FOR.A ®
INNOVATIONS IN VIDEO
and AUDIO TECHNOLOGY

3G/HD/SD Multi Purpose
Signal Processor
FA-9500

THE Processor

All In One

3G-SDI

HD-SDI

HD Analog Component

SD-SDI

SD Analog Component

Y/C

Analog Composite

Embedded Audio

Dolby E / Dolby Digital

AES/EBU

Analog Audio

| Frame Synchronizer |
| Time Base Corrector |
| Up Converter |
| Down Converter |
| Cross Converter |
| Aspect Ratio Converter |
| A/D Converter |
| D/A Converter |
| Audio MUX |
| Audio DEMUX |
| Video Delay |
| Audio Delay |
| Proc Amp |
| Color Corrector |
| Logo Generator |
| Auto Video Optimizer |

FA-9500, the Utmost in Frame Synchronizers

The FA-9500 is a multipurpose signal processor loaded with the functions you need for video production.

The unit supports 3G-SDI, HD/SD-SDI, and analog composite I/O. In addition to its functionality as a frame synchronizer, it also provides up/down/cross/aspect converter, color corrector, and automatic video optimizer (AVO) as standard features. It can convert many types of video and audio signals. Numerous additional functions include, as options, analog component I/O, logo generator, Dolby E encoder/decoder. By combining these varied options, a single unit can provide optimal functionality for all video production scenes, including that for transmission, line production, news reporting, production, editing and distribution. As long as you have an FA-9500, you won't need any other piece of peripheral video equipment.

3G-SDI/HD-SDI/SD-SDI/Analog Composite I/O

For video input, 3 inputs come standard (2 3G/HD/SD-SDI inputs and 1 analog composite input). When you add options, you can select 1 channel from up to 4 inputs. Two SDI input channels are independently synchronized, so during switchover there is no "shock" to either video or audio signals.

In addition, each SDI input has an error detection function. When the signal is cut off or an error detected, a clean switch is triggered and effects a seamless changeover to the other channel. (optional)

Selected input signals go through 2 converter circuits and are respectively output as SDI and analog composite signals. Each channel has 2 distributed outputs. SDI and analog composite both additionally are provided with an I/O bypass function in case power is cut or there is an emergency.

Powerful Frame Synchronizer Performance

FOR-A's frame synchronizers have always exhibited superior performance when processing video with poor quality signals. Synchronizer modes that can be selected include Frame, Line, Input and AVDL modes. The automatic AVDL adjustment range is 5H in HD, 1H in SD.

Moreover, in every mode both H and V ancillary data can be passed through.*

*If input/output formats differ, packets that can be passed through are subject to limitations.

Automatic Video Optimizer (AVO)

This feature lets you monitor video in real time and automatically correct it to normal levels. Ideal for correcting over/under-exposed video, video with exposure better suited to the background than the subject, and so on.

■ Real time correction: Monitors the video white level, black level and gamma curve and automatically corrects them to normal levels (Processing time: Minimum of 1 frame)
■ Dynamic range correction: Recognizes dark and bright areas in video, and implements ideal corrections only in places requiring correction, in order to output highly viewable video with a wide dynamic range
■ Correction range adjustment function: Allows you to set the range for level adjustment (e.g. set level subject to correction of dark areas)
■ Mask function: Allows you to set unnecessary areas for monitoring within the video (e.g. designate places where captions are displayed)

Low level image   Correction   Optimize to normal level

FA-9500 + FA-95AVO
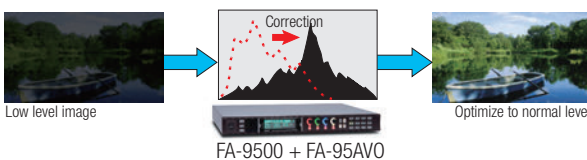
3G Signal Support

In addition to ordinary 1.5 Gbps HD signal processing, the FA-9500 also supports 3Gbps signal processing. Aside from 3G-SDI signal I/O, the FA-9500 offers 2-way conversion with ordinary HD and SD signals.

