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FSN Series

2.5 M/E multi-format production and presentation switchers

> *"We wanted a small flexible system without a lot of external conversion equipment, and the FSN allowed us to do that."*
>
> *Stephen Gray, CT Touring*

Features

- Inputs
  - Up-to 40 native SDI inputs
  - Up-to 12 scalable inputs (SDI/analog/DVI
  - Color correction for all inputs
  - Dedicated DSK cut and fill inputs
- Outputs
  - Up-to 40 native SDI
  - Up-to 6 universal (SDI/Analog/DVI)
- Four 2D-DVE Channels
  - PIPs with borders and shadows
  - Keyframe effects with shot-box
  - Flip, freeze, variable strobe and color effects
  - Scalable key cut and fill
  - Cropping and resizing
- Integrated 16-channel Multiviewer
- Four keyers and DSK
- 2.5 M/E control with a compact console
- Advanced memory section with 'Enables'
- 3G enabled
- Less than 3 lines delay for native sources
- Control panel with production switcher layout
- Hot-swappable active cards and fan tray
- Multiscreen and widescreen support
- Internal widescreen blending support Seamless AUX switching
- FSN-1400 dual redundant power supplies
- SDI Level A to/from Level B conversion (NIC card)
- Simultaneous operation with two FSN-150 controllers

The FSN series is a high-resolution, 3G enabled switcher that combines advanced multi-format production and presentation switching in one highly integrated unit. By seamlessly integrating multiple video and computer graphics formats on a common platform, the FSN series provides a streamlined package that's modular, easy to operate, and easy on your budget.

The FSN allows control of two full M/E busses from the FSN-150 control panel. With a press of a button, the bus can be toggled to control either M/E 1 or M/E 2, without requiring additional hardware. FSN features seamless switching for up to 12 AUX outputs, supporting single and multiscreen displays. With up to 16 cross converter/up/down scalers, an integrated 16-channel Multiviewer and four DVE channels, the FSN places serious input and output capabilities at the user's fingertips in a single 6RU chassis.

The FSN-1400 ships with the System and Mixer/Effects cards pre-installed in the chassis. Additional cards are added to the FSN-1400 to meet the specific application requirements. In addition to the user defined custom configurations, the FSN-1400 is available from the factory in five pre-configured models:

- FSN3G-1004: FSN-1400 with 5x UIC, MVR, 2x UOC
- FSN3G-1802: FSN-1400 with 1x NIC, 5x UIC, 2x DVE, MVR, 1x UOC, 1x NAC
- FSN3G-1804: FSN-1400 with 1x NIC, 5x UIC, 2x DVE, MVR, 2x UOC
- FSN3G-2002: FSN-1400 with 1x NIC, 6x UIC, 2x DVE, MVR, 1x UOC, 1x NAC
- FSN3G-2004: FSN-1400 with 1x NIC, 6x UIC, 2x DVE, MVR, 2x UOC

Additional custom configurations are available from the factory (BTO) upon customer request.

Looking for a pre-configured presentation switcher?

Find out more about Barco's fully integrated multi-screen presentation systems, on www.barco.com

BARCO

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FSN-150 Compact Controller

Custom Control Section
Buttons can be programmed to perform functions such as, macros, preset recalls, freeze, menu access and more. The FSN-150 includes eight dedicated custom buttons.

USB
Enables users to backup and restore system, and update system code.

Memory Section
Enables users to store and recall complete or partial switcher setups using 1000 memory registers. This advanced memory system includes high-end features such as enables/disables. Latching, store and recall for easy entry.

Aux Section
Assigns sources to native or scaled Aux bus outputs. Buttons are provided for 16 Aux outputs. Additional Aux outputs are switched on the GUI.

