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
Frame Rate Converter
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.

It supports 3G-SDI, HD/SD-SDI, and analog composite I/O, in addition to its functionality as a frame synchronizer, provides up/down/cross/aspect converters, second converter (down/cross/aspect conversion), color corrector, and automatic video optimizer (AVO) as standard features. It can convert many types of video and audio signals. The numerous additional functions include, as options, analog component I/O, frame rate converter, logo generator, Dolby E encoder and Dolby E decoder. By combining these varied options, a single unit can provide the optimal functionality for all video production scenes, including line, relay, reporting, production, editing and delivery. As long as you have the FA-9500, you won't need any other 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. For SDI input, 2 channels are synchronously coupled independently, so during switch over there is no shock in either video or audio.

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

Selected input signal go through a converter circuit of 2 internal channels and are output as SDI and analog composite. 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 are Frame, Line, Input and AVDL mode. AVDL adjust range is 5H in HD, 1H in SD.

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

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

Automatic Video Optimizer (AVO)

This 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' s 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 makes ideal corrections only in those places needing it, so highly viewable video with a wide dynamic range is output
■ 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 area 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
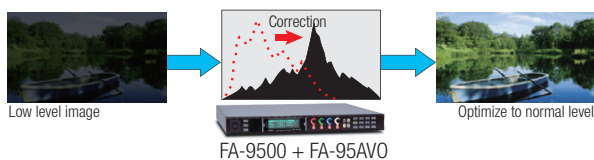
3G Signal Support

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

Digital/Analog Audio I/O

Like video signals, audio signals have digital and analog I/O. Provided are 16 synchronous/asynchronous channels* of embedded audio, 8 channels of AES/EBU, and 4 channels of analog audio, 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, 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 expand and shrink.
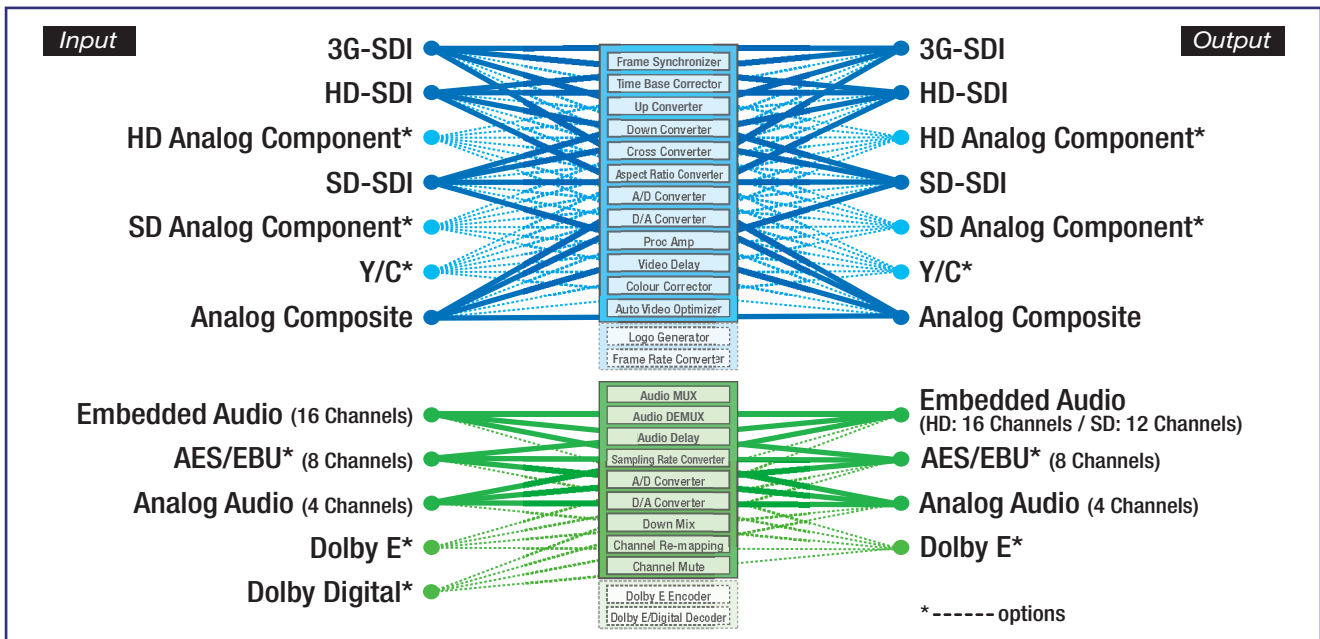
Second Converter

