Section 1 – Karrera & Kayenne Technical Architecture

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- **System Overview**
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  - Interfaces
  - Options
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  - Kayenne Panels & Modules
  - Karrera Panels
  - Menu Panel
  - Karrera Soft Panel (KSP)

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• The Kayenne and Karrera systems use the same software and hardware platforms prior to version 5. Starting with Version 5, the new 3 GB compliant "K-Frame" will be available. The same hardware is used for Karrera and Kayenne Panels and Menus. Older systems will remain at version 4.x.

• This course is intended to cover all products and covers the differences between hardware and software as needed. When specifics are not called out, assume that they are the same for both products.

Section 1 – Objectives

Section Objectives

- Be able to describe the system architecture of a Kayenne or Karerra System and it's components
- Understand how the System components communicate with each other
- Understand the different features of the 1.5G and 3G (K-frame) hardware
- Explain what options are available and how to determine what options are installed
- Be able to describe the functional components of the Kayenne and Karrera panels
- Understand the Video Flow though the 1.5G and 3G frames
- Understand the basic components of an ME
- Be able to explain what the difference between a Physical and Logical ME
- Understand the basic timing requirements of the switcher hardware

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• This course is intended to cover all products and covers the differences between hardware and software as needed. When specifics are not called out, assume that they are the same for both products.

• The Kayenne Panel Control Unit (PCU) frame is a 3 RU, required assembly. It is the interface between the video processing frame and all of the processing for the Control Panel and Menu Panel. Karrera does not use this assembly.

• The PCU is connected to the panel and menu by either a 7.5 or 15 meter cable set.

• The PCU contains a windows XP Processor to drive the Menu Panel and Menu Application. A second Windows XP processor card for a second Touch Screen menu may also be used as an option.

• Multi-Suite operation is now standard on Kayenne and Karrera. This is the ability to operate multiple panels with a single frame. This may act as multiple or separate switchers, or as an assistant panel to the primary panel.

• Suites operation may be used with any combination of the Kayenne, Karrera or the Karrera Soft Panels.

• The 8 RU Kayenne / Karrera Frame has an "Option Slot" that may contain the eDPM assembly (4 more transform engines).

• The K-Frame hardware replaces the older frame and provides 3G capability and new features.

Kayenne & Karrera System Features - 1.5G frame (1)

- User configurable Colored Sources, Bus Mapping & Color of Buttons
- Multi-Suite Operation (Std)
- Split ME Operation (10 MEs!)
- Configurable Kayenne Stripe assignments for 10 MEs
- 6 Keys per ME (4 Complex, 2 Simple)
  - Half ME has 6 Simple Keys
- 1000 E-MEMs, 100 R-MEMs and 999 Macros
- 31 Definable E-MEM Levels
- Granular Timelines
- Up to 16 "internal" iDPMs (DVE), one per Complex Keyer (Option)
- 4 channel "extended" eDPM Module (Opt, 8 RU Frame only)

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• The Kayenne Control Panel is comprised of Stripes. They may be viewed as ME Banks but can control any ME, Primary or Secondary.

• A Stripe may be split into Primary and Secondary Partitions but only within the same Suite.

• Multi-Suite operation is now standard on Kayenne and Karrera. This is the ability to operate multiple panels with a single frame. This may act as multiple or separate switchers, or as an assistant panel to the primary panel.

• E-MEMs allow effects to be saved and recalled.

• R-MEMs allow router salvos or multi takes to be controlled by the switcher.

• Macros allow a user to program and remember a sequence of button presses in the order that they are executed. Different delay times and pauses may be programmed between any button presses in the sequence.

• Granular Time Lines allow the user to only store or remember the elements that are desired to change. For example an effect may be run from memory but use the existing video sources instead of calling up a new source.

• DPM is an abbreviation for Digital Picture Manipulator. This may also be called a DVE (Digital Video Effect) or Transform Engine.

Kayenne & Karrera System Features - 1.5G frame (2)

- 6 Channel (in and out) Image Store for stills (Option)
- 2 or 4 channel (in and out) Clip Store for short or long clips (Option)
- 2 Key Stores standard on each complex Keyer (2V+2K)
- Video Processing (YUV Std)
- Color Correction (RGB Option) per Bus and per Aux Output
- Integrated Router / DDR / VTR / GPI / PBus II control
- Set Def and Match Def Processing (Option)
- Control of certain LDK Camera functions
- Source Rules
- Key Chaining
- Bus Linking

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• Starting with Software Version 2.0, the Clip Store Option became available. This uses the preconfigured Grass Valley K2 Summit 4 channel (4 V + 4 K) Server or the K2 Solo 2 Channel server for on demand video clip recording and playback. Recall or playback is instant, no more waiting for clips to load. Any clip length may be used.

• Each ME has a dedicated but volatile 4 channel frame store. This can be used as Key Store 1 (V+K) and Key Store 2 (V+K).

• Source Rules allows for the control of multiple keys from other functions.

• Router control of the Grass Valley Encore and Jupiter control systems is done by Native Protocol.

• Set Def (Option) allows for 2 outputs per ME card to be configured for a different video standard than the switcher is operating in. This option also allows for aspect ratio conversion.

•Match Def (Option) allows for 4 inputs per ME card to be configured for a different video standard than the switcher is operating in.

• Key Chaining is new in version 2.0 and allows for a key or multiple keys to be activated when another key is selected. This may be on the same or a different ME.

Kayenne & Karrera System Features - 3G - K-Frame Features

- SD/HD Switcher (3G frame)
    - 270, 1,485 or 2,970 Mb/S SDI
- Up to 9 Mix Effects Banks (MEs)
    - 13 RU / 9 ME or 6 RU / 5 ME (+ 1 RU for Power Supply)
- Split ME Operation (Up to 18 MEs!)
- 1 ME per suite configurable as an eDPM (Option)
- 6 Full Featured (Complex) Keyers per ME, including Controller ME
    - Each Keyer has a Dedicated "2D Resizer" (2D-DPM)
- Up to 16 floating / assignable "internal" iDPMs (DVE), (Option)
- Modular Input / Output Assemblies, up to 32 scalable I/O (Option)
- ImageStore: 2 V+K Pairs In, 10 V+K Pairs Out – 'Movies' added in v 6.0
- ME View (v6.0) and MultiViewers (total of 4) (v7.0) options

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• The "K-Frame" is the latest in Switcher Technology from Grass Valley. This frame incorporates 1080p (2.97 GB/S) Serial capability along with 270 MB/S (SD 525 / 625) and 1.485 GB/S (HD 720p / 1080i) rates.

• The frame is available in 2 sizes, 6 RU and 13 RU. Each requiring a 1 RU PS.

• Mix Effect (ME) boards are dual ME. Each board contains 2 sets of ME circuitry. This allows the small frame to carry 2 boards for a total of 4 MEs and the large frame to hold 4 boards for 8 MEs. Like the Kayenne and Karrera frames, the K-Frame contains an ME on the Frame processor board now called the Controller ME. Thus creating either 5 or 9 MEs per frame respectively.

• All Keyers are complex, meaning they are not limited in features in any way. This includes ME's Keys 5 & 6 and all 6 Keyers on the Half ME.

• All ME Video Paths (Keys) have dedicated resizers called "2D DPMs". This allows the repositioning of any Key in "X and Y" space, plus a size and border function. (54 total)

• The iDPM (full DVE) channels are floating and assignable. There are a maximum of 16 in the large frame and 8 in the smaller frame.

• Any ME can also be assigned as an eDPM if licensed. This too has 2D-DPM capability.

Main Differences: 1.5G Frame and 3G K-Frame

Feature	Kayenne Karrera 1.5 G Frame	Compact 3G K Frame (6RU)	Standard 3G K Frame (13RU)
ME's	Up to 4	Up to 4	Up to 8
½ ME or Controller ME	6 basic Keyers	6 Full Keyers	6 Full Keyers
2DPM Option	None	All Keyers	All Keyers
Inputs	48 or 96	64	160
Outputs	24 or 48	32	64
Match Def / Set Def or Modular I/O	8 or 16 Included above	16 Not Included above	32 Not Included above
1080p capability	No	Yes	Yes
Image Store	6 Ch (3 V+K)	10 V+K	10 V+K
Image Store Movies	No	Yes	Yes
MultiViewer	No	Yes	Yes

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External Interfaces

50 Pin D-Type Connector:
- 8 GPI Inputs per ME Board (Opto-isolated, ground closure)
- 32 Outputs Relays (24 Tally and 8 GPO)
    - Per ME Board (or per Input board on K-frame)

8 RS-422/485 Ports (DB-9):
- Peripheral Bus II Protocol (PBus II)
- Editor: GVG 100 & 200 Protocols
- 32 VTR/Device Control: AMP, Odetics, VDCP, BVW
    - 28 Assignable for External, 4 dedicated for ClipStore channels
- Kayenne Serial Tally Protocol (or Ethernet option - K-Frame)

4 Ethernet RJ-45 Connectors on Video Frame (6 on K-Frame)

6 Ethernet RJ-45 Connectors, on PCU Frame (Kayenne panels only)
- Ethernet, Serial & Web Browser Diagnostics

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• The Clip Store counts as 2 or 4 of the 32 controllable devices.

• The video frame has four RJ-45 Facility LAN connectors on the rear panel. These ports are connected to an internal auto-sensing, auto negotiating layer 2 switch located on the frame processor board. The frame processor and Image store CPUs are also tied internally to this device. Connections from the Kayenne PCU panel port and Facility LAN ports should be connected here for reliable gigabit operation. Additional network devices may also be tied to this switch.

• **Never use a hub with this hardware!** A hub may create a "collision domain". Most hubs are also limited to 10MHz operation.

