

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

FORA'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.

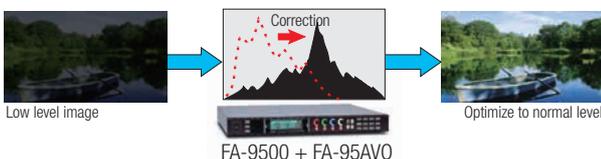
Moreover, in every mode both H and V ancillary data can be passed through.\*

\*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)



## 3G Signal Support

In addition to ordinary 1.5 Gbps HD signal processing, the FA-9500 also supports 3 Gbps 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.

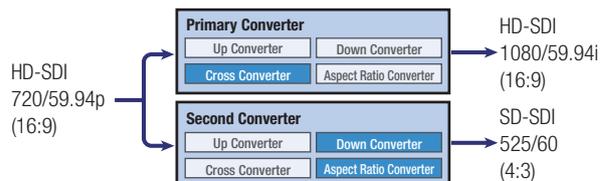
\*During HD input/output only. In SD, only synchronous audio is supported, and at most there are 16 input channels and 12 output channels.

## 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.

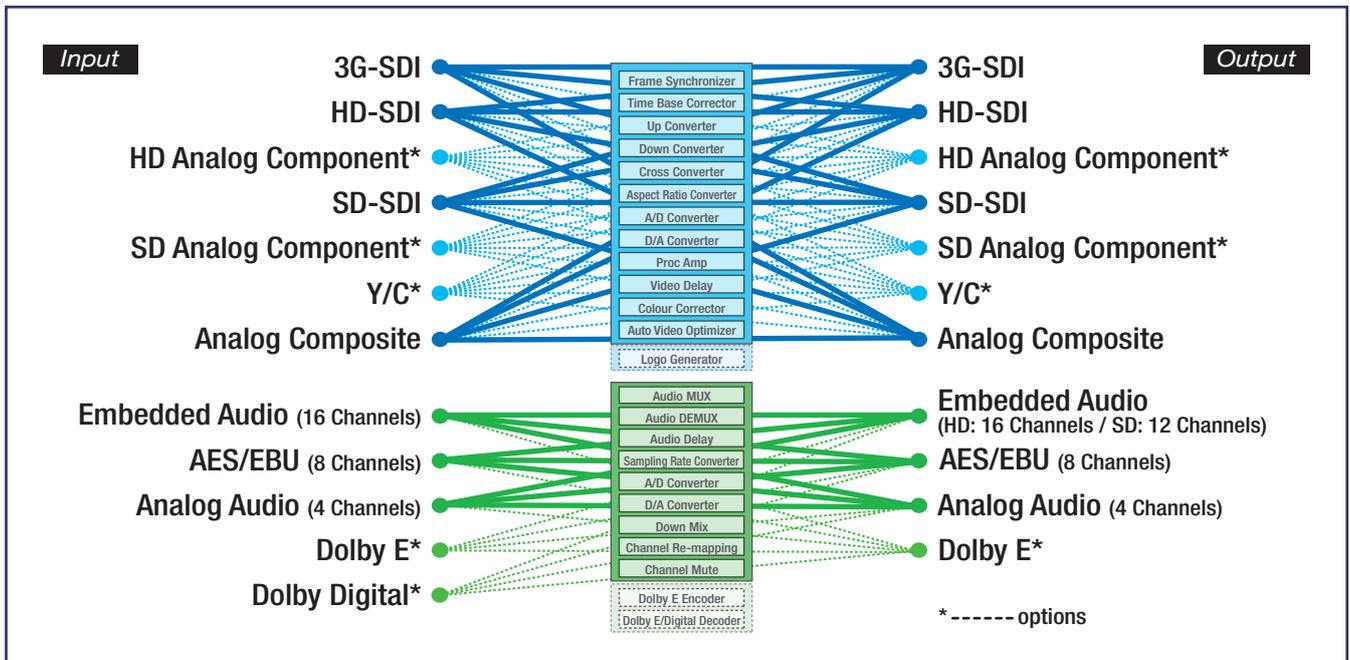
## Second Converter

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.



