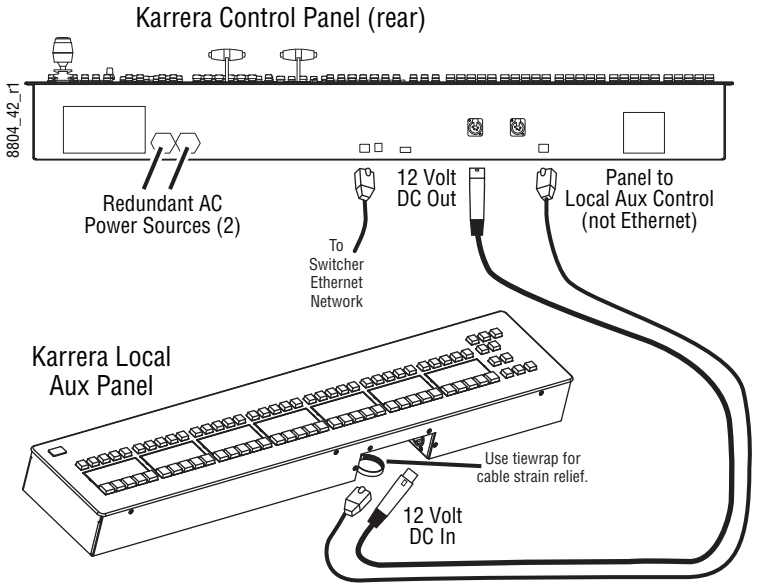


Menu Panel Cabling

CAUTION: Connect the USB port on the front of the Fanless PC (next to the firewire 1394 port) to the Menu Panel. The default PC settings enable knob control by mapping Com 3 to that front USB port.

Optional Karrera Local Aux Panel Cabling

The Karrera Local Aux Panel is powered from the Control Panel, using a 4-pin XLR cable. System control is provided using a RJ-45 connecting cable, which uses a proprietary communications protocol (not Ethernet).

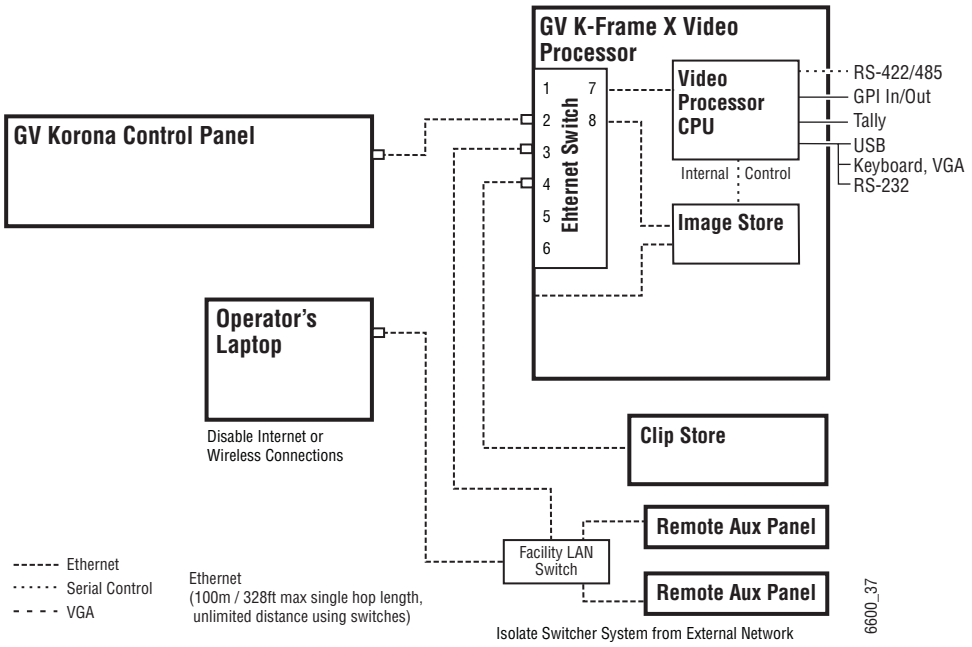


Local Aux Panel Cabling

System Cabling for the GV Korona Control Panel

The GV Korona system uses Ethernet connections for communications. The GV K-Frame X Video Processor has a built-in Ethernet switch. Tally outputs and GPI I/O (General Purpose Interface Input/Output) control are also available on the Frame.

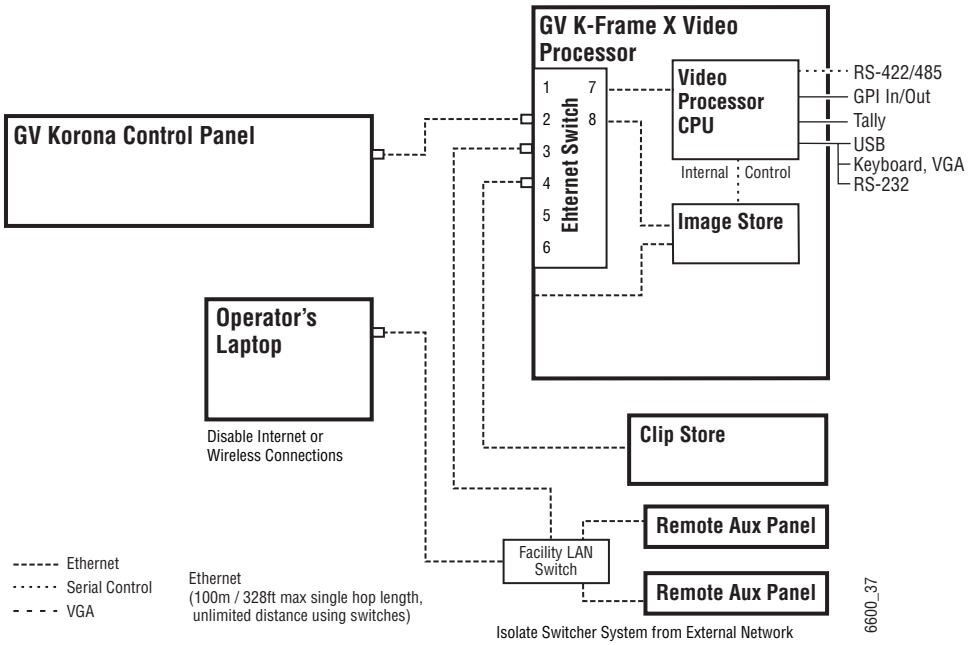
CAUTION: The facility network used for your GV K-Frame X system (and other video production equipment) should be kept separate from any external network, to prevent network traffic from adversely affecting system operation.