Digital/Analog Audio I/O

Like video signals, audio signals have digital and analog I/O. Provided are sixteen synchronous/asynchronous channels* of embedded audio, 8 channels of AES/EBU, and 4 channels of analog audio are provided, supporting audio signals of a total of 28 input channels and 28 output channels. Many types of signal processing are possible, including embedding and de-embedding with video signals and A/D, D/A conversion, flexibly supporting even multi-channel audio content. Individual sampling rate converters are provided for each audio channel. Signal processing without any phase gap between channels is possible for such processes as delay adjustment, level adjustment, down-mixing and remapping.
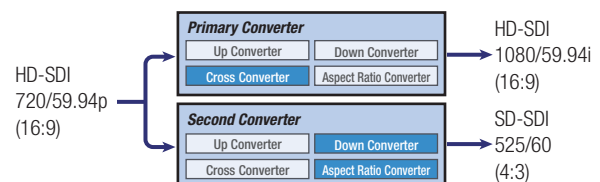
*During HD input/output only. In SD, only synchronous audio is supported, and at most there are 16 input channels and 12 output channels.

Up/Down/Cross/Aspect Converter

In addition to A/D and D/A conversion, an up/down/cross/aspect converter is standard equipment on the FA-9500. Besides mutual conversion between HD and SD, the FA-9500 offers mutual conversion between 1080i format and 720p format (IP conversion) and video expansion and shrinkage.
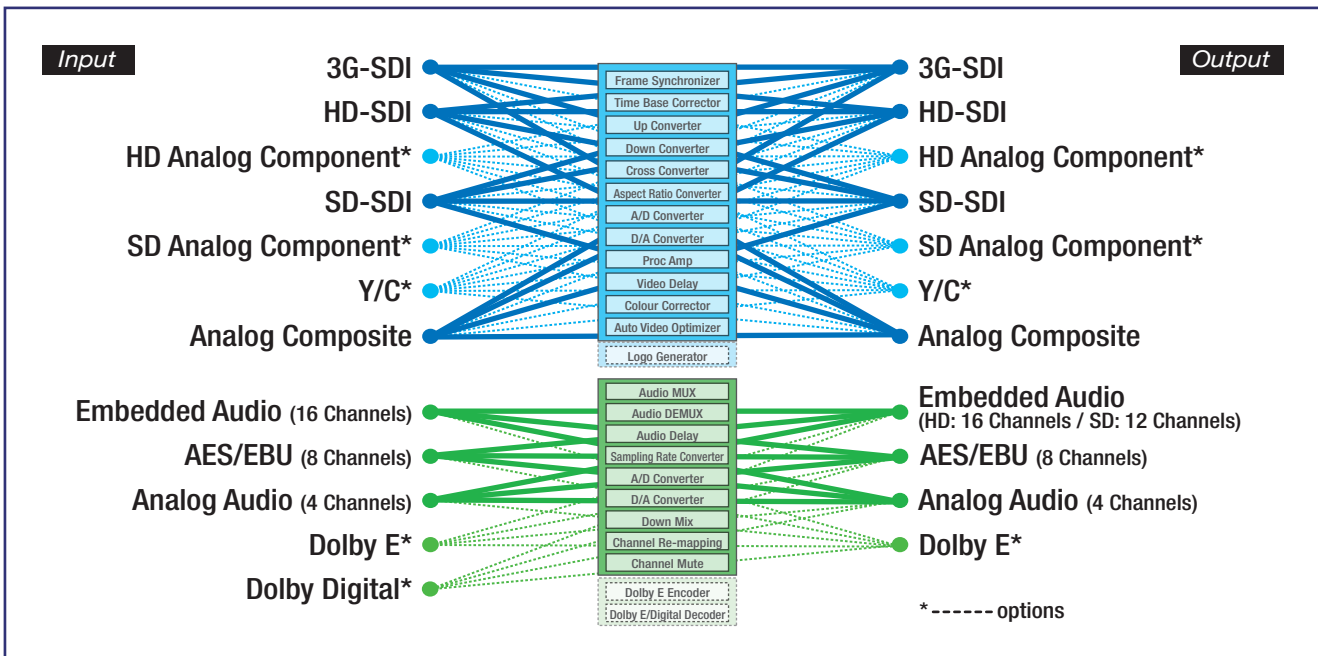
Second Converter

In addition to the ordinary up/down/cross/aspect conversion process, 1 more converter channel is provided for up/down/cross/aspect conversion. If HD/SD simultaneous output is required, this unit is all it takes to deal flexibly with that requirement.