M/E Transition Section
Provides controls for creating cuts, mixes, wipes, keys, and triggering DVE moves. The LCD display indicates key sources, the transition rate and the active memory register.
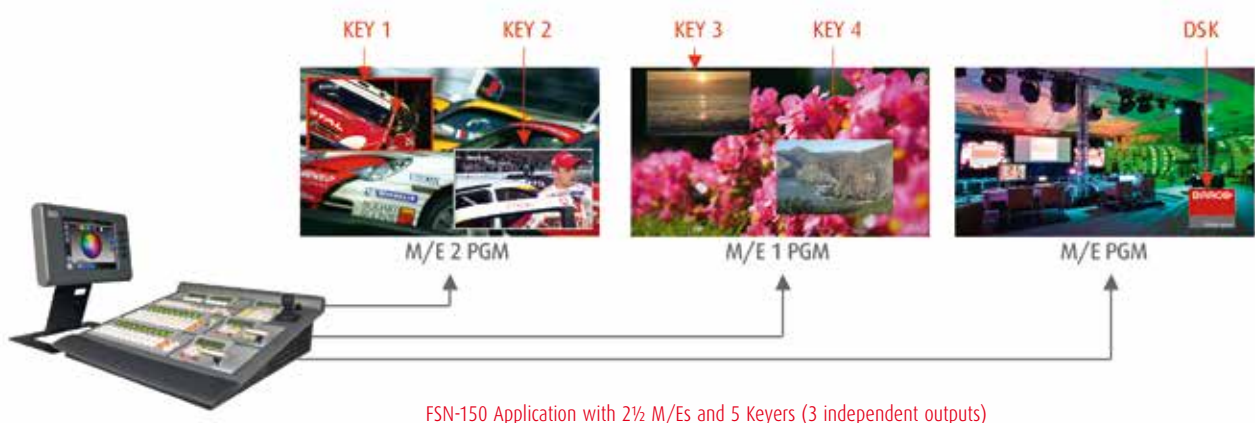
LCD Displays
Daylight viewable, programmable high resolution LCD displays show all source names and custom button names. All displays are angled for easy viewing.

Instant Transitions
This section provides instant CUT or MIX functions for both keyers, regardless of T-Bar position.

M/E Banks
Each M/E includes Background (BG), Preset (PST), and Key buses. Buttons can be assigned to inputs, color backgrounds, stills and test patterns. A dedicated BLACK button is provided. Selectable between M/E 1 and M/E 2.
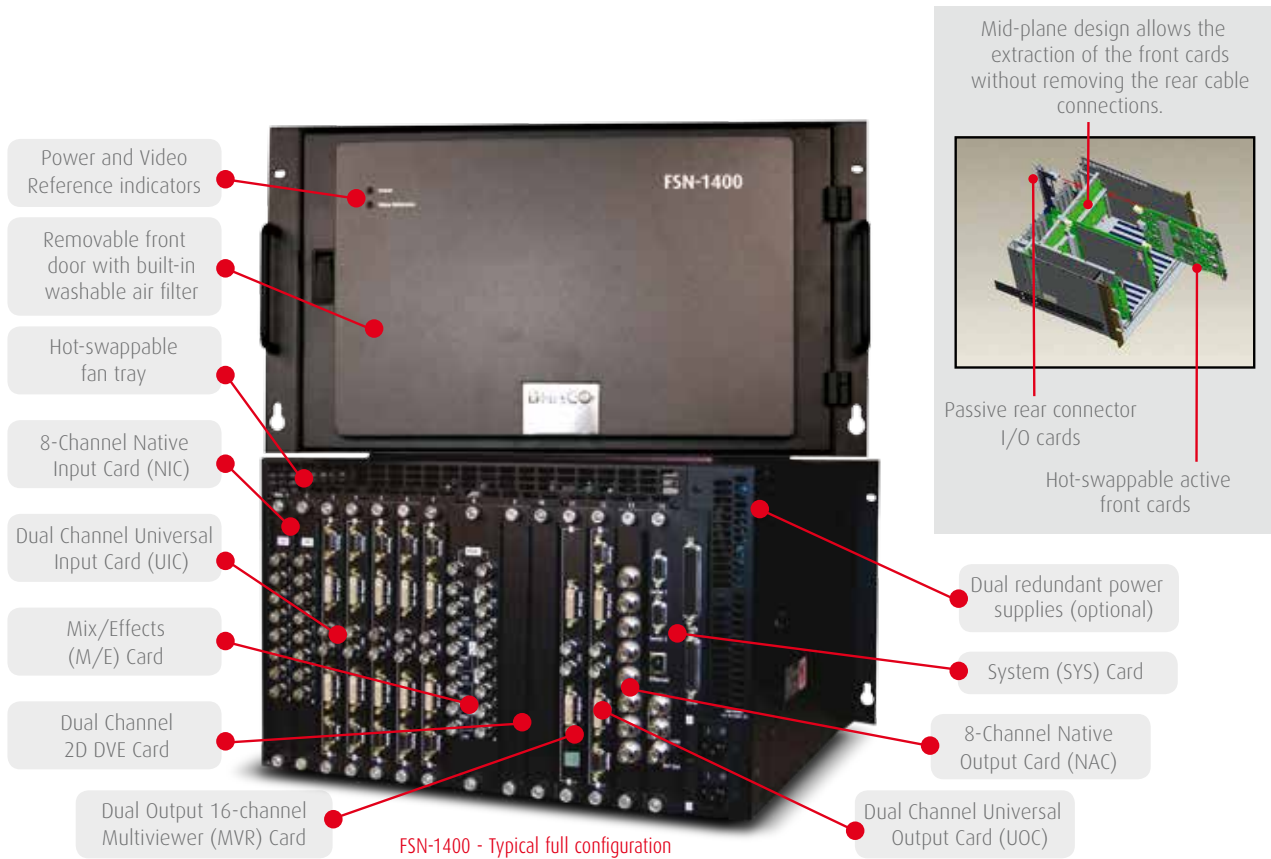
PGM/PST Bank
The PGM/PST bank includes PGM and PST buses plus a phantom DSK Assign bus. All buses operate in "flip-flop" mode.