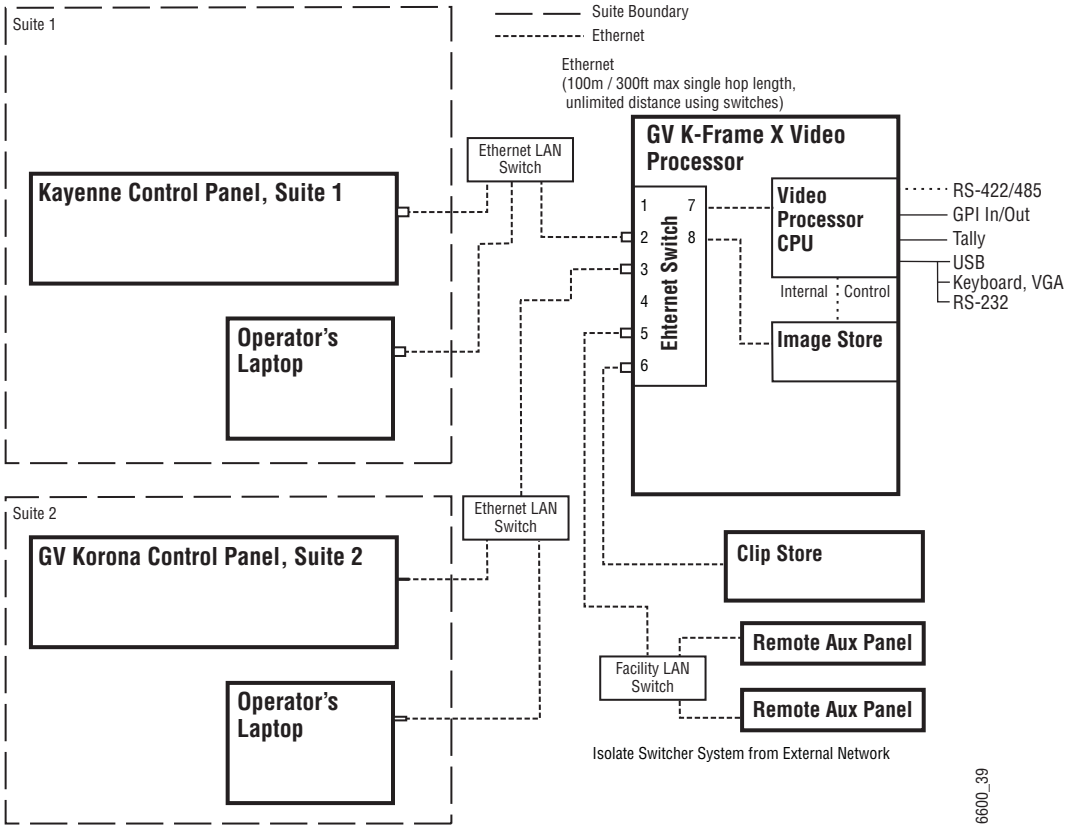
GV K-Frame X/GV Korona System Communications Overview

Suites and Control Surfaces

The GV K-Frame X Control Panel system flexibility allows you to locate control surfaces in physically separate locations. Two dedicated, customer supplied Ethernet switches may be required when multiple suites are being used.



GV K-Frame X/GV Korona Single Suite System



GV K-Frame X/GV Korona Two Suite System

About GV K-Frame X Video Cabling

All GV K-Frame X system video inputs and outputs are configurable. For cabling configuration flexibility, each external primary input can be mapped to any control panel source select button, as can each internal video system source. Any GV K-Frame X system video signal, such as M/E program, preview, clean feed, or PGM/PST, can be mapped to any output bus to be sent to any output connector, or an output bus can act as an auxiliary bus.

IP I/O Fiber Optic Cabling

Grass Valley recommends using OM3 (maximum of 300 meters) or OM4 (maximum of 400 meters) Multi-mode Fiber Optic cabling with the 10GBASE-SR Modules provided with the 10GE IP I/O boards.

SDI Inputs and Outputs

Inputs

Non-looping video inputs on the back of the Video Processor Frame are numbered 1 through 16 on each I/O module. Each accepts a 270 MHz, 1.485 Gb, or 3 Gb serial digital video signal.

Outputs

Paired outputs on the back of the Video Processor Frame are numbered 1-8 on each I/O module. Identical signals are present on each of the paired output connectors. All of the outputs carry the same video format, as determined by the standard selected and the connected reference signals.

IP I/O

Non-looping video IP I/O on the back of the GV K-Frame X Video Processor Frame are numbered 1A through 8A and 1B through 8B on each I/O module. Each accepts a 270 MHz, 1.485 Gb, or 3 Gb serial digital video signal.

Reference Input

The GV K-Frame X Video Processor has digital referencing that can lock to any digital input video signal or one analog looping reference input. Each can be used with any SD/HD/3G/4K standard.

For the analog looping reference input, 75-ohm termination of the looping input can be used either directly, on the adjacent connector, or at the end of a daisy chain looping to other equipment.

Analog Input Sync Rates will show 'Locked' in the Frame Status pane of the Eng Setup, Video Settings menu when the Frame Operating Mode matches a related frequency. For example, a 1080pA/50Hz signal will lock when the Frame is in the 625i/25Hz Frame Operating Mode because 25Hz is 'related' or a divisible of 50Hz.

Supported Media Port Line and Frame Rates

SD

- 720p (1440)x480i 29.97 Hz
- 720p (1440)x576i 25 Hz

HD

- 1280x720p 50/59.94/60 Hz
- 1920x1080i 25/29.97/30 Hz

Note: HDCP is *not* supported.

System Video Timing and Delay

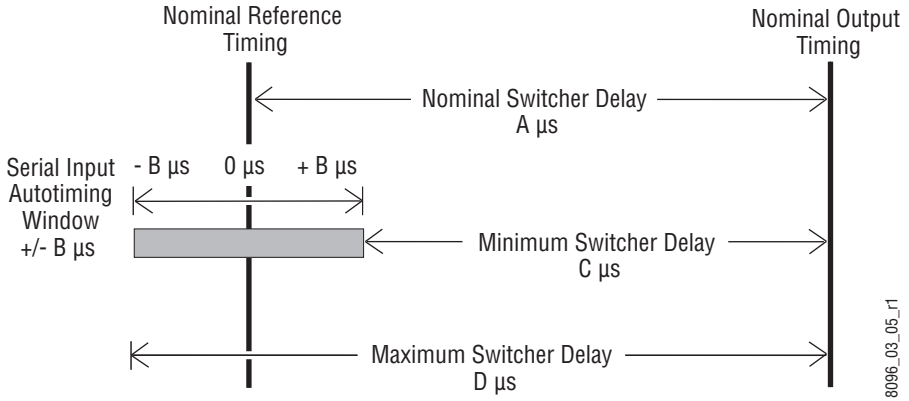
The total delay of a video input to the switcher output can vary according to the relationship of the input to the switcher reference. The switcher will automatically autotime inputs that fall within an autotiming window. Inputs must be within this range to be properly timed at the output. The calculation of the actual video delay of a specific input is

the Nominal Switcher Delay minus the input time location within the autotiming window (the time location value can be zero, positive, or negative.

GV K-Frame X System Timing, 4-M/E System

Frame Operating Mode	A Nominal Switcher Delay	B Autotiming Window	C Minimum Switcher Delay	D Maximum Switcher Delay
525i/29.97	54.91 us	+/- 8.69 µs	46.22 µs	63.56 µs
625i/25	55.10 µs	+/- 8.88 µs	46.22 µs	64.00 µs
720p/59.94/60	20.22 µs	+/- 2.02 µs	18.20 µs	22.24 µs
720p/50	22.43 µs	+/- 4.23 µs	18.20 µs	26.67 µs
1080i-1080psf/29.97/30	23.93 µs	+/- 5.73 µs	18.20 µs	29.66 µs
1080i-1080psf/25	26.88 µs	+/- 8.68 µs	18.20 µs	35.56 µs
1080psf 23.98/24	27.63 µs	+/- 9.43 µs	18.20 µs	37.04 µs
1080p-A 59.94/60	11.97 µs	+/- 2.87 µs	9.1 µs	14.83 µs
1080p-A 50	13.44 µs	+/- 4.34 µs	9.1 µs	17.78 µs
1080p-B 59.94/60	20.23 µs	+/- 9.44 µs	10.79 µs	29.66 µs
1080p-B 50	23.18 µs	+/- 12.39 µs	10.79 µs	35.56 µs

A timing diagram of the input autotiming window and various switcher delay values is provided.