In addition to the ordinary up/down/cross/aspect conversion process, 1 more converter channel is provided for down/cross/aspect conversion. The second converter does not have an up-convert function, but even if HD/SD simul output is needed, this unit is all it takes to deal with that need flexibly.
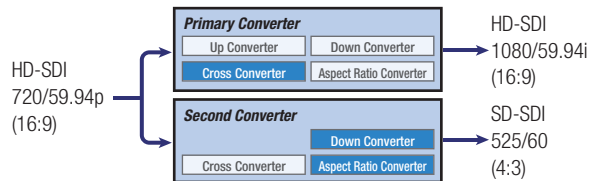
Other Features (Standard Functions)

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

Input / Output Diagram

Input

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

Output

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

Video processing blocks:
- 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
- Frame Rate Converter

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

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

Audio processing blocks:
- 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

*------ options

Color Corrector

A color correction function is also standard. You can not only make color corrections with 3 color correction modes (balance, differential and sepia) but also reproduce the original colors in the selected color space using gamma adjustment or various level adjustment functions.

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

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. There are all types of functions you can add, starting with video I/O boards.
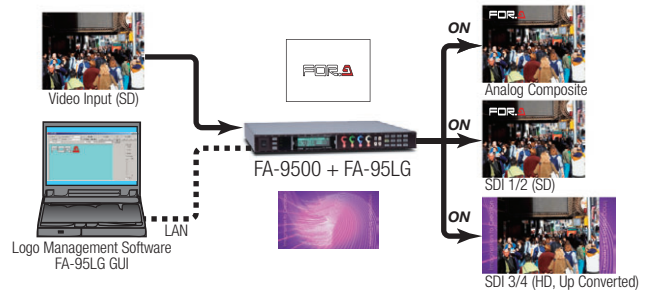
Frame Rate Converter

Besides up/down/cross/aspect conversion, a frame rate converter function can be added. This achieves high-grade frame rate conversion with the conversion know-how FOR-A has developed with our FRC Series of specialty devices.
*There is no motion compensation function.

Logo Generator

This lets you impose logo images, including corporate logos and net logos. Data is maintained even when the power is off. This can be used for branding purposes, or used 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)
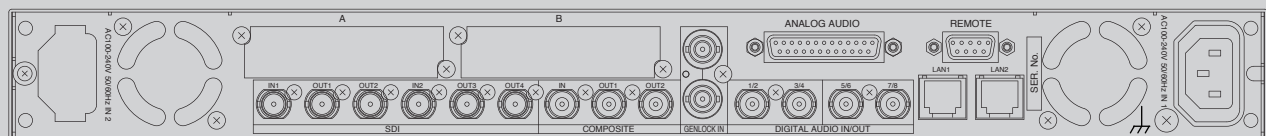
Dolby E encoder/decoder

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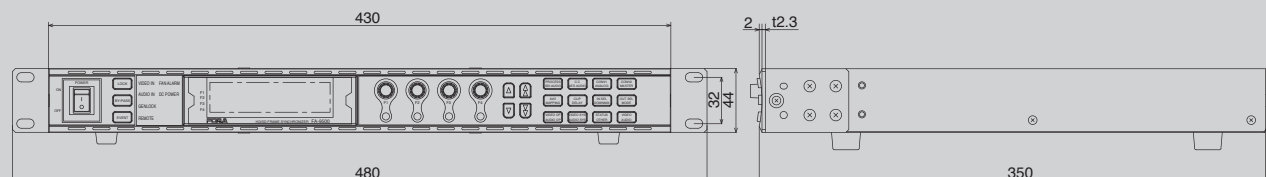
Other Options

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

Many other functions are planned to be added.

Rear Panel

AC100-240V 50/60Hz IN 2

A — SDI — IN1 OUT1 OUT2
B — SDI — IN2 OUT3 OUT4
COMPOSITE — IN OUT1 OUT2
GENLOCK IN
ANALOG AUDIO — DIGITAL AUDIO IN/OUT — 1/2 3/4 5/6 7/8
REMOTE — LAN1 LAN2
SER. No.
AC100-240V 50/60Hz IN 1