• The Kayenne PCU frame has six RJ-45 Facility LAN connectors and one Panel RJ-45 connector on the rear panel. These 6 ports are connected to an internal auto-sensing, auto negotiating layer 2 switch located on the PCU board. The PCU Windows Menu processor is also tied internally to this device. The panel processor is connected directly to the Panel port. Connections from the PCU Panel LAN port and Facility LAN port should be connected directly to the Video Frame network ports for reliable gigabit operation. Additional network devices may also be tied to this switch.

• The Karrera Panel has a single ethernet port. This is to be directly connected to the video frame for control.

Karrera & Kayenne Hardware Options (1)

1.5G Frame:
- Up to 4 Mix Effects Cards (8 RU Frame, 2 ME cards in the 4 RU Frame)
- I/O Expander Cards
- eDPM Module (4 DPM Channels, 8 RU frame only)
- Redundant Frame Power Supply (3 Slots, 2 Std, in the 8 RU frame)

3G K-Frame:
- Up to 4 Dual Video Processor Cards (8-MEs) in the 8 RU Frame or 2 Dual Video Processor Cards (4MEs) in the 4 RU Frame
- Input and Output Cards
- Image Store Card
- Redundant Frame Power Supply (3 Slots, 2 Std, in a 1 RU chassis)

Clip Store 2 or 4 Channel (V+K per channel)

Image Store Memory size

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• The I/O Expander cards are ME assemblies that have input and output circuitry but do not contain any ME processing hardware. They will allow 24 signal inputs and 12 outputs to be connected and used in the video frame per expander card. These cards also contain the ability (if licensed) to operate the Match Def input Scaling Option but will not support Set Def even if licensed.

• I/O expander cards are not required for the K-Frame.

• The 2.5 ME Frame comes fully loaded standard with 2 power supplies.

Karerra & Kayenne Hardware Options (2)

Kayenne Control Panels:
- External Ethernet "Remote" Aux Panels (Single or Multi)
- Device Control Module (DCM) for Machine Control
- Second Menu Processor and Display Panel
- Satellite single and double wide Panel Modules

Karrera Control Panels:
- Local Aux Panel (Power & Data provided from main panel)
- External Ethernet "Remote" Aux Panels (Single or Multi)
- Kayenne Style Menu Panel & Articulated Arm
- Compact / Fanless Windows Menu PC & Bracket

Karrera Soft Panel (KSP) – Software and Keyboard

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• Two Power Supplies are standard in the Control Panel processing Unit frame (PCU).

• The Karrera Soft Panel is a software option only. It does include a custom GV keyboard. The customer is to supply a 1920 X 1080 touch Windows 7 PC.

• The Karrera Local Aux Panel is an option but the 2 and 3 ME panels include a configurable 16 channel Aux control section.
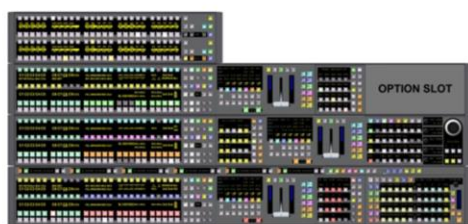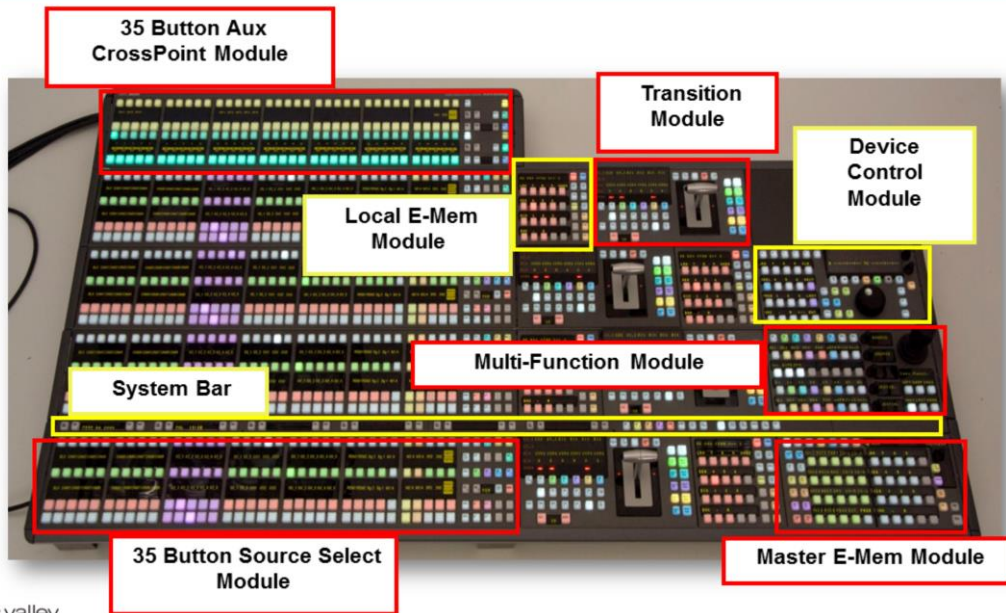
Kayenne Control Panels

KAYN-PNL-100-15

KAYN-PNL-200-25

KAYN-PNL-300-25

KAYN-PNL-400-35

Kayenne Control Panels – Module Assembly

The following Kayenne modules are available:

• KAYN-PNL-TRM - Transition Module

• KAYN-PNL-LEM - Local E-MEM Module

• KAYN-PNL-MEM - Master E-MEM Module

• KAYN-PNL-MFM - Multi-Function Module

• KAYN-PNL-SRC-35, 25, 15 - Source Module, available in 35, 25, and 15 button widths.

• KAYN-PNL-AUX-35, 25 - Local Aux Module, available in 35 and 25 button widths.

• KAYN-PNL-BAR-35, 15 - System Bar, available in two sizes to match various Control Panel widths.

• KAYN-PNL-DCM - Device Control Module, available as an option for 3 and 4-ME panels and as a satellite panel module.
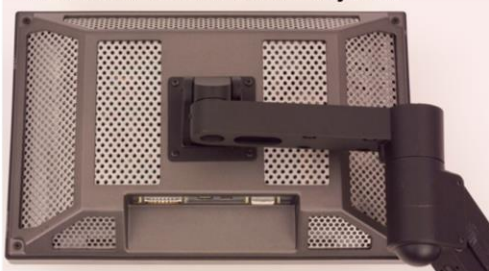
Kayenne Panel Modules

• The Stripe Tray to Panel Module cables are NOT Ethernet. The RJ-45 connectors carry 48 Volts D.C. and a proprietary data format. Do not plug these into anything but Panel Modules!

Kayenne & Karrera Menu Panel & Arm

Menu Panel with Optional Karrera Menu PC (Fanless PC) & Mounting Brackets

Menu Panel with Articulated Mounting Arm without PC for use on Kayenne

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• The Touch Screen Menu resolution is 1280 x 768.

• The menu display requires 48 Volts D.C. This is supplied via the large multi-pin connector from either the Kayenne PCU frame or a brick power supply.

• The Menu Panel has 4 usable USB "type 2" ports. All 4 of the ports are usable by the Windows XP processor. Clips and still may be stored to the hard drive for use with the Image Store via USB.

• The menu panel may also display video from an external DVI–D source when connected to the bottom of the panel.

• When a DVI–D source is used in place of a PCU, the Type "B" USB connector will be activated and connected to the Touch Screen controller and the 4 USB ports.

• For use with Karrera, this menu is an option and may have a fanless PC secured via a bracket to the back of the display. Power for the PC will come from the 12 Volts supplied by the Karrera Panel. Menu Display power will be 48 V.D.C. supplied by a brick supply.