Switcher Timing Diagram

- For inputs entering the switcher in zero time with the reference, the total delay through the switcher is the Nominal Switcher Delay (A µs).
- Inputs that reach the switcher at the latest point in the autotiming window (+B µs) will have a total delay that equals the time required for switcher processing. This value is the Minimum Switcher Delay (C µs).
- Inputs that reach the switcher at the earliest point in the autotiming window (-B µs) will have a total delay equal to the Nominal Switcher Delay (A µs) plus the autotiming window range. This value is the Maximum Switcher Delay value (D µs).

On GV K-Frame X systems, the autotiming window varies depending on the operating mode. The Timing Analyzer in the Video Settings Menu displays this autotiming information.

Note: The maximum switcher delay is approximately one line of video.

Timing Analyzer

Use the Eng Setup, Video Settings, Timing menu when timing the system.

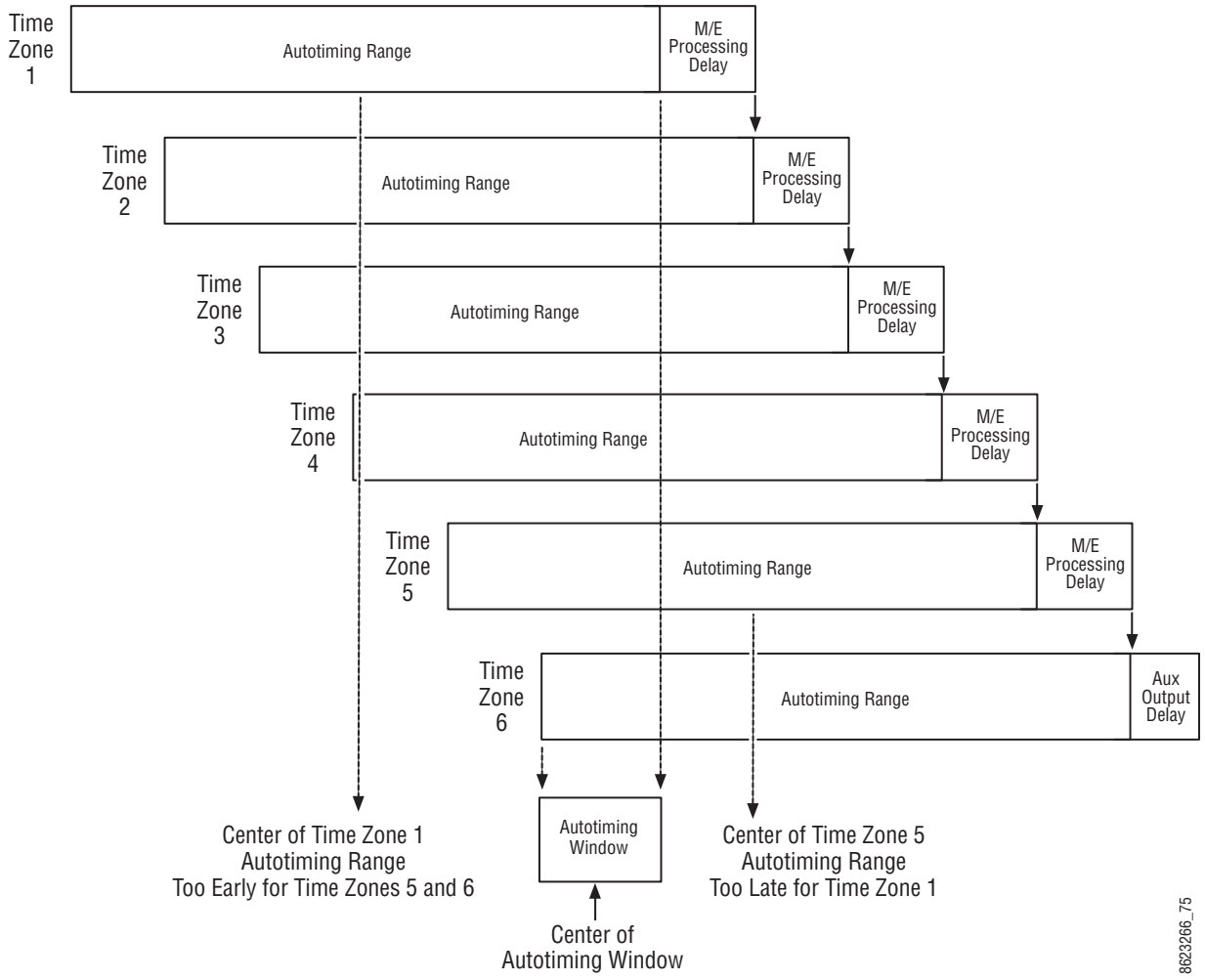
This analyzer reports the timing position of a selected source relative to the internal sync generator. The source is selected with the upper right Analyzer Source soft knob and data pad. The relative position of that source is reported in lines and µs. Positive values indicate the source is later in time than the internal sync generator, and negative values indicate the source is earlier.

GV K-Frame X systems have an autotiming window. Sources that fall within that window will be properly timed throughout the system, even if the signal is cascaded through multiple M/Es.

The Switcher Horizontal and Switcher Vertical soft knobs adjust the timing of the GV K-Frame X system relative to the incoming reference. These values are generally best left at zero.

Time Zones and the Autotiming Window

Each M/E has a fixed amount of delay from its input to output. To allow reentries to remain in time, M/E timings are staggered such that the up stream M/E outputs are earlier in time than down stream M/E inputs. A 5 M/E production switcher has six time zones to accommodate reentry through all the M/Es to any output. When all M/Es are cascaded into each other, the most up stream M/E is in the earliest time zone. Aux buses and other outputs are always in the latest time zone. The overlapping range of all the autotimers is the published autotiming window for the switcher.



Production Switcher Time Zones

Any source fed to the switcher must be within the autotiming range of all six time zones. If not, the source will be in time on some M/Es but not on others. As illustrated in the figure, a source centered in one time zone's autotiming range can be too early or late for other switcher time zones.

If a signal falls just outside the autotiming window, that image will be shifted one line up or down. On SD systems a shift of one line could be easily seen, but on higher resolution systems the lines are so narrow that a single line shift may be difficult to observe.

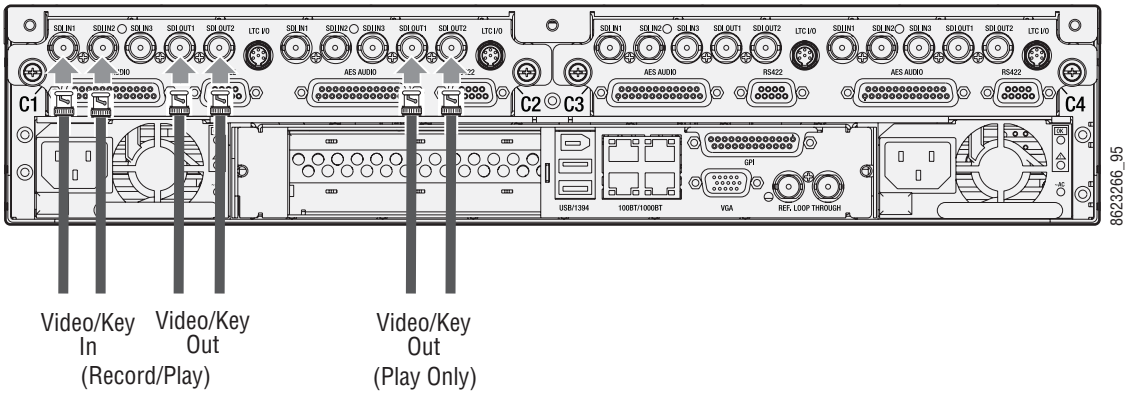
ClipStore Cabling

The GV K-Frame X system uses an Ethernet connection for communications with ClipStore. Ethernet cables are connected from the Frame, either directly or through a dedicated Ethernet switch, to the bottom left (of the four) 100BT/1000BT Ethernet ports on the Summit/Solo backplane. Refer to the *K2 Summit/Solo* manuals included with the your K2 system.