HD-SDI 720/59.94p (16:9)

Primary Converter
Up Converter | Down Converter
Cross Converter | Aspect Ratio Converter
→ HD-SDI 1080/59.94i (16:9)

Second Converter
Up Converter | Down Converter
Cross Converter | Aspect Ratio Converter
→ SD-SDI 525/60 (4:3)

Other Features (Standard Functions)

■ Video delay
■ 2D/3D comb filter for Y/C separator (composite)
■ Web browser-based monitoring and control
■ SNMP monitoring/control partial function

Input / Output Block Diagram

Input

- 3G-SDI
- HD-SDI
- HD Analog Component*
- SD-SDI
- SD Analog Component*
- Y/C*
- Analog Composite

- Embedded Audio (16 Channels)
- AES/EBU (8 Channels)
- Analog Audio (4 Channels)
- Dolby E*
- Dolby Digital*

Processing (video):
- Frame Synchronizer
- Time Base Corrector
- Up Converter
- Down Converter
- Cross Converter
- Aspect Ratio Converter
- A/D Converter
- D/A Converter
- Proc Amp
- Video Delay
- Colour Corrector
- Auto Video Optimizer
- Logo Generator

Processing (audio):
- Audio MUX
- Audio DEMUX
- Audio Delay
- Sampling Rate Converter
- A/D Converter
- D/A Converter
- Down Mix
- Channel Re-mapping
- Channel Mute
- Dolby E Encoder
- Dolby E/Digital Decoder

Output

- 3G-SDI
- HD-SDI
- HD Analog Component*
- SD-SDI
- SD Analog Component*
- Y/C*
- Analog Composite

- Embedded Audio (HD: 16 Channels / SD: 12 Channels)
- AES/EBU (8 Channels)
- Analog Audio (4 Channels)
- Dolby E*

* ------ options

Color Corrector

A color correction function is also standard. In addition to implementing color corrections with 3 color correction modes (balance, differential and sepia), original colors in selected color spaces can be reproduced using gamma adjustment or various level adjustment functions.

- Three types of color correction modes (balance, differential and sepia)
- Gamma adjustment function (high, mid and low tone)
- White level and black level adjustment
- Various clip functions (YPbPr, RGB)

Color correction mode

Balance mode:
For color correction in RGB signals.

Differential mode:
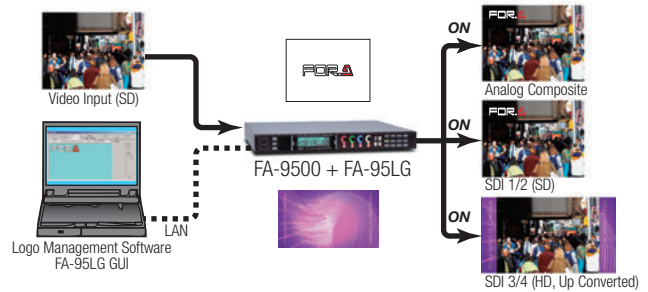For color correction without effecting the white balance.

Sepia mode:
For monotone color schemes.

Varied Options

The FA-9500 offers a wide range of options that let you expand with the functions you need without waste. Many types of functions can be added, starting with video I/O boards.

Logo Generator

This feature lets you impose logo images, including corporate logos and net logos. Data is maintained even when the power is off. This feature can be used for branding purposes, or as a side panel added to a 4:3 video in place of a logo.

Video Input (SD)

Logo Management Software FA-95LG GUI

LAN

FA-9500 + FA-95LG

ON — Analog Composite
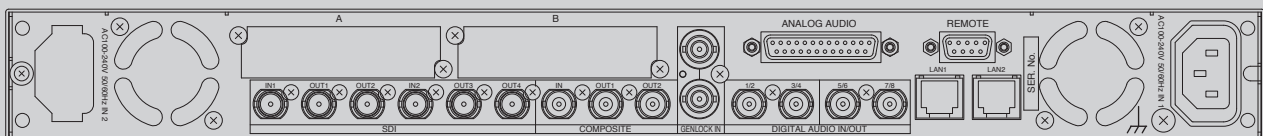ON — SDI 1/2 (SD)
ON — SDI 3/4 (HD, Up Converted)