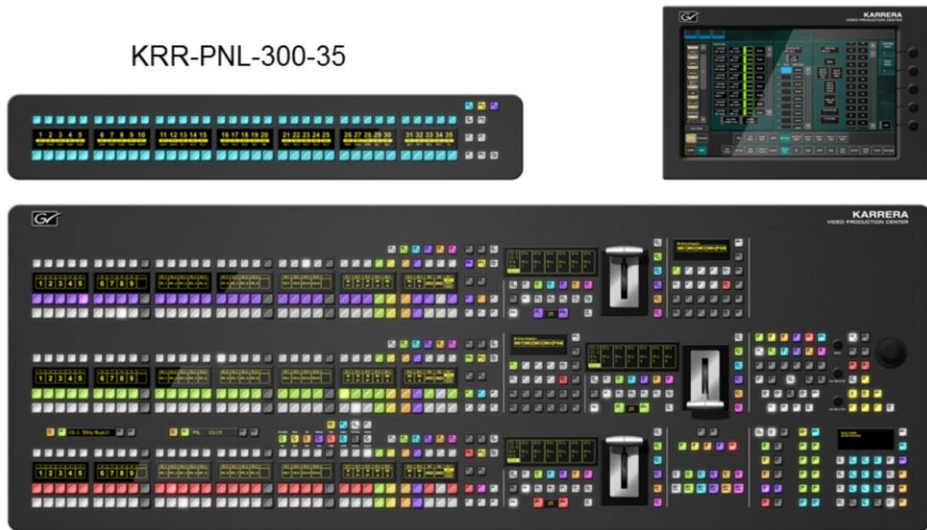Karrera 2 ME Control Panels

KRR-PNL-200-25

KRR-PNL-200-25C

- Three varieties of the Karrera panel are available:
    - 25 Button 2 ME (Wide Panel, Original)
    - 25 Button 3 ME (Narrow and Taller Panel, New)
    - 35 Button 3 ME
- Aux panels are also available in both 25 and 35 button models.
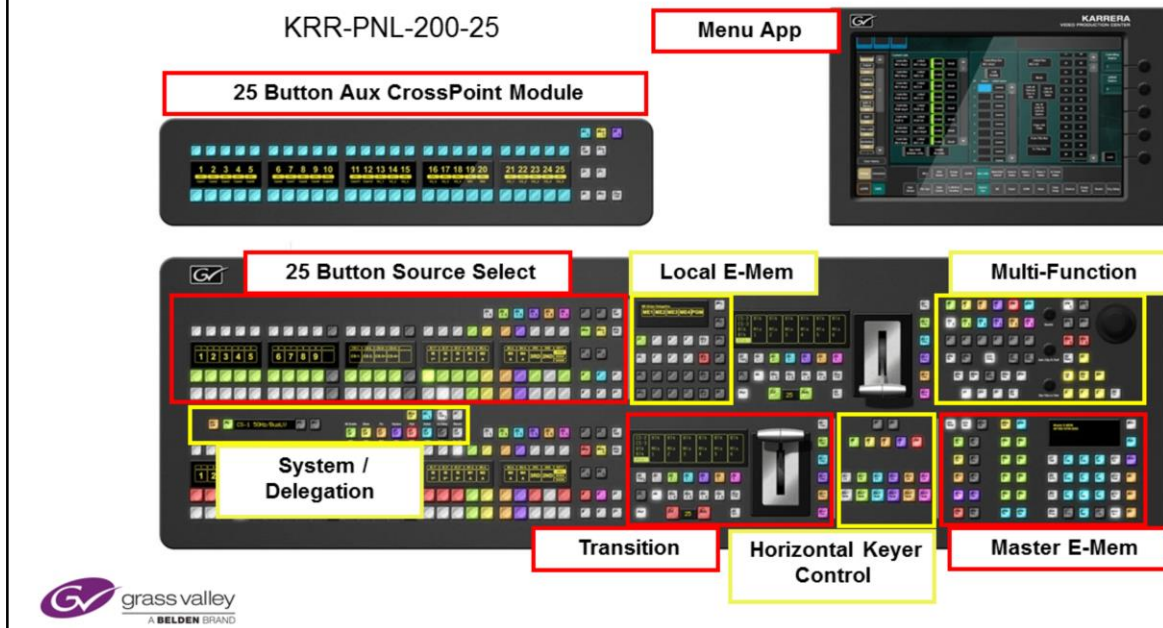- Menu Panels, Processors and Aux Panels are options.

Karrera 3 ME Control Panel

KRR-PNL-300-35

- Three varieties of the Karrera panel are available:
  - 25 Button 2 ME (Wide Panel, Original)
  - 25 Button 3 ME (Narrow and Taller Panel, New)
  - 35 Button 3 ME
- Aux panels are also available in both 25 and 35 button models.
- Menu Panels, Processors and Aux Panels are options.

Karrera Control Panels

KRR-PNL-200-25

- While being a smaller panel than the Kayenne, all major functions are present .
- Some functions will need to be performed on the menu application.

KSP Feature consists of the KSP software, Keyboard and License for the K-Frame.
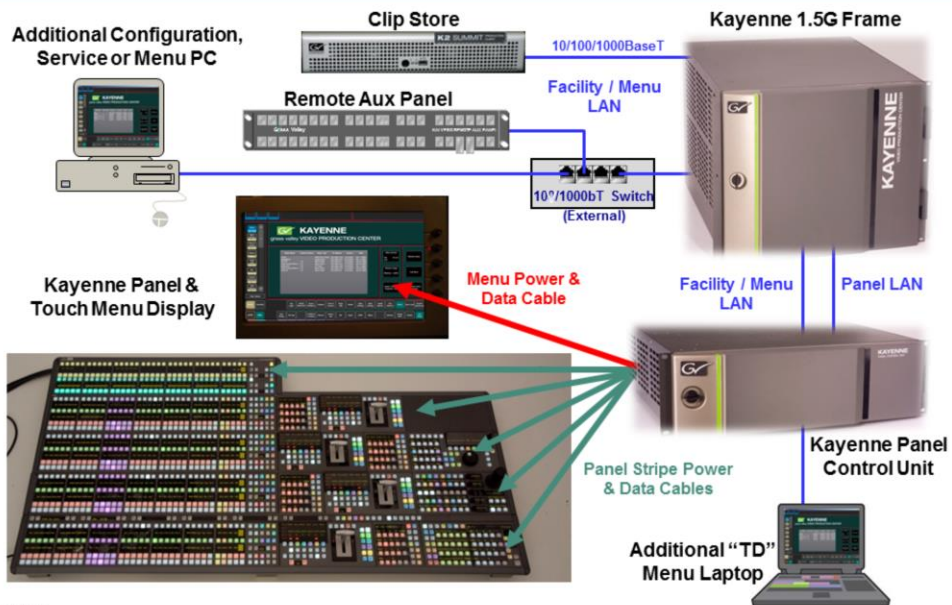
Customer purchases their own PC

Dell or HP touch screen self contained PC recommended.

Display must have a native 1920 x 1080 resolution.

• Ordering Model information: KRR-LIC-1ME-GUI

• The Karrera Soft Panel (KSP) is a Windows Version 7 Application.

  • Two applications running at all times, Menu and Panel.
  • A PC is NOT supplied by Grass Valley.
  • Software and a custom Keyboard are supplied.
  • The option must be licensed in the Karrera Video Frame.
  • Certain HP and Dell Touch PCs have been qualified by GV Engineering.

• The software is written for a Touch Screen with a resolution of 1920 x 1080.

• The Menu Application is an overlay on top of the "Soft Button Board".

• The Menu operates the same as if on a dedicated menu panel or PC.
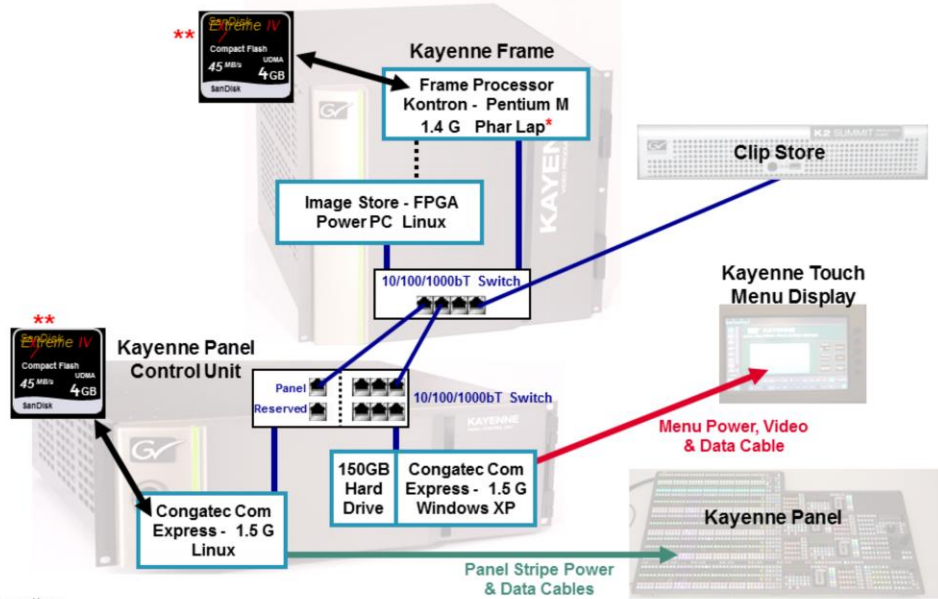
Kayenne 1.5G System Communications

The Clip Store, Panel LAN and Menu/Facility LAN must be connected as shown with no Ethernet switches or Routers between the components and the Frame.
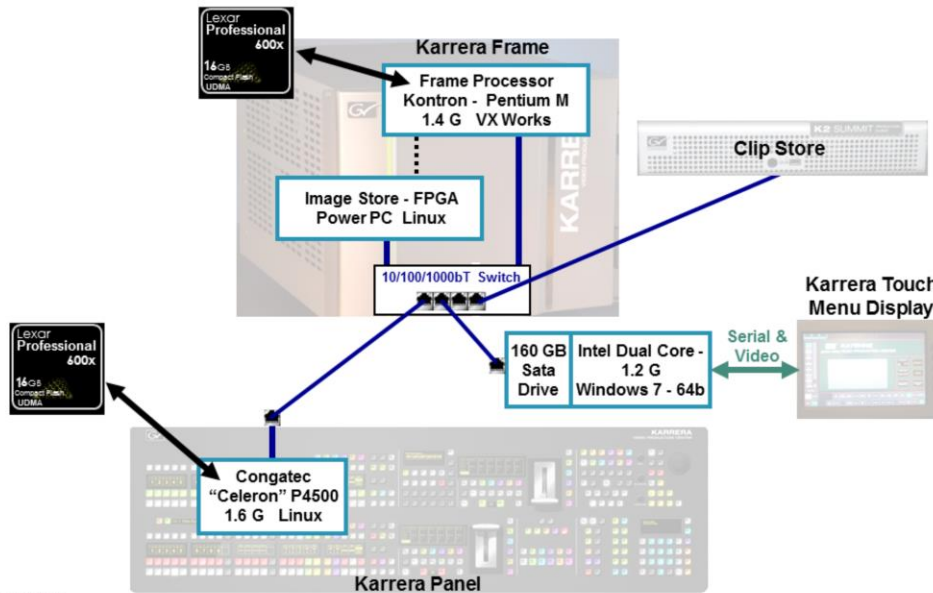
• Kayenne and Kayenne-XL systems use a panel constructed of "Stripes". Each row on the panel or Mix Effects bank is comprised of panel modules to create a stripe.

• Panel Modules may be assembled into the Stripe Trays in any order desired.