ClipStore Video Cabling

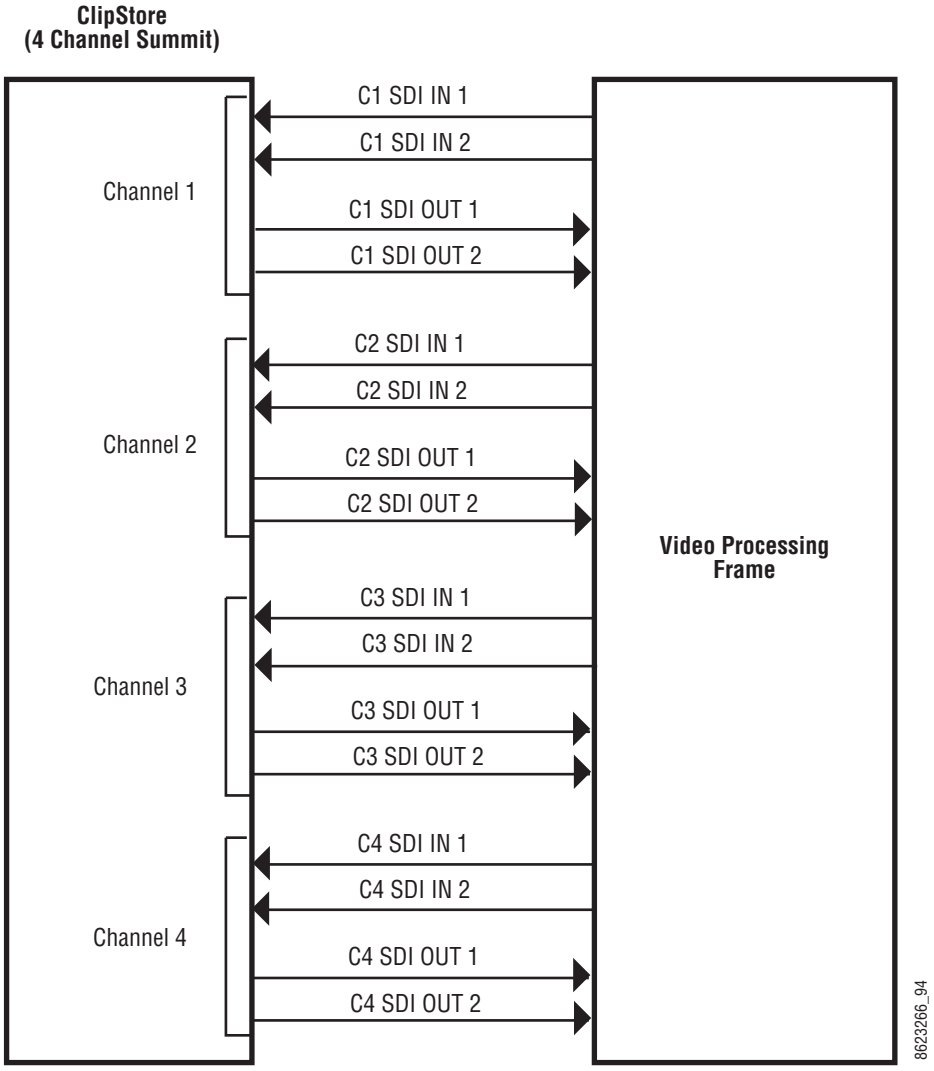
The ClipStore channels on the server backplane are labeled C1-C4 (Channel 1 through Channel 4 on the Summit) from left to right. The Solo backplane is not labeled, Channel 1 is on the left and Channel 2 is on the right when facing the backplane.

ClipStore requires SDI connections for both video and key— two connections In/Out per channel for recording and playback. For playback only, two SDI connections to Out 1 and Out 2 are all that is required per channel.



ClipStore Backplane Connections

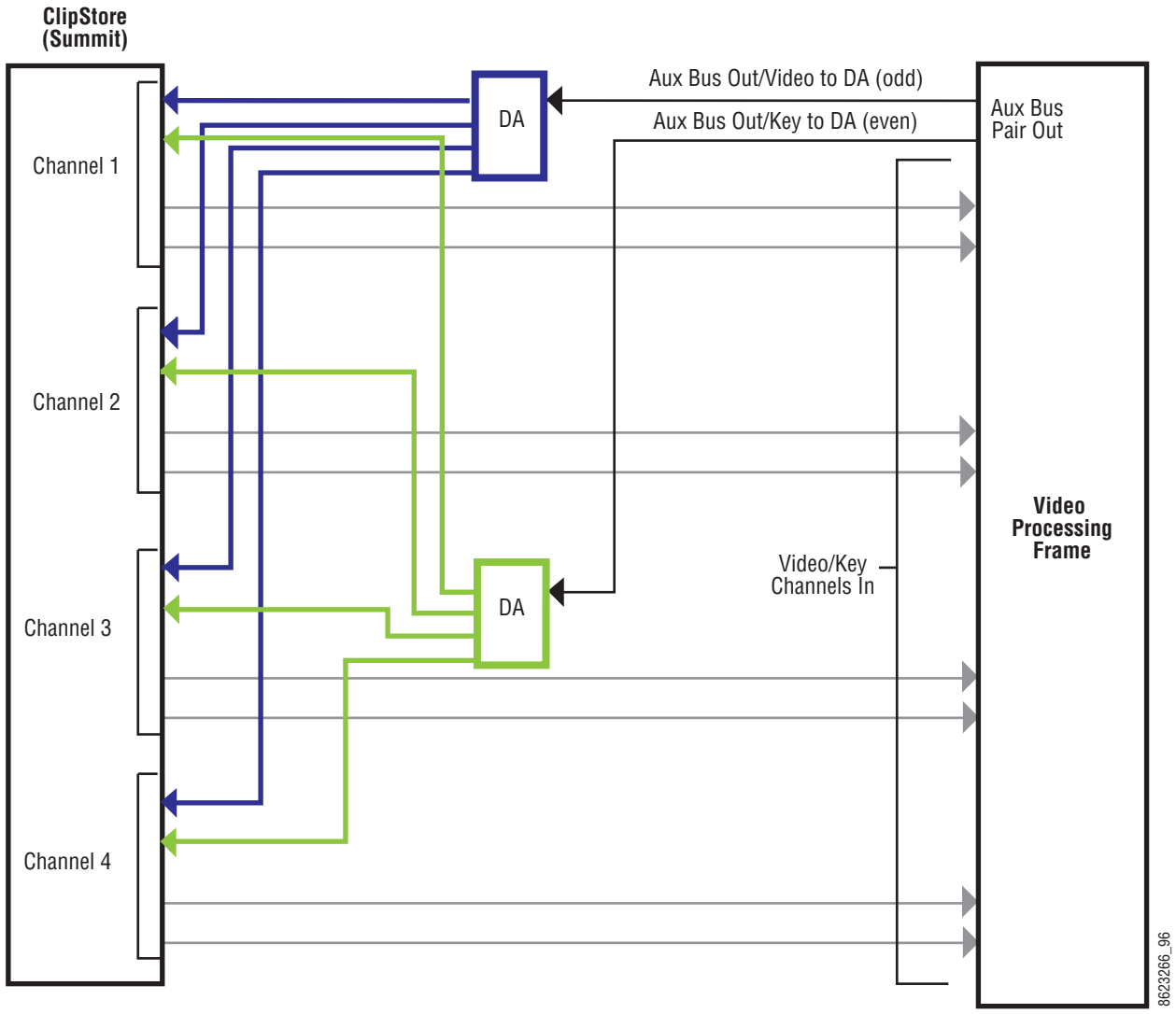
The ClipStore server (4-channel Summit/2-Channel Solo) can be connected directly to the frame. It is also possible to connect to the ClipStore directly from a router and not use any switcher outputs.