PGM/PST Transition Section
Provides controls for creating cuts, mixes, wipes, a downstream key (DSK) and a fade to black (FTB). The LCD display indicates the DSK source, transition rates for DSK and FTB, and the active memory register.

FSN-150 Application with 2½ M/Es and 5 Keyers (3 independent outputs)

FSN-1400 Video Processing Chassis

Mid-plane design allows the extraction of the front cards without removing the rear cable connections.

Power and Video Reference indicators

Removable front door with built-in washable air filter

Hot-swappable fan tray

8-Channel Native Input Card (NIC)

Dual Channel Universal Input Card (UIC)

Mix/Effects (M/E) Card

Dual Channel 2D DVE Card

Dual Output 16-channel Multiviewer (MVR) Card

Passive rear connector I/O cards

Hot-swappable active front cards

Dual redundant power supplies (optional)

System (SYS) Card

8-Channel Native Output Card (NAC)

Dual Channel Universal Output Card (UOC)

FSN-1400 - Typical full configuration

Card	FSN-1400 Slots														Max. # of cards	Inputs				Outputs			Scalers
	1	2	3	4	5	6	7	8	9	10	11	12	13	14		Native	Universal	DSK	LTC	Native	Universal	Multv.	
NIC	•	•	•	•											4	8							
UIC		•	•	•	•	•	•								6		2						2
M/E								•							1			2		16			
DVE							•	•							2								2
MVR									•						1				1			2	
UOC											•	•	•		3						2		2
NAC											•	•	•		3					8			
SYS														•	1								

● Included with the FSN-1400 chassis   • Optional

Remote AUX Panel RCP-120

The RCP-120 allows users to remotely control routing sources to the FSN AUX outputs. This capability allows technical personnel to select sources for monitoring, perform adjustments or record without interfering with the main production workflow managed by the FSN-150 control panel. Dedicated menus allow the setup and configuration of the RCP-120 from the FSN control panel. An integrated web interface is also provided for remote setup and configuration. The RCP-120 is available in a slim 1RU package featuring 12 high resolution color graphical LCD displays allowing for electronic labeling. The panel provides selection of up-to 20 sources. Up to thirty-two RCP-120 units can be connected to the FSN system via an Ethernet switch. The buttons on the RCP-120 follow the input bus mapping and source labeling as is defined on the FSN control panel. Alternately the RCP-120 can be mapped with custom functions such as memory recalls or transitions.

Native Input Card (NIC)

The Native Input Card (NIC) accepts up to eight SD/HD/3G SDI signals. The FSN-1400 can accept up to four NICs, allowing up to 32 native SDI inputs to be installed. Since there are no scalers on the NIC, all connected inputs must be set to the native resolution of the FSN.

The NIC provides frame synchronization for all inputs with a jitter window of ±0.5 lines per input channel. From the system's touch screen menu, you can monitor the input video timing and lock status.