• Each Stripe communicates with the Kayenne Panel Control Unit (PCU) via it's own proprietary Power and Data Cable.

• The Menu "Touch" Display Panel uses a different proprietary Power and Data Cable to communicate with it's processor in the PCU.

• The PCU communicates with the Kayenne frame using 2 Ethernet (10, 100, 1000bT) connections.

• PCU to Stripe and Menu cables are available in either 7.5 or 15 meter lengths.

• There are 4 network ports on the rear of the Kayenne Frame and 6 on the PCU. Grass Valley requires that the connections (menu AND panel) between the PCU and Kayenne frame are dedicated and not run through a switch.

• The connection between the ClipStore and the Kayenne Frame must also be dedicated and not run through a switch.

Kayenne Processor Communications

- The PCU contains two Congatec Com Express SBC processors. These are Intel 1.5 Gig Core 2 Duo processors with 2 GB of RAM.

- The PCU Linux SBC boots from the 4 GB CF Card. All data is also written to the CF card.

- The PCU SBC Windows XP processor boots from the hard drive. This drive has all menu function software and is also used for remote data storage from the Video Frame Image Store.

- The Video Frame Kontron Processor boots from the Video Frame 4 Gig Compact Flash. All data, Configurations, E-MEMs and NV Ram are written to this CF card.

- The menu panel also contains four USB connections. These may be used for storing and saving stills, configurations, E-MEMs and loading software to the system as well as Keyboard and mouse connections for the Windows operating system.

- * Starting with software version 4.0, the Frame Processor board will be running VX Works for the operating system and not Phar Lap. This requires a hardware upgrade of the processor board to rev -04. This board will also require a 16 GB Compact Flash card. This board is compatible with both Kayenne and Karrera systems running software version 4.0 and newer. This board is NOT backwards compatible for pre version 4 Kayenne software.

- ** Starting with software version 3.0, the supplied CF cards may be 16 GB. Currently the "Lexar Professional 600x UDMA" is the only 16 GB CF card certified for use by GV Engineering. The San Disk 4GB card will also still work in the PCU for all versions.

Karrera System Communications

The Clip Store, Panel LAN and Menu/Facility LAN must be connected as shown with no Ethernet switches or Routers between the components and the Frame.

• •The Karrera system uses a panel constructed of internal "Stripes". Each row The Menu "Touch" Display Panel is an option on Karrera. When supplied by GV, it will use a different (than Kayenne) proprietary Power and Data Cable set to communicate with it's standalone Windows 7, 64 bit PC. This is a small fanless "brick" PC and can mount on the articulated arm directly behind the menu panel with the supplied bracket.

• The Optional Aux Panel has separate Power and Data connections to the rear of a Karrera Panel. The RJ-45 connector (Stripe Data, not ethernet) does NOT carry power.

• The Panel and Menu both communicate with the Karrera frame using 2 Ethernet (10, 100, 1000bT) frame connections.

• Other devices may communicate with the Karrera frame via Ethernet.

• There are 4 network ports on the rear of the Karrera Frame. Grass Valley requires that the connections between the frame and panel & Menu are dedicated and not run through a switch.

• The connection between the ClipStore and the Karrera Frame must also be dedicated and not run through a switch.

Karrera Processor Communications

- Karrera system Panels and Menus communicate directly with the Video Frame.

- The Karrera panel contains one Congatec Celeron processor. The Panel processor running Linux, boots from the 16 Gig Compact Flash. All data is also written to the CF card.

- The Menu PC, an option, running Windows 7, 64 bit, boots from its internal 160 GB Sata hard drive. This drive contains all of the menu function software. This PC is a "Fanless" PC that mounts in brackets behind the Menu Display Panel.

- The Video Frame Kontron Processor boots from the Video Frame 16 Gig Compact Flash. All data, Configurations, E-MEMs and NV Ram are written to this CF card.

- The menu panel also contains four USB connections. These may be used for storing and saving stills, configurations, E-MEMs and loading software to the system as well as Keyboard and mouse connections for the Windows operating system.

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Karrera & Kayenne 1.5G Fame HD & SD Video Inputs

Kayenne / Karrera 4 RU and 8 RU Frame Inputs:

- All Inputs are Serial Digital 270 Mb/S for SD OR 1.485 Gb/S for HD
  - 24 (2 or 4 ME Frame w/1 ME Board)
    - Inputs 21, 22, 23, 24 – Scalar – MatchDef Option
  - 48 (2 or 4 ME Frame w/2 ME Boards)
    - Inputs 45, 46, 47, 48 – Scalar – MatchDef Option
  - 72 (4 ME Frame w/3 ME Boards)
    - Inputs 69, 70, 71, 72 – Scalar – MatchDef Option
  - 96 (4 ME Frame w/4 ME Boards)
    - Inputs 93, 94, 95, 96 – Scalar – MatchDef Option

- 2 Analog Loop Thru References (Black, Tri-Level Sync)

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• Each ME board provides 24 inputs at the rear of the frame.

• The last 4 inputs for each ME may be used as standard inputs or when licensed, can be used with the "MatchDef" option. This allows the format of the incoming video to be changed as long as the input is in the same Vertical timing system. For example: If the switcher is operating in the 1080i / 59.94 format then the MatchDef inputs may accept either 480i or 720p formats as long as they are both 59.94 Hz vertical. Match Def will then convert them to 1080i for correct processing.

• There are 2 pair of Reference input Loop-Thru BNC connectors. One is for standard definition, 525/59.94 or 625/50 color black or black burst (RP-154). The second is for Tri-level HD sync.

• The switcher may also be referenced from any of the 96 input signals.
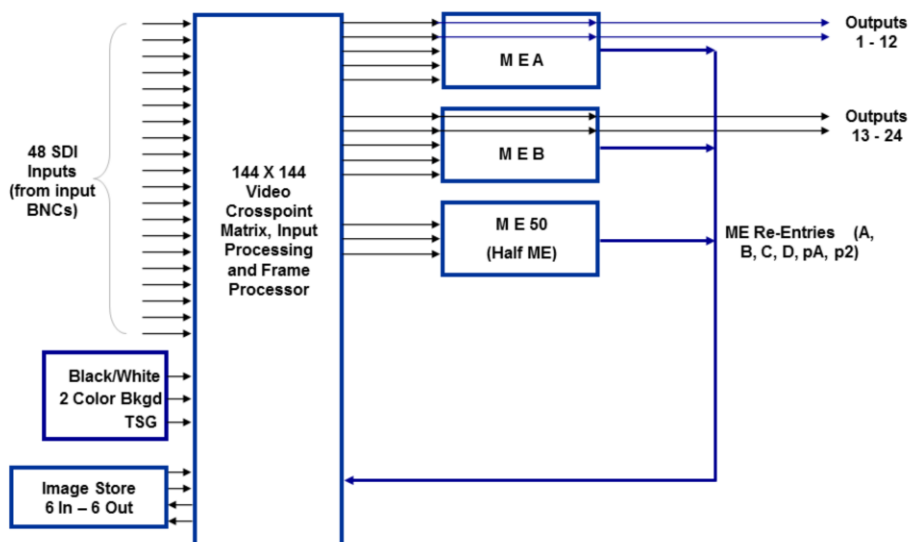
Karrera & Kayenne 1.5G HD & SD Video Outputs

Kayenne / Karrera 4 RU and 8 RU Frame Outputs:

- All Outputs are Serial Digital 270 Mb/S for SD OR 1.485 Gb/S for HD
- Any output configurable to any Function
- 12 Outputs per ME
  - 12 Outputs (2 or 4 ME Frame w/1 ME Board)
    - Outputs 11, 12 – Scalar – SetDef Option
  - 24 Outputs (2 or 4 ME Frame w/2 ME Boards)
    - Outputs 23, 24 – Scalar – SetDef Option
  - 36 Outputs (4 ME Frame w/3 ME Boards)
    - Outputs 35, 36 – Scalar – SetDef Option
  - 48 Outputs (4 ME Frame w/4 ME Boards)
    - Outputs 47, 48 – Scalar – SetDef Option

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• Each ME board provides 12 outputs to the rear of the frame. These outputs can be configured for any output function.

• If the "Set Def" option is enabled (licensed), the last 2 outputs from each ME board are scalable to other desired formats within the same vertical timing format.

Kayenne & Karrera 1.5G Frame Video Flow 2 M E (4 RU)

- The ME 50 or Half ME circuitry is located on the frame processor board.

- Keyers on ME 50 are simple keys only.

- Each ME has 6 outputs that may be routed as re-entries to other MEs or to output connectors. These output functions are configured in the ME Modes menu.

- For basic "Switcher 101" video flow, please refer to the appendix.