ClipStore Direct Connection

Odd numbered outputs are used for fill and even are used for cut. The first output assigned to a ClipStore channel must be an odd numbered output.

Also, DAs (Distribution Amplifiers) can be used to distribute GV K-Frame X Aux Bus output. The example shows DAs being used for both the Video and Key Aux Bus outputs from the frame.



ClipStore Connection Using Distribution Amplifiers

Video Processor Frame GPI/Relay Tally Interface

The GPI (General Purpose Interface) and relay tally interface provides a means to transfer commands to and from the switcher to external devices. A one wire per function parallel hardware relay mechanism is used. The nominal contact rating specification for each relay is 1A, 60 V.

GPI and Relay Tally Connections

Each GV K-Frame X Video Input/output module has a 37 pin female sub-miniature D connector on the rear of the chassis, available for GPI and relay tally. Each connector has 4 GPI Inputs, 4 GPI Outputs, and 16 Relay Tally Outputs. Relays are in groups of four with a common ground. The output relays are the same hardware but the GPI is being driven by

the GPI output software and the relay tally is driven by the Relay Tally system software. Relay tally connections can be used to trigger GPIs on external devices.

GPI Inputs

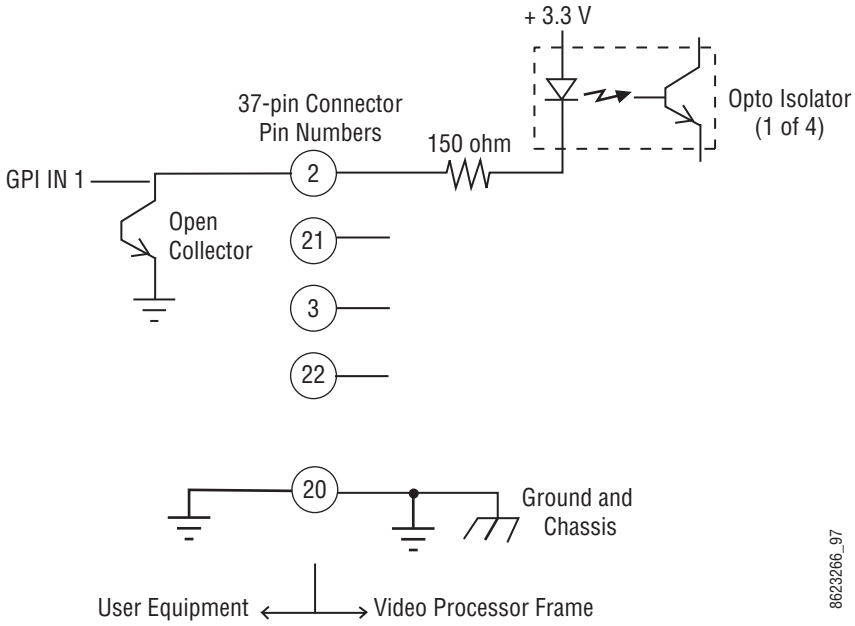
The purpose of the GPI In pins is to provide a stimulus from the external devices to the switcher. A simple connection of two pins activates the corresponding input. An external relay contact or an open-collector output can be employed.

> CAUTION: When connecting to an open-collector output, there is no ground potential isolation between the Video Processor Frame and controlling devices.

Since the circuit ground is led out of the device, cabling should be shielded for this kind of control. Non-shielded cables may cause EMC and/or ESD problems.

To activate a GPI In you must provide switch closure between a particular GPI In pin and its common (1 or 20). Pins 1 and 20 of each connector are connected to ground. For applications that span across more than one connector, only one ground (common) connection is required.

The following diagram has the GV K-Frame X GPI inputs on the left.



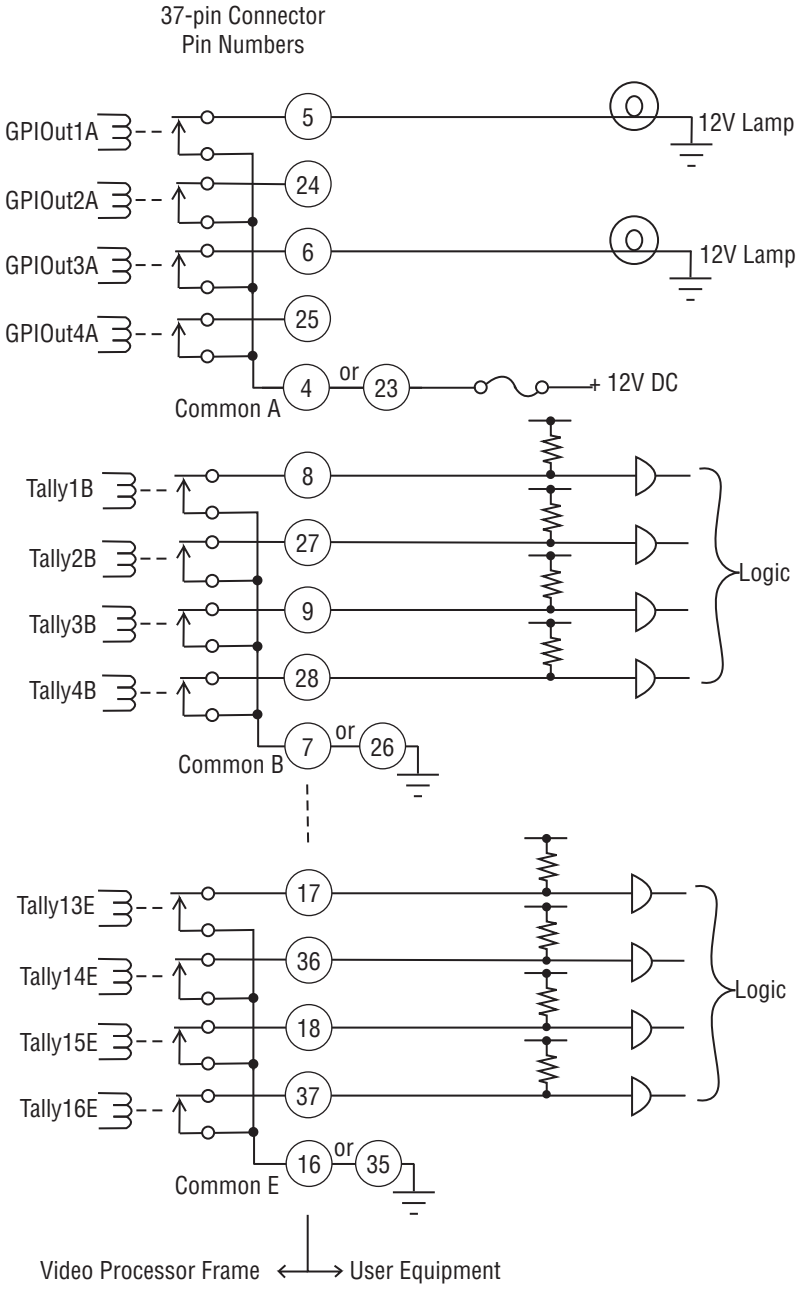
GPI Input Connections (Typical 1 of 4 Connections)