In addition to frame synchronization, the NIC provides the following video processing features on a per-input channel basis:

• Hue and saturation adjustment
• Independent RGB contrast and brightness adjustment
• Horizontal and vertical mask adjustment
• Freeze
• Output black on LOS (Loss Of Signal)
• Color gamma correction

Universal Input Card (UIC)

The Universal Input Card (UIC) is a high performance dual-channel scaling processor that accepts a wide range of video and computer signals, and converts them to the switcher's native format. Each channel operates independently.

The FSN-1400 accepts up to six UIC cards, allowing up to 12 universal, non-native input signals to be scaled. Each channel accepts analog RGBHV/RGBS/RGsB, YPbPr video, S-video, Composite input signals on HD-15 connectors, DVI digital signals on DVI-I connectors and SD/HD/3G video on BNC connectors.

A custom algorithm allows each channel to automatically and rapidly lock to the selected input video source. For genlocked sources, the delay through each scaling channel is one frame.

In addition, the UIC provides the following video processing features per input channel:

• Freeze
• Input size and position adjustments
• Brightness and contrast adjustment
• Hue, saturation
• Independent RGB contrast and brightness adjustment
• Gamma adjustmenst
• Scaler sharpness control
• Powerful de-interlacing modes:
  - Motion adaptive
  - Field to frame (for low latency)
  - pSF (Frame-to-Frame)
  - 3:2 (NTSC) and 2:2 (PAL) pull-down detection
• 12-bit processing
• Output black on LOS (loss of signal) or invalid signal
• Flicker filter

Multiviewer Card (MVR)

The Multiviewer card provides a fully integrated monitoring solution, eliminating the need for multiple monitors and signal distribution, simplifying your system's operation and reducing the overall operating cost. The Multiviewer enables you to monitor up to 16 video signals, comprised of any input source, any Program, Preview or Clean feed output, and any Aux bus output.

In addition to video sources, the Multiviewer can also display a real-time-clock (RTC) or timecode from the MVR card's LTC input connector.

The Multiviewer operates in either single or dual monitor modes. In single mode, up to 16 PIPs can be displayed on a single monitor. In dual mode, the 16 PIPs are distributed between two DVI-D and HD-SDI monitor outputs. Over 20 different layouts are available, designed to fit any monitoring requirement.

Once a layout is selected, you can customize the text, background, border and UMD color. Any PIP can be turned off, and the overall layout's background color, border color, and UMD (Under Monitor Display) color are all variable. The Multiviewer provides standard red/green tally within the UMD, and PIP borders automatically turn red to indicate loss-of-signal (LOS) or cyan when the corresponding input source is frozen. Just like all FSN cards, the Multiviewer card is hot-swappable, allowing for quick and easy extraction and insertion, without disturbing the system operation.

2D Digital Video Effects (DVE) Card

The 2D-DVE card allows you to create PIPS from any source. A wide variety of effects are offered, including sizing, positioning, cropping, and programmable borders and shadows.

Up-to two 2D-DVE cards can be installed in the FSN-1400 chassis, each card containing two independent DVE channels. All inputs and outputs signals to the DVE card are internal to the chassis, and no external connections or rear I/O connector card is required.

Keyframes and the Shot Box
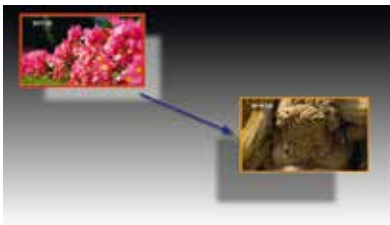
Using the touch screen menu, you can easily create keyframe effects, allowing PIPs to "fly" anywhere on or off screen with ease. PIP size, border and shadow parameters can all be dynamically re-sized from one keyframe to the next, creating sophisticated and visually dynamic morphing effects.

In addition, a "shot box" enables you to store and retrieve 128 keyframe "looks." Complete keyframe effects can also be stored and recalled from the switcher's memory system.

Flip, Freeze, Colorize

In addition to creating PIPs and keyframe effects, the DVE card enables you to create a variety of stunning special effects. For example, a full color image can be tinted to appear in sepia tone, monochrome, strobed at variable rates, frozen, or flipped both horizontally and vertically.

In addition, each of the RGB components for any selected input can be modified independently, allowing you to colorize images according to the creative requirements of your program.