Kayenne & Karrera 1.5G Video Flow 4 ME (8 RU)
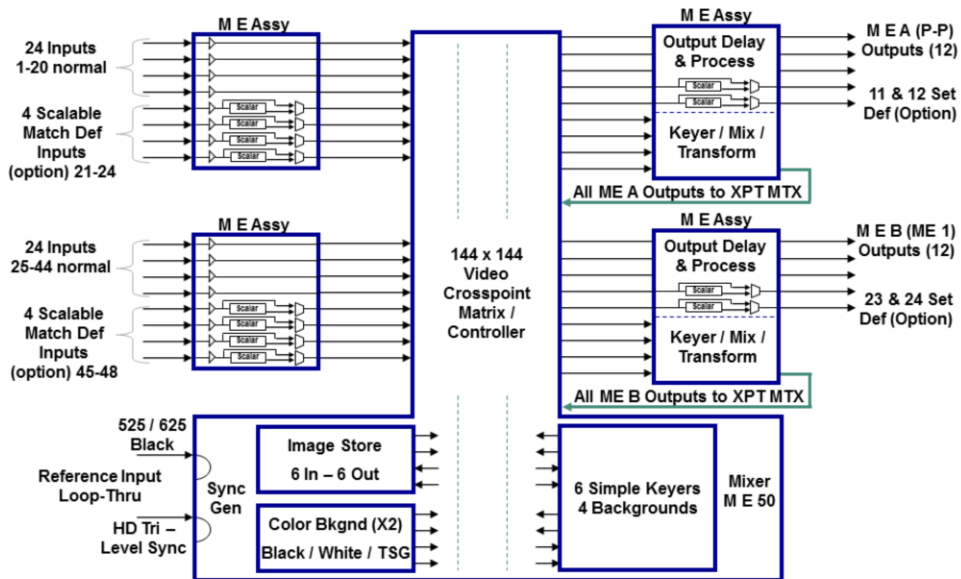
Kayenne Physical Vs. Logical Mapping – 1.5G Frame

• ME A through ME D refer to physical hardware slots in the frame that correspond to related input and output BNC connectors on the rear of the frame.

• ME 50 or the "Half ME" is actually located on the Frame Processor in the center of the frame between slots B & C on the 8 RU frame and between Slots A & B on the 4 RU frame.

• As seen above left, the Physical Frame ME hardware may be Logically Mapped to any ME Name. Refer to the: "Eng Setup / Acquire Resources" menu.

• As seen above center, the Logical ME Name may then be applied or mapped to any operating position (Stripe) on the Panel (or Panels in the case of multiple Suite delegations). Refer to the "Local E-Mem" panel, "Delegation Mode". Once configured the operator only sees the Logical names in menus and panel displays.

• The factory default mapping for a 4.5 ME system and panel is shown. (Logical MEs show default colors).

• The Karrera Panels use the same configurable mapping of hardware to Control Surfaces.

• The Karrera Panel will display stripe to ME delegation at the right end of the CrossPoint display.

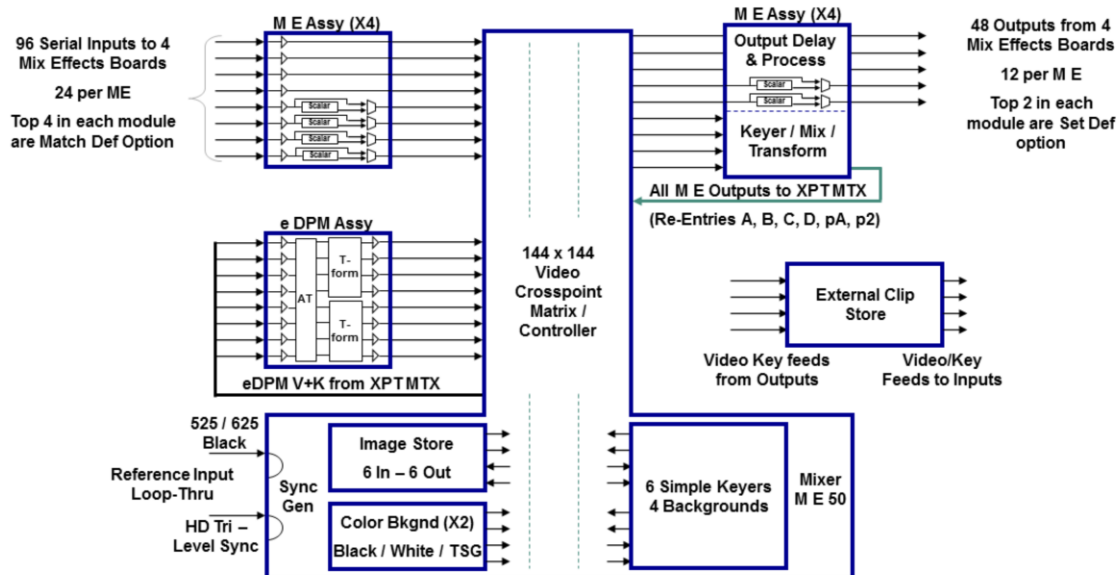Kayenne & Karrera Video Flow 2.5 ME 1.5G Frame (4 RU)

Timing Notes:

• Inputs are equalized on the ME boards before entering the crosspoint circuits.

• Outputs come from the ME boards as untimed serial data, through the crosspoint matrix, back onto the ME board. The data is then processed, delayed and sent out via the backplane.

• The system genlock reference may be chosen from either the analog Color Black loop-thru, HD Tri-Level Analog Sync Loop Thru or any of the serial digital video inputs.

• If a signal is outside of that timing window, it will be vertically off by one line, either up or down. There is no guarantee that it will frame properly.

• Internal reference may be moved to be either early or late a small amount in comparison to the selected genlock source. This function may aid in capturing an input into the auto-timing window.
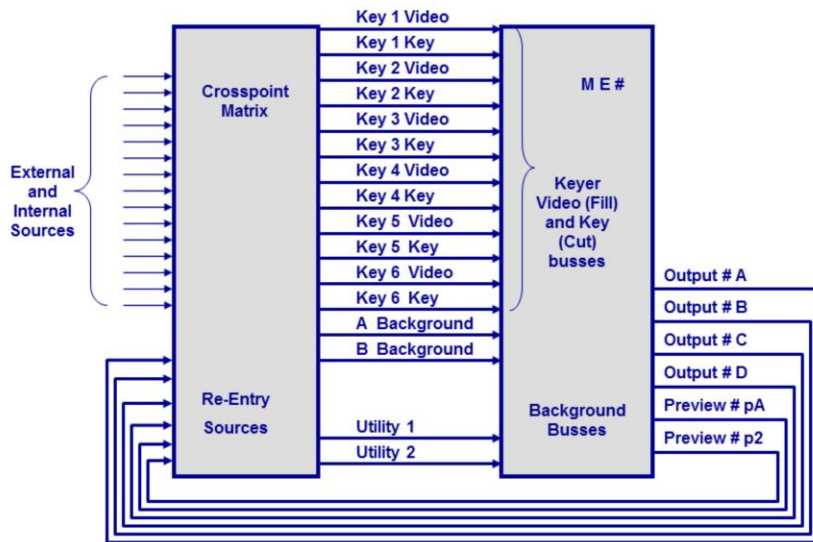
Kayenne & Karrera Video Flow 4.5 ME 1.5G frame (8 RU)

• The above drawing represents the fully loaded 8 RU frame with 4.5 Mix Effects functions and the Optional eDPM board.

• The drawing assumes four sets of ME hardware as shown once in the top third.

• Do not install the eDPM board in an empty ME slot if the frame is not licensed for that ME.

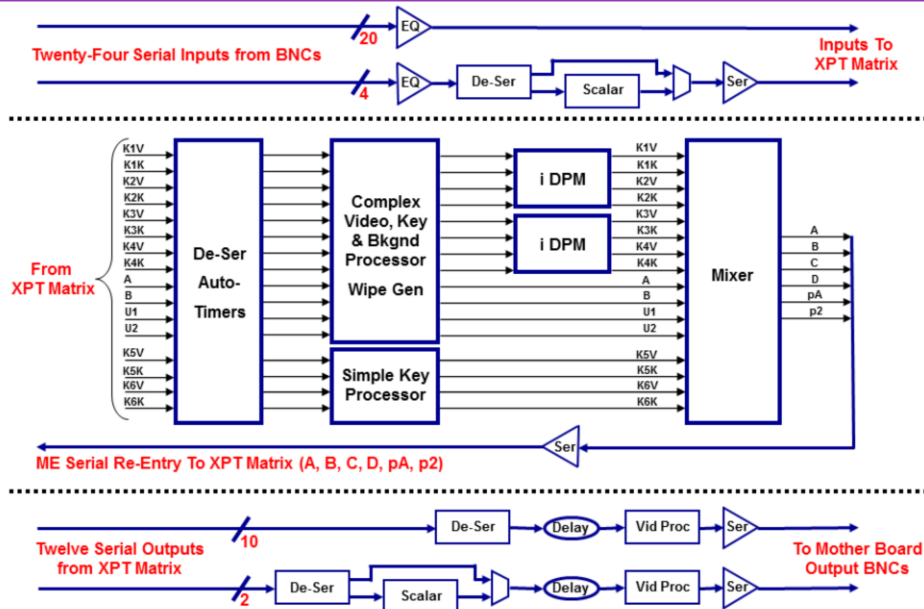Kayenne & Karrera 1.5G Frame – M E Video Flow

ME Mode Notes:

Each Mix Effects area can be configured for different operating modes.

1. Normal Mode. Main output is A – all keys active. B, C and D are clean outputs – No keys active.

2. Programmable Clean Feed Mode (PCF) (Flexi-Key) – Provides controllable keys on all 4 ME outputs

3. Split Mode. (Double Take) – Enables Primary and Secondary ME functions. Keys can be assigned to either Primary or Secondary. Utility busses are Secondary backgrounds.