Relay Tally/GPI Outputs

Relay Tally and GPI Outputs are arranged in groups of four. Each group has its own common connection. These commons can all be tied together, forming one common bus for all the outputs. Alternatively, multiple smaller commons can be constructed to interface with systems that need isolated common connections. This common or isolated bus scheme can

extend across multiple connectors. For example, a situation may require two isolated common buses, half of the commons form the first common bus and the other half form the second common bus.

The first four outputs have the common bus tied to +12 Volts. This drives the relay tally lamp system. The last outputs have the common bus tied to ground; this drives a logic system. All relays can be used to drive logic or control external circuitry.



Relay Tally and GPI Output Connection Example

Although the diagram shows mechanical relays, the actual outputs are implemented with solid state relays. The solid state relays are bidirectional; either polarity voltage can be applied. If the switcher GPI/Relay Tally outputs are used to drive downstream DC relays, be sure to install diodes across the relay coils to clamp inductive spikes. Shielded cable is recommended for the connection from the switcher to the user Relay Tally system.

Relay Tally and GPI Output Specifications

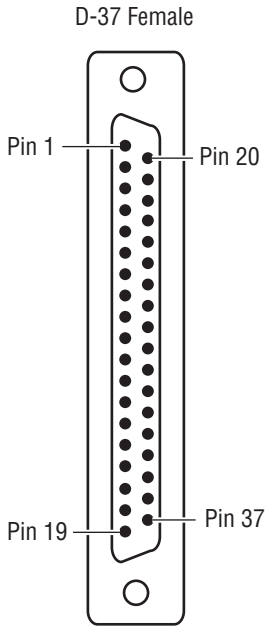
Maximum current for any one output	1 amp AC/DC
Maximum current for any one common	2 amp AC/DC
Maximum off (open circuit) voltage between output and common	60 Volts peak
Maximum voltage between any point and ground (chassis)	60 Volts peak

GPI In, GPI Out, Relay Tally Pin Assignments

Each GV K-Frame X Input/Output Module has a 37 pin connector for GPI and Relay Tally. The connectors are arranged in left to right order on the rear of the Frame.

Input/Output Module Connectors

Module Number	Signals		Module Number	Standard 13RU Frame
1	GPI In 1-4		6	GPI In 21-24
	GPI Out 1-4			GPI Out 21-24
	Relay Tally 1-16			Relay Tally 81-96
2	GPI In 5-8		7	GPI In 25-28
	GPI Out 5-8			GPI Out 25-28
	Relay Tally 17-32			Relay Tally 97-112
3	GPI In 9-12		8	GPI In 29-32
	GPI Out 9-12			GPI Out 29-32
	Relay Tally 33-48			Relay Tally 113-128
4	GPI In 13-16		9	GPI In 33-36
	GPI Out 13-16			GPI Out 33-36
	Relay Tally 49-64			Relay Tally 129-144
5	GPI In 17-20		10	GPI In 37-40
	GPI Out 17-20			GPI Out 37-40
	Relay Tally 65-80			Relay Tally 145-160



Socket Pinout

GPI Signals

GPI In, Tally, GPI Out Signals (first five boards from left to right)

Ribbon Cable	37-Pin D-Sub		1	2	3	4	5
1	1		GPIInCom	GPIInCom	GPIInCom	GPIInCom	GPIInCom
2		20	GPIInCom	GPIInCom	GPIInCom	GPIInCom	GPIInCom
3	2		GPIIn1	GPIIn5	GPIIn9	GPIIn13	GPIIn17
4		21	GPIIn2	GPIIn6	GPIIn10	GPIIn14	GPIIn18
5	3		GPIIn3	GPIIn7	GPIIn11	GPIIn15	GPIIn19
6		22	GPIIn4	GPIIn8	GPIIn12	GPIIn16	GPIIn20
7	4		GPIOutCom	GPIOutCom	GPIOutCom	GPIOutCom	GPIOutCom
8		23	GPIOutCom	GPIOutCom	GPIOutCom	GPIOutCom	GPIOutCom
9	5		GPIOut1	GPIOut5	GPIOut9	GPIOut13	GPIOut17
10		24	GPIOut2	GPIOut6	GPIOut10	GPIOut14	GPIOut18
11	6		GPIOut3	GPIOut7	GPIOut11	GPIOut15	GPIOut19
12		25	GPIOut4	GPIOut8	GPIOut12	GPIOut16	GPIOut20
13	7		TallyComA	TallyComE	TallyComI	TallyComM	TallyComQ
14		26	TallyComA	TallyComE	TallyComI	TallyComM	TallyComQ
15	8		Tally1A	Tally17E	Tally33I	Tally49M	Tally65Q
16		27	Tally2A	Tally18E	Tally34I	Tally50MK	Tally66Q
17	9		Tally3A	Tally19E	Tally35I	Tally51M	Tally67Q
18		28	Tally4A	Tally20E	Tally36I	Tally52M	Tally68Q
19	10		TallyComB	TallyComF	TallyComJ	TallyComN	TallyComR
20		29	TallyComB	TallyComF	TallyComJ	TallyComN	TallyComR
21	11		Tally5B	Tally21F	Tally37J	Tally53N	Tally69R
22		30	Tally6B	Tally22F	Tally38J	Tally54N	Tally70R
23	12		Tally7B	Tally23F	Tally39J	Tally55N	Tally71R
24		31	Tally8B	Tally24F	Tally40J	Tally56N	Tally72R
25	13		TallyComC	TallyComG	TallyComK	TallyComO	TallyComS
26		32	TallyComC	TallyComG	TallyComK	TallyComO	TallyComS
27	14		Tally9C	Tally25G	Tally41K	Tally57O	Tally73S
28		33	Tally10C	Tally26G	Tally42K	Tally58O	Tally74S
29	15		Tally11C	Tally27G	Tally43K	Tally59O	Tally75S
30		34	Tally12C	Tally28G	Tally44K	Tally60	Tally76S
31	16		TallyComD	TallyComH	TallyComL	TallyComP	TallyComT
32		35	TallyComD	TallyComH	TallyComL	TallyComP	TallyComT
33	17		Tally13D	Tally29H	Tally45L	Tally61P	Tally77T
34		36	Tally14D	Tally30H	Tally46L	Tally62P	Tally78T

GPI In, Tally, GPI Out Signals (first five boards from left to right)

Ribbon Cable	37-Pin D-Sub		1	2	3	4	5
35	18		Tally15D	Tally31H	Tally47L	Tally63P	Tally79T
36		37	Tally16D	Tally32H	Tally48L	Tally64P	Tally80T
37	19		Reserved	Reserved	Reserved	Reserved	Reserved

GPI In, Tally, GPI Out Signals (second five boards from left to right)