DVE Menu

The system's DVE menu provides an easy and intuitive way to set up and run each DVE channel. All buttons are color-coded according to functionality, and on the menu's "size and position" tab, the central palette contains dedicated presets for rapid and accurate effect creation. Additional tabs are provided for effect setup, panning and zooming the source within a PIP, masking all edges, and creating borders and shadows.

DVE Applications

Following are two of the many applications for which the FSN's 2D DVE can be used.

Image Cropping and Resizing

In this application, the FSN's native resolution is set to 1920 x 1080i:

• A video server provides a background image at 720p.
• A live SD-SDI image with a 4:3 aspect ratio is captured by the FSN.
• A portion of the live image is cropped and displayed in a PIP.
• A border and shadow are added to the cropped image.
• Using a dual-keyframe effect, the PIP can be dynamically resized and moved anywhere on or off screen.


Cut and fill

In this application:

• The image from the video server is used as a background
• The high-contrast cut signal is generated on a PC
• The live camera provides the fill signal
• Individual DVE channels are assigned to both the cut and fill signals, and the resulting PIP is keyed over the background

Note that within the FSN, any source can be used as a cut or fill signal and routed to any DVE channel.
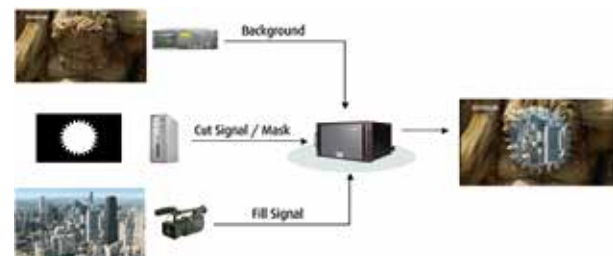
Universal Output Card (UOC)

The Universal Output Card (UOC) is a high performance dual channel scaler card that enables the FSN to output DVI, Analog or SMPTE 3G/HD/SDI signals, independent of the switcher's native video format.

Inputs to the UOC are internal, simplifying system setup and wiring. Up to three UOCs can be inserted in the FSN-1400 chassis, providing six independent outputs, each of which can output at a different format and resolution. When the system's UOC capability is combined with its UIC capability, FSN effectively operates as a multi-channel "anything in, anything out" system.

In the bottom diagram, several sources at different formats and resolutions are connected to FSN. In this example, which uses three UOCs, the FSN outputs six different signals at different formats and resolutions.

You can select the output format for each channel via the UOC setup menu, and all standard analog, DVI and SDI formats are available. In addition to standard formats, you can also output custom resolutions and timings, thus further enhancing the system's "anything in, anything out" flexibility.

The UOC outputs can vertically genlock to the system's internal sync, or free-run. For vertically locked outputs, the frame delay is one or two (user selectable) interlaced fields for interlaced native outputs, or one progressive frame for native progressive outputs.

The UOC also offers additional effects:

· Pan and zoom

· Brightness, contrast, hue, saturation, and gamma correction

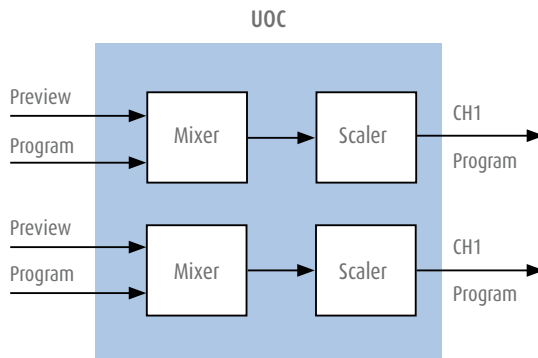· Internal test pattern

Multi-screen support

Depending on the number of UOC cards, the FSN can support up to six single screens or a combination of single-screens and edge-blended widescreen configurations. Feathering is fully integrated for the edge-blended configurations.

Supported widescreen configurations:
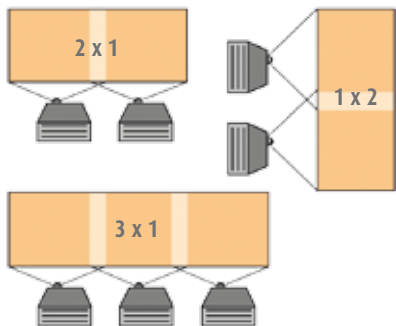
Mixers

Each UOC channel can be independently defined to include a mixer before the scaler. In the diagram both channels are defined with a mixer, but a combination of a mixer and non-mixer configurations is also allowed. The mixers support cut and dissolve transitions. The Preview inputs to the mixers can be viewed with the Multiviewer card prior the transition.