4. Split / Layered mode configures the B output as a Key channel. If in Split mode, the Primary side Key will be output B and the Secondary side Key will be output D.
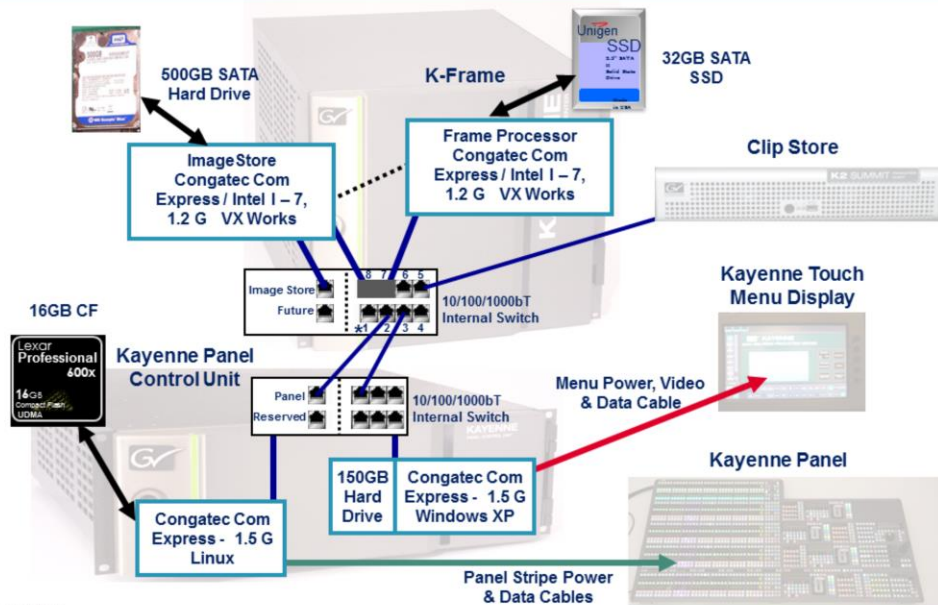
Kayenne & Karrera 1.5G Frame M E Video Flow (Detail)

- ME Notes:

- All Switcher outputs are configurable as to function.

- The Re-Entry paths to the crosspoint matrix in a single Mix Effects switcher are only used for feeding the Aux Busses / Outputs.

- Output delay circuitry is used to ensure that all outputs are always at the correct output electrical length.

- The last two outputs of each ME output group of 12 are capable of having their video format set to another standard by the scalar hardware. The 2 outputs must be set to the same format (to each other) and the same vertical rate as the switcher.

- iDPM processing is only available for Keys 1, 2, 3 and 4 on any ME.

3G K-Frame Processor Communications (w/Kayenne PCU)

The K-Frame Video Congatech Com Processor boots from the Video Frame 16 GB Sata II Solid State Hard Drive (SSDD). This frame does not contain a removable CF card. All data, Configurations, E-MEMs and NV Ram are written to this drive.

There are 2 different versions of the Frame Processor Board for the K-Frame. The different size frames dictate which board is used. They are NOT interchangeable. The 6 RU frame uses a 144 x 144 Cross Point chip and a smaller number of video paths and drivers. The 13 RU frame uses a 288 x 288 Cross Point chip.

This Frame Processor board will be running VX Works for the operating system and not Phar Lap as Kalypso and pre-version 4 Kayenne does. This board is NOT backwards compatible to Kayenne or Karrera frames.

The K-Frame uses an optional ImageStore board instead of having this functionality on the Frame Processor board. This board is optional and also communicates directly to the rear frame network connections for external storage.

The Video Frame E-Net switch port #1 is configured from the factory as a diagnostic connection to a PC running WireShark. When this port is in Diagnostic mode (DIP switch 1), an adjacent LED will be illuminated. This port will then mirror all communications from all ports.

The Clip Store, Panel LAN and Menu/Facility LAN must be connected as shown with no Ethernet switches or Routers between the components and the Frame.

3G K-Frame HD & SD Video Inputs

Kayenne / Karrera K-Frame 6 RU and 13 RU Frame Inputs:

- All Inputs are Serial Digital: 270 Mb/S, 1.485 Gb/S or 2.97 Gb/S
  - 32 Inputs per Rear Input Card
    - 64 Inputs Maximum per 6 RU Frame (2 cards)
    - 160 Inputs Maximum per 13 RU Frame (5 cards)
  - 4 Scalable Inputs per Modular I/O Assembly (Optional)
    - 16 Scalar Inputs Maximum per 6 RU Frame (4 Modules)
    - 32 Scalar Inputs Maximum per 13 RU Frame (8 Modules)

- 1 Analog Loop Thru Reference (Black or Tri-Level Sync)

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• The K-Frame utilizes a mid-plane board. This allows tor front and rear access with circuit boards.

• Input boards carry 32 input BNCs, provide Equalization and reclocking before sending the sources to the mid-plane and then to the Frame processor Cross Point chip.

• Optional Modular I/O assemblies may be used for Set Def and Match Def Scaling functions and / or additional normal inputs and outputs. Each module has 4 Scalar Circuits, 4 input and 4 output BNCs. These may be configured in any combination of Set Def and / or Match Def inputs and outputs with a MAXIMUM of 4 Scalar functions. There are 3 modes of operation that can be configured on a connector by connector basis: Match Def, Set Def and Bypass.

• The "Match Def" option allows the format of the incoming video to be changed as long as the input is in the same Vertical timing system. For example: If the switcher is operating in the 1080i / 59.94 format, then the Match Def inputs may accept 480i, 720p or 1080p formats as long as they are both 59.94 Hz vertical. Match Def will then convert them to 1080i for correct processing.

• There is 1 set of Reference input Loop-Thru BNC connectors. The switcher frame may be referenced by Color Black or Tri-Level Sync for any mode. Tri-Level Sync is NOT required for HD operation. The switcher may also be referenced from any of the SDI input signals.

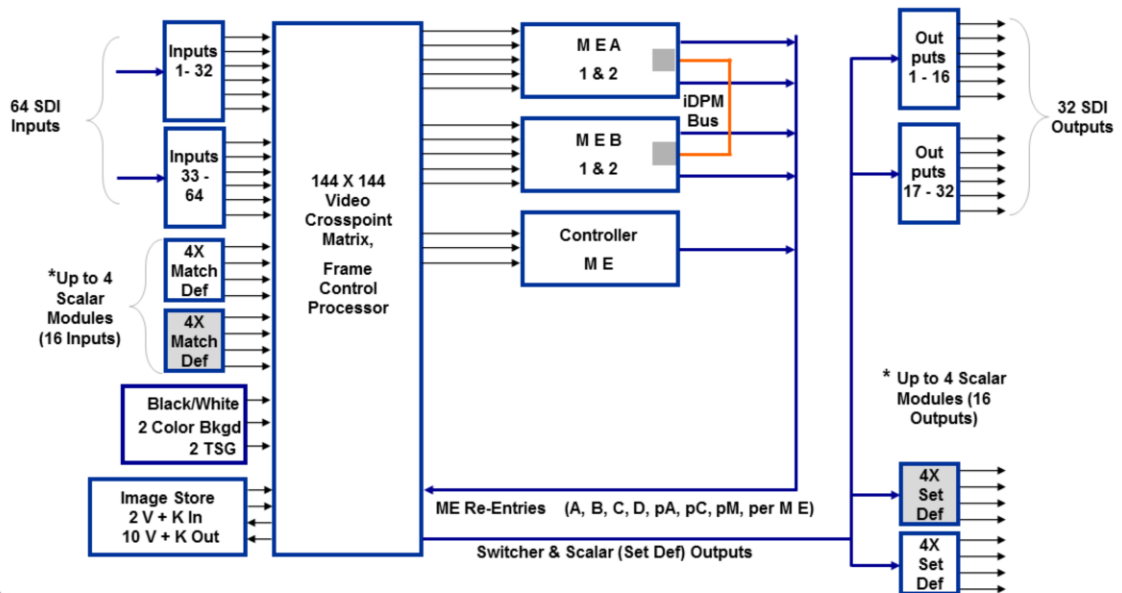## 3G K-Frame HD & SD Video Outputs

Kayenne / Karrera K-Frame 6 RU and 13 RU Frame Outputs:

- All Outputs are Serial Digital: 270 Mb/S, 1.485 Gb/S or 2.97 Gb/S
  - 16 Outputs per Rear Output Card
    - 32 Outputs Maximum per 6 RU Frame (2 cards)
    - 64 Outputs Maximum per 13 RU Frame (4 cards)
  - 4 Scalable Outputs per Modular I/O Assembly (Optional)
    - 16 Scalar Outputs Maximum per 6 RU Frame (4 Modules)
    - 32 Scalar Outputs Maximum per 13 RU Frame (8 Modules)

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• Output boards carry 16 output channels, each with 2 BNCs for a total of 32 connectors. Output delay and line drive abilities are on this output card. All outputs are being fed from the Frame processor Cross Point chip via the mid plane.

• Optional Modular I/O assemblies may be used for Set Def and Match Def Scaling functions and / or additional normal inputs and outputs. Each module has 4 Scalar Circuits, 4 input and 4 output BNCs. These may be configured in any combination of Set Def and /or Match Def inputs and outputs with a MAXIMUM of 4 Scalar functions. There are 3 modes of operation that can be configured on a connector by connector basis: Match Def, Set Def and Bypass.

• The "Set Def" option allows the format of the outgoing video to be changed to a different format as long as it is the same Vertical timing system as that of the switcher. For example: If the switcher is operating in the 1080i / 59.94 format, then the Set Def hardware may convert and output 480i, 720p or 1080p formats as long as they are 59.94 Hz vertical.