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)
Additional Formats (option)	1080/60i, 1080/60p, 1080/30p, 1080/30PsF, 1080/29.97p, 1080/29.97PsF, 1080/25p, 1080/25PsF, 1080/24p, 1080/23.98p, 720/60p
Video Input	3G-SDI: 3 Gbps, HD-SDI: 1.5 Gbps or SD-SDI: 270 Mbps, 75Ω x 2 BNC
	Analog Composite: 1.0 Vp-p, 75Ω BNC x 1
Video Input (option)	HD Analog Component
	SD Analog Component
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)
	Analog Composite: 1.0 Vp-p, 75Ω BNC x 2
Video Output (option)	HD Analog Component
	SD Analog Component
Video I/O Process	3 inputs (standard) or 4 inputs (maximum input) -> 1 processing -> 2 x 2 outputs
Video Processing	4:2:2 Digital Component
Quantization	3G/HD/SD-SDI: 10-bit
	Analog Composite: 12-bit
Sampling Frequency	3G-SDI: Y: 148.5 MHz, C: 74.25 MHz
	HD-SDI: Y: 74.25 MHz, C: 37.125 MHz
	SD-SDI: Y: 13.5 MHz, C: 6.75 MHz
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)
DG/DP	1% / 1° (composite)
S/N Ratio	60 dB (without quantization noise, composite)
K-factor (2T pulse)	1% (composite)
Comb Filter	2D or 3D comb filter (selectable, composite)
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.)
Synchronizer mode	Frame Sync mode, Line Sync mode, AVDL mode, Input Sync mode
System Phase Control	
Frame Sync mode	H phase: -1/2 H to +1/2 H
	V phase: -1/2 frame to +1/2 frame
	Maximum delay: 1 frame + 1H, Minimum delay: +1 H
Line Sync mode	H phase: -1/2 H to +1/2 H
	V phase: -1/2 frame to +1/2 frame
	Maximum delay: 1 H +1/2 H, Minimum delay: +1/2 H
AVDL mode	H phase: -1/2 H to +1/2 H
	V phase: -1/2 frame to +1/2 frame
	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)
Input Sync mode	H phase: -1/2 H to +1/2 H
	V phase: -1/2 frame to +1/2 frame
	Maximum delay: 1 frame, Minimum delay: +520 clk
Video Delay	Maximum 8 frames(Frame Sync or Input Sync)
Video Processing Functions	Up/Down/Cross converter
	Aspect ration converter
	Proc Amp
	Color corrector
	Automatic video optimizer (AVO)
	Second converter (Down/Cross/Aspect ratio)
Proc Amp	Video level: 0.0% to 200.0%
	Chroma level: 0.0% to 200.0%
	Black level: -20.0% to 100.0%
	HUE: -179.8° to +180°

Video Clip		YPBPR mode
		RGB mode
		Composite mode
Color Correction		Balance mode
		Differential mode
		Sepia mode
Audio Input		
	Embedded Audio	3G/HD: 16 channels (Group 1 to 4), 48 kHz, 16-bit to 24-bit, synchronous/asynchronous SD: 16 channels (Group 1 to 4), 48 kHz, 16-bit to 24-bit, synchronous only
	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-bit to 24-bit
	Analog Audio	Balanced or unbalanced, 4 inputs (2 stereo channels), 1 port, 25-pin D-sub (female) for analog audio input/output, 600Ω or High impedance, 48 kHz, 24-bit
Audio Output		
	Embedded Audio	3G/HD: 16 channels (Group 1 to 4), 48 kHz, 16/20/24-bit, synchronous/asynchronous SD: 12 channels (Group 1 to 3), 48 kHz, 16/20/24-bit, synchronous only
	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-bit to 24-bit
	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
Audio Delay		2 ms to 1,000 ms (adjustable in 1 ms steps)
Audio Processing (Set per channel)		Sampling rate converter (SRC)
		Gain control
		Down mix
		Channel re-mapping
		Channel mute
Interfaces		Ethernet: 10BASE-T/100BASE-TX/1000BASE-T, RJ-45 x 2
		Remote (GPI): 9-pin D-sub (male) (7 terminals) x 1, TTL negative logic level signal or Make contact
FA-95D-D/FA-95DE-E (Option)		
	Audio Input	AES/EBU: Unbalanced, 1.0 Vp-p, 75Ω BNC x 1, 48 kHz, 16-bit to 24-bit
	Audio Output	AES/EBU: Unbalanced, 1.0 Vp-p, 75Ω BNC x 1, 48 kHz, 16/20/24-bit
	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
Temperature/Humidity		0°C to 40°C / 30% to 90% (no condensation)
Power		100 V AC to 240 V AC ±10%, 50/60 Hz
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) with 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)
Dimensions/Weight		430 (W) x 350 (D) x 44 (H) mm / 3.0 kg (without options)
Accessories		Operation manual, AC cord, rack mount brackets
Options		FA-95PS: Redundant power supply unit
		FA-95DACBL: Digital audio expansion connector cable
		FA-95CO: Changeover function
		FA-95RU: Remote control unit
		FA-95D-D: Dolby E / Dolby Digital decoder
		FA-95DE-E: Dolby E encoder
Planned Features		HD/SD analog component input/output card
		FRC (Frame Rate Converter) (includes additional standard)
		Logo generator

Dolby is a registered trademark of Dolby Laboratories.