UOC Application
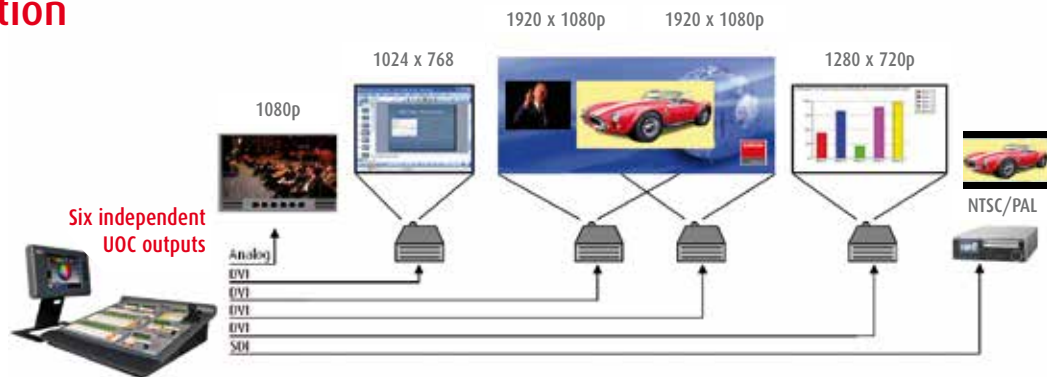
Native Aux Card (NAC)

The Native AUX Output Card (NAC) provides eight SD/HD/3G SDI outputs, in addition to the six native AUX outputs on the M/E card. You can install up to three NACs in the FSN-1400, enabling the system to be equipped with up to 30 native AUX outputs.

Using the Aux section on the control panel or the Aux Menu, any FSN output or any signal from the internal crosspoint matrix can be assigned to any NAC AUX output.

NAC Mixers

In addition to the single outputs, the NAC can also be configured with multiple two-channel A/B Mixers. Up-to four mixers can be defined, each supporting cut and dissolves with independent transitions rates. The mixer outputs can be defined to provide a duplicate Program or Program/Preview output. The Preview inputs to the mixers can be viewed with the Multiviewer card prior to the transition
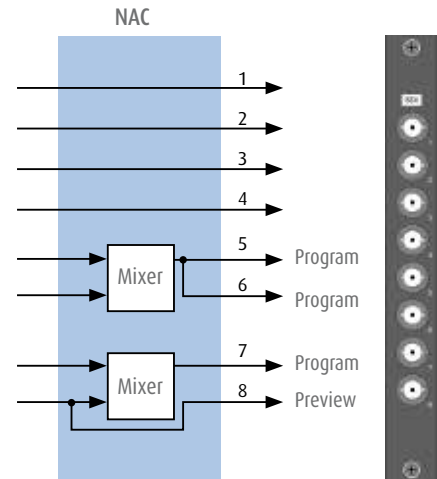
M/E Card

The M/E card provides all Program, Preview and Clean outputs for all M/E banks, along with six AUX outputs. All outputs run at the switcher's selected native resolution, and internal test patterns can be routed to any (or all) outputs.

In addition to the native outputs, the card also includes two BNC connectors dedicated to the DSK CUT and FILL input signals. Adjustments for these two DSK inputs are provided on the DSK Setup Menu.
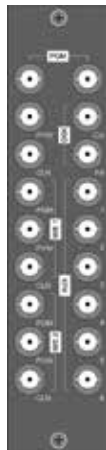
System Card

The System card provides the FSN's reference timing signals, plus connections for GPIO and 24 Tally outputs. The Ethernet and serial communication connectors also reside on the card.

Three connections are provided for reference:

· Reference Input: The system accepts bi-level and black burst for SD, and tri-level for HD with status reporting. If the external video reference is lost, no visual artifacts on FSN video outputs will occur.

· Reference Output: The system outputs bi-level and black burst for SD, and tri-level for HD. The signal can be vertically locked to external video reference, or free run.