The grey boxes in the ME represent the 4 channels of iDPM that are on each ME board. The orange line indicates that these are available for routing to any Keyer in any ME

 * Modular I/O assemblies may be used as input hardware, output hardware or a combination of both. There are ONLY 4 module slots in the Compact Frame for a total of 32 I/O connections but with only 16 conversion functions.
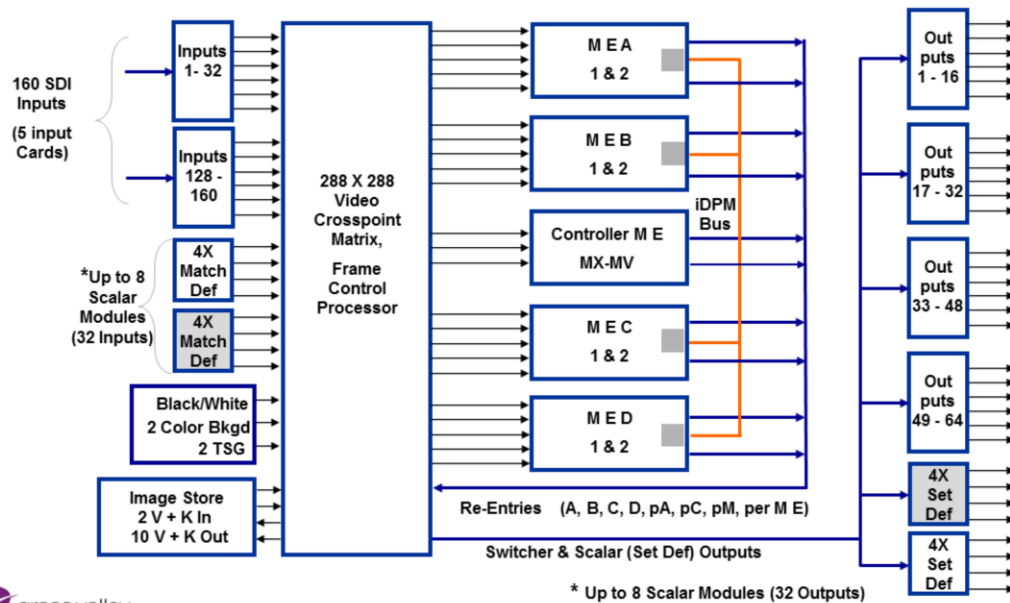
 When Match Def (Input Scaling) is used for any of the input connectors on a Modular I/O assembly, the companion output connectors on the same unit are standard outputs only. The inverse is true as well. When outputs are used for Set Def, the companion input channels are standard or same format as the operating format of the switcher.

 When Modular I/Os are used as additional inputs in the Compact Frame, for configuring, they start at Source Number 161 and go to 176.

 When Modular I/Os are used as additional outputs in the Compact Frame, for configuring, they start at Output Number 65 and go to 80.

 The ME Viewer Output is called PVW M.(pM)

The grey boxes in the ME represent the 4 channels of iDPM that are on each ME board. The orange line indicates that these are available for routing to any Keyer in any ME

* Modular I/O assemblies may be used as input hardware, output hardware or a combination of both. There are 8 module slots in the rear of the Standard Frame for a total of 64 I/O connections but with only 32 conversion functions.

 When Match Def (Input Scaling) is used for any of the input connectors on a Modular I/O assembly, the companion output connectors on the same unit are standard outputs only. The inverse is true as well. When outputs are used for Set Def, the companion input channels are standard or same format as the operating format of the switcher.
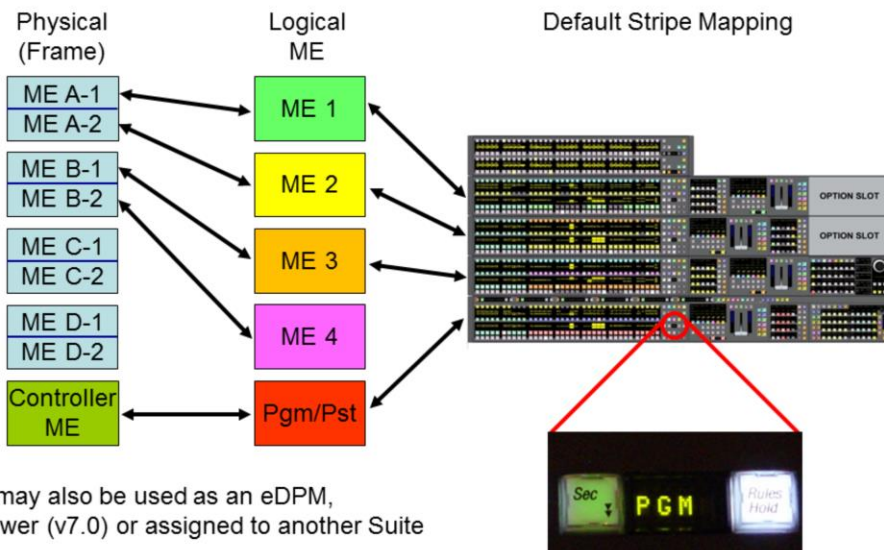
 When Modular I/Os are used as additional inputs in the Standard Frame, for configuring, they start at Source Number 161 and go to 192.

 When Modular I/Os are used as additional outputs in the Standard Frame, for configuring, they start at Output Number 65 and go to 96.

The Large frame has a different Controller card.

This card has a larger Crosspoint chip and additional hardware dedicated for use as a MultiViewer. (MX-MV)

Note that The ME hardware is required to be used as a MultiViewer but it does not need an ME license. An ME can be used as an eDPM but does require an ME license.

ME A through ME D refer to physical hardware slots in the frame. Each ME Slot now carries a dual ME card or 2 separate sets of ME circuitry. Each slot is now labeled as the slot letter name with a 1 or 2 suffix.
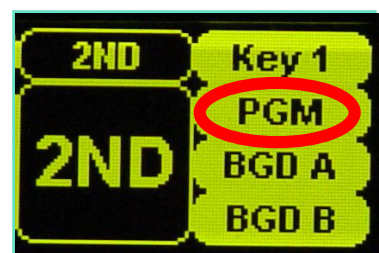
The Controller ME is identical to the full MEs except iDPM capability

As seen above left, the Physical Frame ME hardware may be Logically Mapped to any ME Name. Refer to the: "Eng Setup / Acquire Resources" menu.
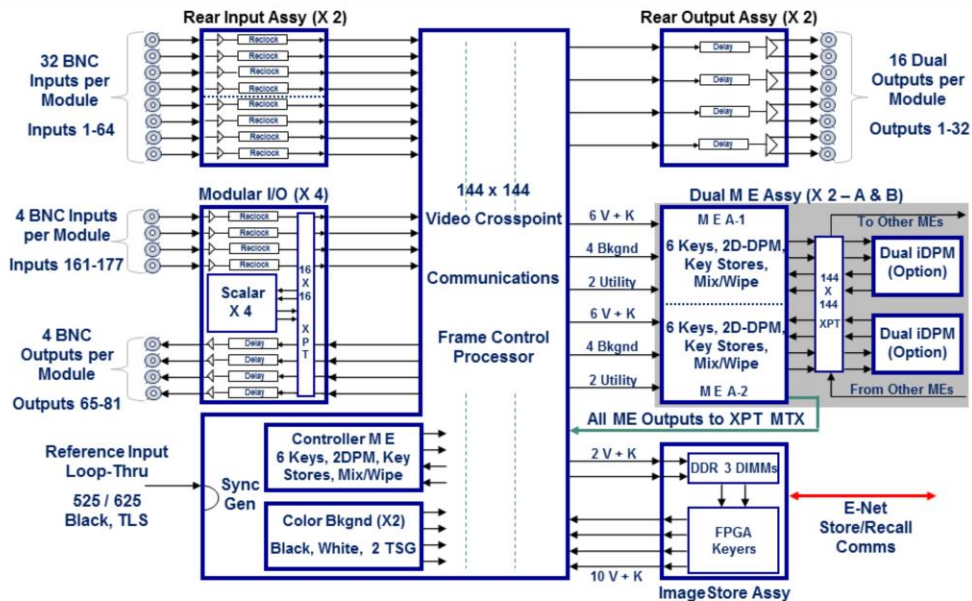
As seen above center, the Logical ME Name may then be applied or mapped to any operating position (Stripe) on the Panel (or Panels in the case of multiple Suite delegations). Refer to the "Local E-Mem" panel, "Delegation Mode". Once configured the operator only sees the Logical names in menus and panel displays.

Karrera Panel Display

The Karrera Panels use the same configurable mapping of hardware to Control Surfaces.

The Karrera Panel will display stripe to ME delegation at the right end of the CrossPoint display.

3G K-Frame Video Flow 5 MEs (6 RU Detail)

Timing Notes:

Inputs are equalized and reclocked on the Input boards before entering the crosspoint circuits.

Outputs come from the M E boards as untimed serial data, through the crosspoint matrix and are then fed to the Output boards. The data is then processed, delayed and sent out via the output connector assembly.
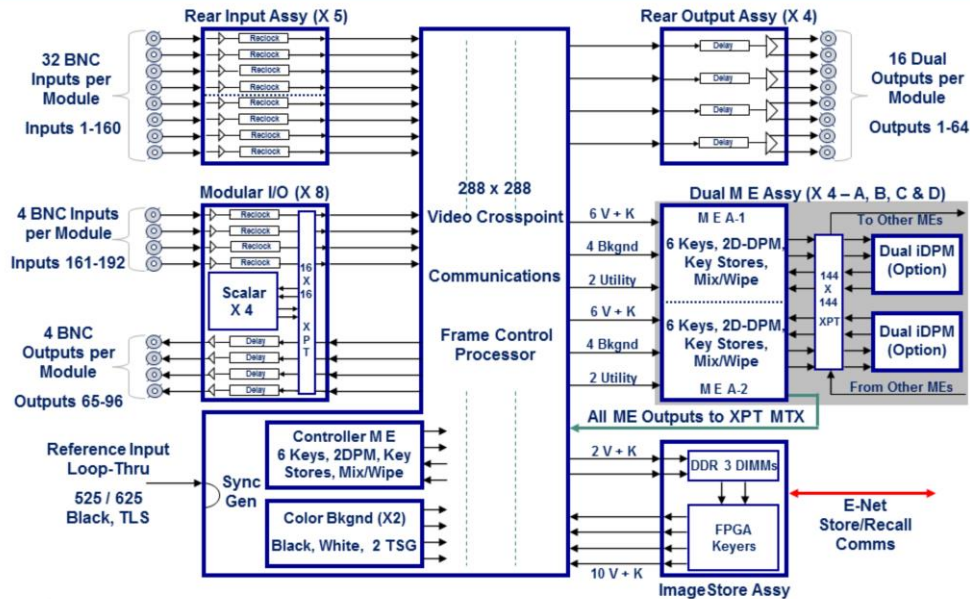
Unlike the original Kayenne frame, this system has one genlock reference loop-thru. All operating formats may be locked to analog Color Black, HD Tri-Level Analog Sync or from any of the serial digital video inputs.