Ribbon Cable	37-Pin D-Sub		6	7	8	9	10
1	1		GPIInCom	GPIInCom	GPIInCom	GPIInCom	GPIInCom
2		20	GPIInCom	GPIInCom	GPIInCom	GPIInCom	GPIInCom
3	2		GPIIn21	GPIIn25	GPIIn29	GPIIn33	GPIIn37
4		21	GPIIn22	GPIIn26	GPIIn30	GPIIn34	GPIIn38
5	3		GPIIn23	GPIIn27	GPIIn31	GPIIn35	GPIIn39
6		22	GPIIn24	GPIIn28	GPIIn32	GPIIn36	GPIIn40
7	4		GPIOutCom	GPIOutCom	GPIOutCom	GPIOutCom	GPIOutCom
8		23	GPIOutCom	GPIOutCom	GPIOutCom	GPIOutCom	GPIOutCom
9	5		GPIOut21	GPIOut25	GPIOut29	GPIOut33	GPIOut37
10		24	GPIOut22	GPIOut26	GPIOut30	GPIOut34	GPIOut38
11	6		GPIOut23	GPIOut27	GPIOut31	GPIOut35	GPIOut39
12		25	GPIOut24	GPIOut28	GPIOut32	GPIOut36	GPIOut40
13	7		TallyComU	TallyComY	TallyComAC	TallyComAG	TallyComAK
14		26	TallyComU	TallyComY	TallyComAC	TallyComAG	TallyComAK
15	8		Tally81U	Tally97Y	Tally113AC	Tally129AG	Tally145AK
16		27	Tally82U	Tally98Y	Tally114AC	Tally130AG	Tally146AK
17	9		Tally83U	Tally99Y	Tally115AC	Tally131AG	Tally147AK
18		28	Tally84U	Tally100Y	Tally116AC	Tally132AG	Tally148AK
19	10		TallyComV	TallyComZ	TallyComAD	TallyComAH	TallyComAL
20		29	TallyComV	TallyComZ	TallyComAD	TallyComAH	TallyComAL
21	11		Tally85V	Tally101Z	Tally117AD	Tally133AH	Tally149AL
22		30	Tally86V	Tally102Z	Tally118AD	Tally134AH	Tally150AL
23	12		Tally87V	Tally103Z	Tally119AD	Tally135AH	Tally151AL
24		31	Tally88V	Tally104Z	Tally120AD	Tally136AH	Tally152AL
25	13		TallyComW	TallyComAA	TallyComAE	TallyComAI	TallyComAM
26		32	TallyComW	TallyComAA	TallyComAE	TallyComAI	TallyComAM
27	14		Tally89W	Tally105AA	Tally121AE	Tally137AI	Tally153AM
28		33	Tally90W	Tally106AA	Tally122AE	Tally1 38AI	Tally154AM
29	15		Tally91W	Tally107AA	Tally123AE	Tally139AI	Tally155AM

GPI In, Tally, GPI Out Signals (second five boards from left to right)

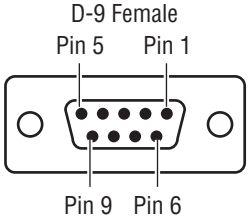
Ribbon Cable	37-Pin D-Sub		6	7	8	9	10
30		34	Tally92W	Tally108AA	Tally124AE	Tally1 40AI	Tally156AM
31	16		TallyComX	TallyComAB	TallyComAF	TallyComAJ	TallyComAN
32		35	TallyComX	TallyComAB	TallyComAF	TallyComAJ	TallyComAN
33	17		Tally93X	Tally109AB	Tally125AF	Tally141AJ	Tally157AN
34		36	Tally94X	Tally110AB	Tally126AF	Tally142AJ	Tally158AN
35	18		Tally95X	Tally111AB	Tally127AF	Tally1 43AJ	Tally159AN
36		37	Tally96X	Tally112AB	Tally128AF	Tally144AJ	Tally150AN
37	19		Reserved	Reserved	Reserved	Reserved	Reserved

RS-422/485 Port Pin Assignments

Eight RS-422/485 ports are available on the rear of the GV K-Frame X Video Processor, and can be used to control various devices, or for switcher control by an external controller.

> Note: The Frame serial port pinout is automatically configured based on assignment. The Frame is the bus controller when controlling external devices and PBus. The Frame is a tributary when controlled by an editor.

RS-422/485 Pinouts

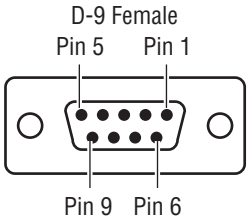
Socket	Pin	Bus Controller	Tributary
	1	Chassis Ground	Chassis Ground
	2	RxA (-)	TxA (-)
	3	TxB (+)	RxB (+)
	4	Signal Ground	Signal Ground
	5	Not used	Not used
	6	Signal Ground	Signal Ground
	7	RxB (+)	TxB (+)
	8	TxA (-)	RxA (-)
	9	Chassis Ground	Chassis Ground

RS-232 Port Pin Assignments

RS-232 serial ports are located on each processor board (Video Processor, Panel Processor, Menu PC and Controller I/O for V-series), available for maintenance and diagnostics.

Standard VGA and keyboard ports, present on all processor boards, are also available for maintenance.

RS-232 Pinouts

Socket	Pin	Signal
	1	Chassis Ground
	2	Transmit Data
	3	Receive Data
	4	Not used
	5	Signal Ground
	6	Not used
	7	Clear to Send
	8	Request to Send
	9	Not used

A Specifications

GV K-Frame X Video Processor Specifications

Video Standards

3G Modes	
1080p 50/59.94/60, Level-A and Level-B (Level B, SDI only)	SMPTE 424M-2006
HD Modes	
1080i 29.97/30	SMPTE 274M Tables 4 and 5
1080i 25	SMPTE 274M Tables 6
1080sf IP: 25/29.97/30 SDI: 23.976/24/25/29.97/30	SMPTE RP211 Table 12-16
720p 50/59.94/60	SMPTE 296 Table 1-3
SD Modes	
525i 29.97	SMPTE 259M
625i 25	SMPTE 259M

Mechanical

Component	Depth	Width	Height	Weight[a]	Rack Units
15-RU Frame	603.5 mm (23.76 in.)	482.6 mm (19 in.)	665.9mm (26.22 in.)	Base 58.3 kg (128.6 lbs.) Fully loaded 77.7 kg (171.4 lbs.)	15
Power Supply Frame	492 mm (19.73 in.)	483.1 mm (19 in.)	44 mm (1.75 in.)	11 kg (24lbs.) (Two PS modules, each weigh 2.5 kg (5.4 lbs.). Up to three modules supported.	1

a. All weights are approximate

Environmental

Storage temperature	-20 to 70 C (-4 to 158 F)
Operating temperature	0 to 40 C (32 to 104 F)
Relative humidity	0-95% (non-condensing)
Electromagnetic environment	E2 (according to EN55103-1 and -2

Network Connections

Type of connection	10/100/1000 Base T
Protocol	TCP(UDP)/IP, Auto speed detection. Auto crossover cable configuration.
Cable and connectors	CAT5 UTP, RJ45 connectors
Max. Cable Length	100m / 300ft
Note: The GV K-Frame X Video Processor has an internal Ethernet switch with six available external ports. One connection is required for each Control Panel and one is required for each Menu PC. An external Ethernet switch is required to connect more than six devices.	