· Reference Loop: The looped reference input signal is present on the connector, even if the system card is removed.
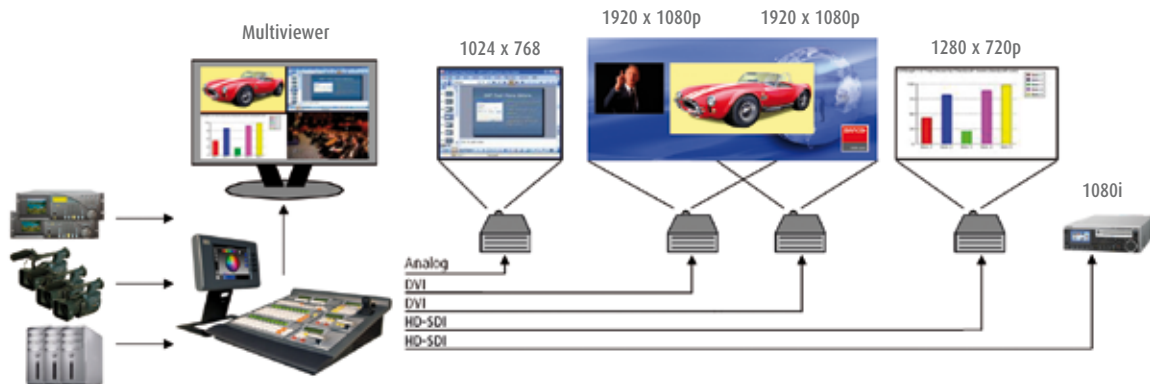
Graphical User Interface (GUI)

An essential part of the FSN's ease-of-use is the graphical menu system. The menus provide an intuitive, user-friendly environment that allows operators to efficiently set up the unit and perform quick modifications.

The display includes a high-resolution color touch screen and four rotary knobs that allow users to easily modify switcher parameters.

The graphical menus can also run on an off-the-self LCD monitor that connects to the FSN-150 via the DVI or HD-15 connector.

FSN multi-format multi-screen application

Specifications

TYPE		FORMAT
Inputs	Up to 40 SD/HD SDI inputs	SMPTE 424M, 292M, 259M-C
	Up to 12 universal inputs (SD/HD, DVI, Analog)	SMPTE 424M, 292M, 259M-C DDWG 1.0 RGBHV/RGBS/RGsB, YPbPr, S-video, Composite
	Dedicated Native Cut and Fill SD/HD SDI inputs (standard on the M/E card) for DSK	SMPTE 424M, 292M, 259M-C
Outputs	10 SD/HD/3G SDI native outputs for Program/Preset/Clean	SMPTE 424M, 292M, 259M-C
	6 standard native SD/HD SDI Aux outputs on the M/E card. Up to 24 additional native outputs with optional NAC cards	SMPTE 424M, 292M, 259M-C
	Up to 6 optional universal outputs (SD/HD, DVI, Analog)	SMPTE 424M, 292M, 259M-C DDWG 1.0 RGBHV/RGBS/RGsB, YPbPr, S-video, Composite
	Multiviewer: Up to 16 windows on one or two SD/HD, DVI	SMPTE 424M, 292M, 259M-C DDWG 1.0
Control	Analog Ref Input/Loop/Output on a BNC connector	Bi-level and Blackburst at SD Tr-level at HD
	Tally Outputs: 24 contacts on DB50 up to 30VDC at 1 Amp	
	Ethernet communication between FSN-150 and FSN-1400	10/100Base-T
Resolutions		
VGA (640x480) through WUXGA (1920x1200), HDTV (720p,1080i, 1080p), 2048x1080, Plasma Display Resolutions		
Mechanical		
FSN-1400	6RU: 19" W x 10.5" H x 20.75" D (max) / 48.26cm W x 26.67cm H x 52.7cm D (max)	58 lbs / 26.5 Kg
FSN-150	22" W x 7" H x 24" D / 55.88cm W x 17.78cm H x 60.96cm D	26 lbs / 12 Kg
Display	11.6" W x 9.7" H x 2.67" D max with knobs / 29.46cm W x 24.64cm H x 6.78cm D with knobs	5 lbs / 2.5 Kg
Stand	14" W x 13" H x 10" D / 35.56cm W x 33.02cm H x 25.4cm D	8 lbs / 3.75 Kg

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