If a signal is outside of that timing window, it will be vertically off by one line, either up or down. There is no guarantee that it will frame properly.

Internal reference may be moved to be either early or late a small amount in comparison to the selected genlock source. This function may aid in capturing an input into the auto-timing window.

Dual iDPM modules are a license option. Each Dual Video Processor board contain 2 iDPM channels for a total of 4 iDPMs. A fully optioned 13RU Frame may contain 16 floating Transform Engines.
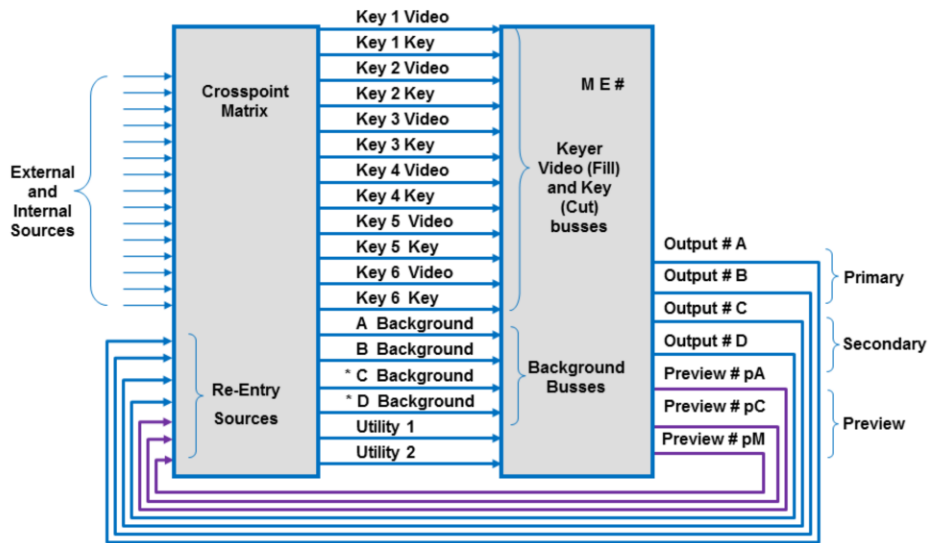
3G K-Frame Video Flow 9 MEs (13 RU Detail)

The Larger frame hold 2 additional Dual Video Processor boards and has more Input, Output and Modular I/O capability.

The Controller card has a larger Video crosspoint chip and an extra MultiViewer chip and is therefore not compatible with the smaller K-Fames.

3G K-Frame M E Video Flow

Two Sets per Dual Video Processor

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ME Mode Notes:

* The Video Processor hardware works in a similar fashion to the Kayenne and Karrera. One difference is the addition of the C and D Background busses. These are used for backgrounds for the Secondary Partition in Split Mode described below. This change frees up the Utility busses for other functions.
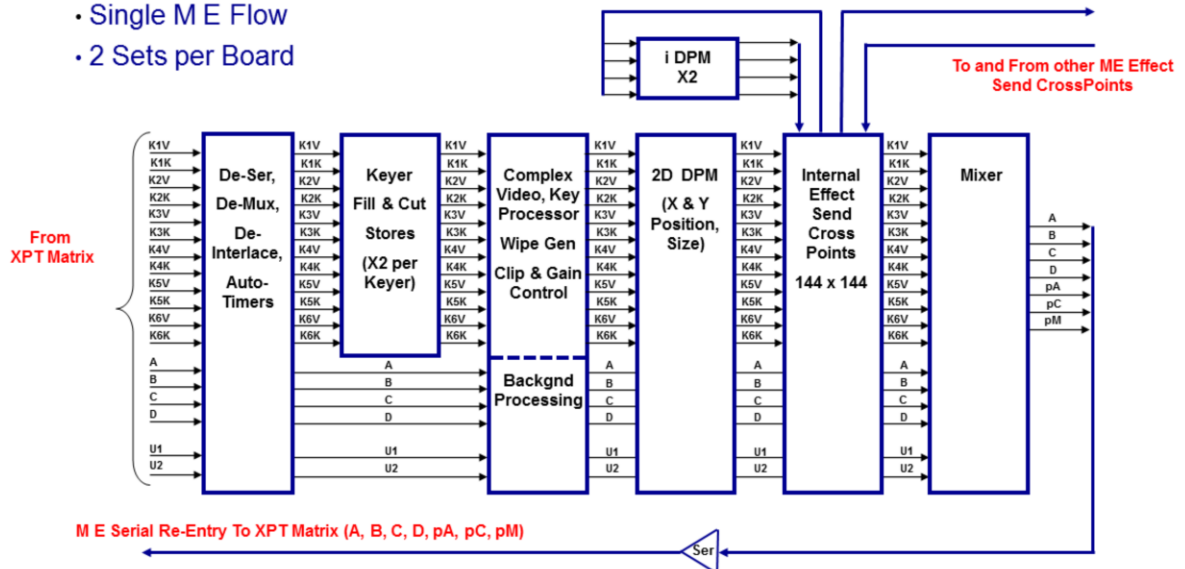
The other Difference is the M E View output (pM) active with v6.0 software.

Each Mix Effects area can be configured for different operating modes.

1. Normal Mode. Main output is A – all keys active. B, C and D are clean outputs – No keys active.

2. Programmable Clean Feed Mode (PCF) (Flexi-Key) – Provides controllable keys on all 4 ME outputs

3. Split Mode. (Double Take) – Enables Primary and Secondary ME functions. Keys can be assigned to either Primary or Secondary. Utility busses are Secondary backgrounds.

4. Split / Layered mode configures an output as a Key channel. If in Split mode, the Primary side Key will be output B and the Secondary side Key will be output D.
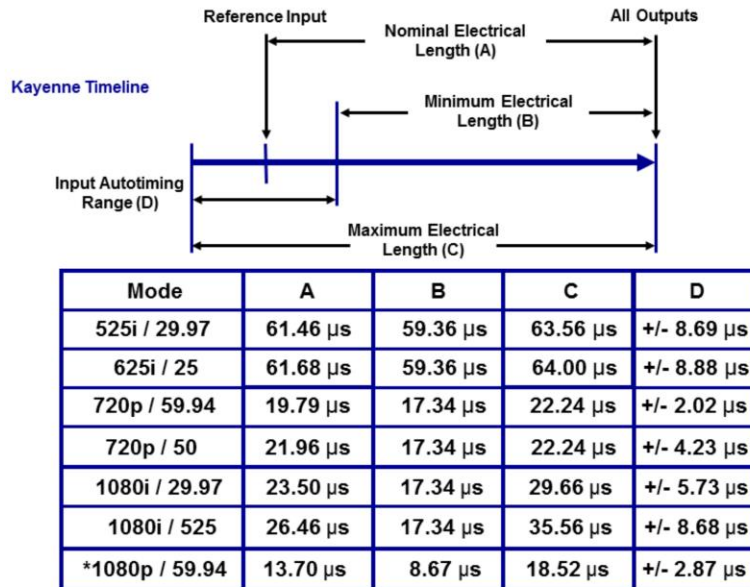
ME Notes:

• All Switcher outputs are configurable as to function.

• iDPM processing is assignable to any ME, any Key. The Keyers no longer have their own dedicated Transform Engine as in the Kayenne and Karrera frames. iDPMs are floating, accessed through the Effects Send menus. Each Dual ME board may contain up to 4 optional iDPM Licenses. A Standard frame may then have a maximum of 16 Transform Engines.

• The K-Frame contains a 2D DPM (Resizer) on every ME Keyer path. This allows for X & Y transforms and Picture Size to be adjusted. This will not allow for Z-space transforms or rotation of any kind. But this is perfect for repositioning and sizing keys

Kayenne & Karrera 3G K-Frame Timing

Mode	A	B	C	D
525i / 29.97	61.46 µs	59.36 µs	63.56 µs	+/- 8.69 µs
625i / 25	61.68 µs	59.36 µs	64.00 µs	+/- 8.88 µs
720p / 59.94	19.79 µs	17.34 µs	22.24 µs	+/- 2.02 µs
720p / 50	21.96 µs	17.34 µs	22.24 µs	+/- 4.23 µs
1080i / 29.97	23.50 µs	17.34 µs	29.66 µs	+/- 5.73 µs
1080i / 525	26.46 µs	17.34 µs	35.56 µs	+/- 8.68 µs
*1080p / 59.94	13.70 µs	8.67 µs	18.52 µs	+/- 2.87 µs

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Timing Notes:

• There may be a very slight difference in measurable delay between different versions of software.

• All paths through the switcher will be of equal delay or length of time except when using eDPM or iDPM channels. This will add 1 frame length to the signal being transformed.

• If an input signal is before or ahead in time of the auto timing window, a one line vertical shift up may occur when selecting this signal.

• If an input signal is after or late in time compared to the auto timing window, a one line vertical shift down may occur when selecting this signal.

• Embedded Audio (Ancillary Data) may be passed or stripped from paths through the switcher as configured in the Eng Setup / Video Settings Menu.

•* All values are for K-frame systems.