Dolby E encoder/decoder

An optional Dolby E encoder/decoder can be equipped as a function for adding audio. This enables accurate monitoring and signal correction of multiple channel surround sound.
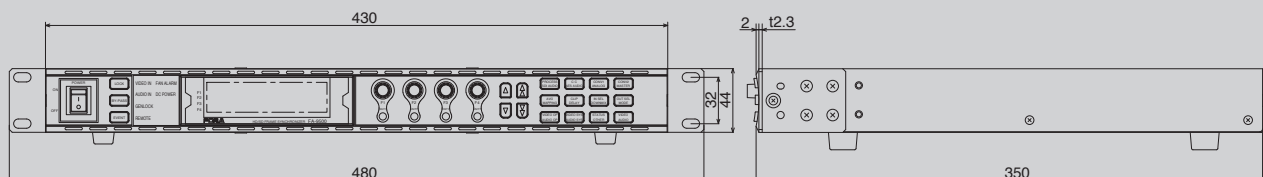
Other Options

- Analog component I/O
- Changeover function
- Digital audio expansion cable
- Redundant power supply unit

Rear Panel

AC100-240V 50/60Hz IN 2

A — B

SDI: IN1 OUT1 OUT2 IN2 OUT3 OUT4

COMPOSITE: IN OUT1 OUT2

GENLOCK IN

DIGITAL AUDIO IN/OUT: 1/2 3/4 5/6 7/8

ANALOG AUDIO

REMOTE: LAN1 LAN2

SER No.