Video Processor Power Supply

Power Supply Frame	
Line voltage	100V-240V AC +/-10% autorange, power factor corrected. Automatic line-voltage sensing for 120V and 240V sources.
Line frequency	50/60Hz +/- 5%
Power consumption	2500 Watts maximum
Leakage current	< 2.5 mA
Interconnect DC cable length	864 mm/34 in.

Number of M/Es, Inputs, and Outputs

Frame	M/Es	I/O Card Inputs	I/O Card Outputs	GPI Inputs	GPI/Tally Outputs
15-RU	1 to 9	16 to 160 (Large Card)/ 8 to 32 with 1-4 Media Port inputs (Small Card)	8 to 80 dual 4 to 16	4 per Large I/O Card	20 per Large I/O card

Board Count

Frame	M/Es	Inputs/Outputs	I/O Modules (MatchDef/ SetDef
15-RU	Up to 4 M/E boards	Up to 10 boards: 16 inputs/8 dual outputs per board	Up to 4 boards: 8 inputs/4 outputs per board

GV K-Frame X Serial Digital Video Inputs

Format	ITU-R656, SMPTE 259M, 270 Mbit/s. SMPTE 292M, 1.485 Gbit/s SMPTE 424M-2006, 3 Gbit/s
Return loss	>10 dB, 1.5GHz to 3GHz
Type of Connector	75 ohm BNC (SMPTE 259M)
Nominal Amplitude	800mV peak-to-peak terminated
Channel Coding	Conforms to SMPTE 259M, SMPTE 292M
Ancillary Data	Blanked or passed (user selectable)
Embedded audio	Blanked or passed (user selectable)
EDH	Blanked
Input Impedance	75 ohm
Max cable length	SD Video 350 meters (1148 ft.) using Belden 1694A type cable
	HD Video 200 meters (656 ft.) using Belden 1694A type cable
	3G Video 140 meters (459 ft.) using Belden 1694A type cable

GV K-Frame X Serial Digital Video Outputs

Format	ITU-R656, SMPTE 259M, 270 Mbit/s. SMPTE 292M, 1.485 Gbit/s SMPTE 424M-2006, 3 Gbit/s
Return loss	>10 dB, 1.5GHz to 3GHz
Type of Connector	75 ohm BNC (SMPTE 259M)

GV K-Frame X Serial Digital Video Outputs

Nominal Amplitude	800 mv peak-to-peak across 75 ohm +/- 10%
Rise & Fall Times	400 to 1400 picoseconds 75 ohm termination between 20% and 80% amplitude
Timing Jitter	£ I UI R 601/656
Alignment jitter	£ 2 UI (SD), £ 1 UI (HD)
Output Impedance	75 ohm
DC Offset	< 50mV with 75 ohm termination

B Regulatory Notices

Certifications and Compliances

FCC Emission Control

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense. Changes or modifications not expressly approved by Grass Valley, A Belden Brand can affect emission compliance and could void the user's authority to operate this equipment.

Canadian EMC Notice of Compliance

This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

Le présent appareil numérique n'emet pas de bruits radioélectriques dépassant les limites applicables aux appareils numeriques de la classe A préscrites dans le Règlement sur le brouillage radioélectrique édicte par le ministère des Communications du Canada.

EN55022 Class A Warning

For products that comply with Class A. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Canadian Certified Power Cords

Canadian approval includes the products and power cords appropriate for use in the North America power network. All other power cords supplied are approved for the country of use.

Canadian Certified AC Adapter

Canadian approval includes the AC adapters appropriate for use in the North America power network. All other AC adapters supplied are approved for the country of use.

FCC Emission Limits

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may no cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesirable operation.

Certification

This product has been evaluated for Electromagnetic Compatibility under the EN 55103-1/2 standards for Emissions and Immunity and meets the requirements for E4 environment.

This product complies with Class A. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

This product has been evaluated and meets the following Safety Certification Standards

Category	Standard	Designed/tested for compliance with:
Safety	UL 60950	UL 60950-1 Issue 2007/03/27 Ed. 2 Information Technology Equipment-Safety Part 1 General Requirements.
	IEC 60950	IEC 60950-1 Issue: 2005/12/08 Ed. 2 Information Technology Equipment-Safety Part 1 General Requirements; Corrigendum 1: 8/2006; Amendment 1: 2009/12/17.
	CAN C22.2, No. 60950	C22.2 #60950-1 Issue 2007/03/01 Ed. 2 Information Technology Equipment-Safety-Part 1 General Requirements.
	EN60950	Safety of Information Technology Equipment, including Electrical Business Equipment.
	2006/95/EC	Low Voltage Directive

Category	Standard	Designed/tested for compliance with:
EMC	EMC Directive 2004/108/EC via EN 55103-1 and 2	Audio, Video and Entertainment Lighting Control for the European Community.
	EN55103-1 : 2009	Electromagnetic compatibility. Product family standard for audio, video, audio-visual and entertainment lighting control apparatus for professional use. Part 1 Emissions, Environment E4 EN 55022: Class A Radiated Emissions EN 61000-3-2: Powerline Harmonic Emissions EN 61000-3-3: Voltage Fluctuations “Flicker” EN 55022: Class A Conducted Emissions Radiated Magnetic Field Emissions Peak Inrush Current
	EN55103-2 : 2009	Electromagnetic compatibility--Product family standard for audio, video, audio-visual and entertainment lighting control apparatus for professional use. Part 2 Immunity, Environment E4 EN 61000-4-3: Radiated RF Immunity EN 61000-4-2: Electrostatic Discharge “ESD” EN 61000-4-4: Electrical Fast Transients “EFT” EN 61000-4-11: Voltage Dips & Fluctuations EN 61000-4-5: Power Line Surge EN 61000-4-6: Conducted RF Immunity Radiated Magnetic Field Immunity
	US FCC Class A	CISPR Pub. 22 (1985)
	Canada FCC Industry Canada	ICES-003
	Australia & New Zealand:	AS/NZS 3548

DEKRA Certificate

Certifying that Grass Valley product meets the ISO 9001: 2008 standard.

CERTIFICATE

Certificate Number: 510040.001

The Quality System of:

Grass Valley, A Belden Brand and its Grass Valley Affiliates

Headquarters: **3499 Douglas-B Floreani** **St. Laurent, Quebec H4S 2C6** **Canada**	**3030 NW Aloclek Drive** **Hillsboro, OR 97124** **United States**
Street Bergschot 69 **4817 PA Breda** **The Netherlands**	**125 Crown Point Court** **Grass Valley, CA 95945** **United States**

Including its implementation, meets the requirements of the standard:

ISO 9001:2008

Scope:
St. Laurent HQ: The design, manufacture and support of video and audio products and systems.

Grass Valley and Hillsboro: Design, outsource manufacture and support.

Breda: Design, manufacture, including outsource manufacture, and support.

This Certificate is valid until: June 14, 2018
This Certificate is valid as of: June 14, 2015
Certified for the first time: June 14, 2000

Dr. Cem O. Onus
Managing Director, Business Assurance
DEKRA Certification, Inc.

The method of operation for quality certification is defined in the DEKRA Master Services Agreement. Integral publication of this certificate is allowed.

DEKRA Certification, Inc.
1120 Welsh Road, Suite 210
North Wales, PA 19454
USA
Ph: (215)997-4519
Fax: (215)997-3810

Accredited By:
ANAB

ANAB ACCREDITED
MANAGEMENT SYSTEMS CERTIFICATION BODY

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 online form for e-mail contact is also available from the website.

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