AC100-240V 50/60Hz IN

External Dimensions

430

480

2 - t2.3

32 / 44

350

Specifications

Video Formats	1080/59.94p, 1080/50p (Level-A), 1080/59.94i, 1080/50i, 1080/24PsF, 1080/23.98PsF, 720/59.94p, 720/50p, 525/60 (NTSC), 625/50 (PAL)	Video Clip	YPBPR mode
			RGB mode
Video Input	3G-SDI: 3 Gbps, HD-SDI: 1.5 Gbps or SD-SDI: 270 Mbps, 75Ω BNC x 2		Composite mode
		Color Correction	Balance mode
	Analog Composite: 1.0 Vp-p, 75Ω BNC x 1		Differential mode
Video Input (option)	HD Analog Component		Sepia mode
	SD Analog Component	Audio Input	
Video Output	3G-SDI: 3 Gbps or HD-SDI: 1.5 Gbps or SD-SDI: 270 Mbps, 75Ω BNC x 4 (2 x 2 outputs)	Embedded Audio	3G/HD: 16 channels (Group 1 to 4), 48 kHz, 16/20/24-bit, synchronous/asynchronous
	Analog Composite: 1.0 Vp-p, 75Ω BNC x 2		SD: 16 channels (Group 1 to 4), 48 kHz, 16/20/24-bit, synchronous only
Video Output (option)	HD Analog Component	AES/EBU	Unbalanced, 1.0 Vp-p, 75Ω BNC x 4 for AES/EBU input/output, Maximum 4 pairs of stereo channels, 32/44.1/48 kHz, 16/20/24-bit
	SD Analog Component		
Video I/O Process	3 inputs (standard) or 4 inputs (maximum input) -> 1 processing -> 2 x 2 outputs	Analog Audio	Balanced or unbalanced, 4 inputs (2 stereo channels), 25-pin D-sub (female) x 1 for analog audio input/output, 600Ω or High impedance, 48 kHz, 24-bit
Video Processing	4:2:2 Digital Component		
Quantization	3G/HD/SD-SDI: 10-bit		
	Analog Composite: 12-bit	Audio Output	
Sampling Frequency	3G-SDI: Y: 148.5 MHz, C: 74.25 MHz	Embedded Audio	3G/HD: 16 channels (Group 1 to 4), 48 kHz, 16/20/24-bit, synchronous/asynchronous
	HD-SDI: Y: 74.25 MHz, C: 37.125 MHz		SD: 12 channels (Group 1 to 3), 48 kHz, 16/20/24-bit, synchronous only
	SD-SDI: Y: 13.5 MHz, C: 6.75 MHz	AES/EBU	Unbalanced, 1.0 Vp-p, 75Ω BNC x 4 for AES/EBU input/output, Maximum 4 pairs of stereo channels, 48 kHz, 16/20/24-bit
Frequency Response	100 kHz to 4.2 MHz: -0.5 dB to +0.5 dB, 4.2 MHz to 5.0 MHz: -1.0 dB to +1.0 dB, roll off above 5.0 MHz (NTSC, composite)		
	100 kHz to 4.2 MHz: -0.5 dB to +0.5 dB, 4.2 MHz to 5.5 MHz: -1.0 dB to +1.0 dB, roll off above 5.5 MHz (PAL, composite)	Analog Audio	Balanced or unbalanced, 4 outputs (2 stereo channels), 25-pin D-sub (female) x 1 for analog audio input/output, less than 100Ω, 48 kHz, 24-bit
DG/DP	1% / 1° (composite)	Audio Delay	2 ms to 1,000 ms (adjustable in 1 ms steps)
S/N Ratio	60 dB (without quantization noise, composite)	Audio Processing (Set per channel)	Sampling rate converter (SRC)
K-factor (2T pulse)	1% (composite)		Gain control
Comb Filter	2D or 3D comb filter (selectable, composite)		Down mix
Genlock Input	BB: NTSC 0.429 Vp-p/PAL 0.45 V p-p or Tri-level Sync: 0.6 Vp-p, 75Ω BNC x 1, loop-through (Terminate with 75Ω terminator, if unused.)		Channel re-mapping
			Channel mute
Synchronizer mode	Frame Sync mode, Line Sync mode, AVDL mode, Input Sync mode	Interfaces	Ethernet: 10BASE-T/100BASE-TX/1000BASE-T, RJ-45 x 2
System Phase Control			Remote (GPI): 9-pin D-sub (male) (7 terminals) x 1, TTL negative logic level signal or Make contact
Frame Sync mode	H phase: -1/2 H to +1/2 H		
	V phase: -1/2 frame to +1/2 frame	FA-95D-D/FA-95DE-E (Option)	
	Maximum delay: 1 frame + 1H, Minimum delay: +1 H	Audio Input	AES/EBU: Unbalanced, 1.0 Vp-p, 75Ω BNC x 1, 48 kHz, 16/20/24-bit
Line Sync mode	H phase: -1/2 H to +1/2 H	Audio Output	AES/EBU: Unbalanced, 1.0 Vp-p, 75Ω BNC x 1, 48 kHz, 16/20/24-bit
	V phase: -1/2 frame to +1/2 frame	Reference Input	BB: NTSC 0.429 Vp-p/PAL 0.45 Vp-p or Tri-level Sync: 0.6 Vp-p, 75Ω BNC x 1
	Maximum delay: 1 H +1/2 H, Minimum delay: +1/2 H	Temperature/Humidity	0°C to 40°C / 30% to 90% (no condensation)
AVDL mode	H phase: -1/2 H to +1/2 H	Power	100 V AC to 240 V AC ±10%, 50/60 Hz
	V phase: -1/2 frame to +1/2 frame	Consumption	FA-9500: 50 VA (47 W) (at 100 V AC to 120 V AC), 64 VA (52 W) (at 220 V AC to 240 V AC)
	Maximum delay: 5 H +1/2 H, Minimum delay: +1/2 H (HD)		
	Maximum delay: 1 H +1/2 H, Minimum delay: +1/2 H (SD)		FA-9500 + FA-95PS: 60 VA (55 W) (at 100 V AC to 120 V AC), 73 VA (56 W) (at 220 V AC to 240 V AC)
Input Sync mode	H phase: -1/2 H to +1/2 H		
	V phase: -1/2 frame to +1/2 frame	Dimensions/Weight	430 (W) x 350 (D) x 44 (H) mm / 3.0 kg (without options)
	Maximum delay: 1 frame, Minimum delay: +520 clk	Accessories	Operation manual, AC cord, rack mount brackets
Video Delay	Maximum 8 frames (Frame Sync or Input Sync)	Options	FA-95PS: Redundant power supply unit
Video Processing Functions	Up/Down/Cross converter		FA-95DACBL: Digital audio expansion connector cable
	Aspect ration converter		FA-95CO: Changeover function
	Proc Amp		FA-95RU: Remote control unit
	Color corrector		FA-95D-D: Dolby E / Dolby Digital decoder
	Automatic video optimizer (AVO)		FA-95DE-E: Dolby E encoder
	Second converter (Up/Down/Cross/Aspect ratio)		FA-95AIO: HD/SD analog component input/output card
Proc Amp	Video level: 0.0% to 200.0%		FA-95LG: Logo generator
	Chroma level: 0.0% to 200.0%		
	Black level: -20.0% to 100.0%		
	HUE: -179.8° to +180°		

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