## 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

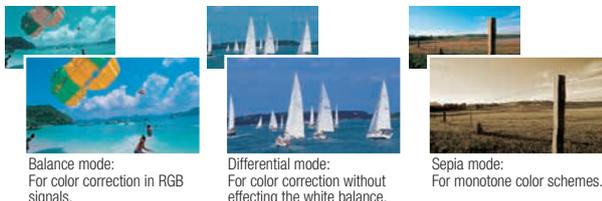


### Color Corrector

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

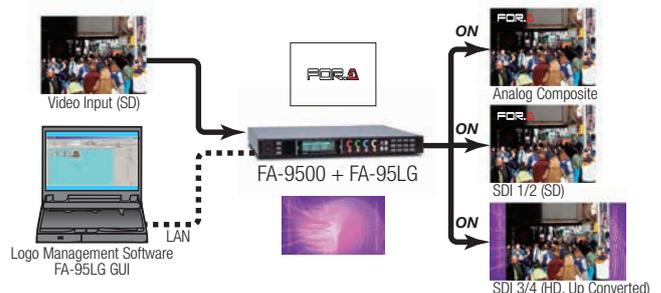


### Varied Options

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.



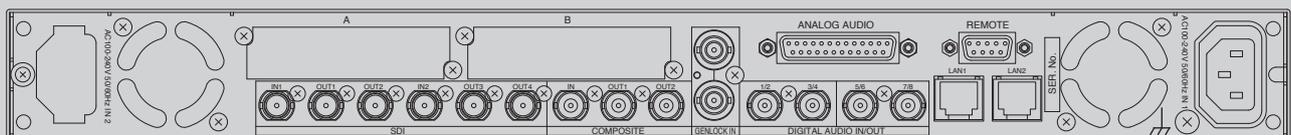
### Dolby E encoder/decoder

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.

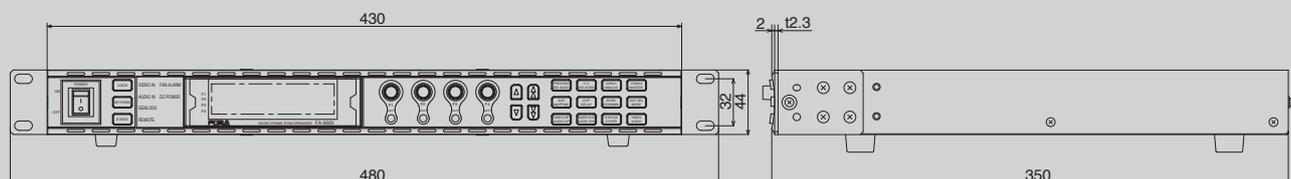
### Other Options

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

### Rear Panel



### External Dimensions



## Specifications

|                            |  |                                |  |
|----------------------------|--|--------------------------------|--|
| Input Video Formats        | 1080/59.94p, 1080/50p (Level-A),<br>1080/59.94i, 1080/50i, 1080/24PsF, 1080/23.98PsF, 720/59.94p, 720/50p,<br>525/60 (NTSC), 625/50 (PAL)  | Audio Input                    |  |
| Output Video Formats       | 1080/59.94i, 1080/50i, 1080/24PsF, 1080/23.98PsF, 720/59.94p, 720/50p,<br>525/60 (NTSC), 625/50 (PAL), PAL-M   | Embedded Audio                 | 3G/HD: 16 channels (Group 1 to 4), 48 kHz, 16-bit to 24-bit,<br>synchronous/asynchronous<br>SD: 16 channels (Group 1 to 4), 48 kHz, 16-bit to 24-bit, synchronous only   |
| Video Input                | 3G-SDI: 3 Gbps, HD-SDI: 1.5 Gbps or SD-SDI: 270 Mbps, 75 Ω BNC x 2<br>Analog Composite: 1.0 Vp-p, 75 Ω BNC x 1   | AES/EBU                        | Unbalanced, 1.0 Vp-p, 75 Ω BNC x 4 for AES/EBU input/output,<br>Maximum 4 pairs of stereo channels, 32/44.1/48 kHz, 16-bit to 24-bit   |
| Video Input (Option)       | HD Analog Component<br>SD Analog Component   | Analog Audio                   | Balanced or unbalanced, 4 inputs (2 stereo channels),<br>25-pin D-sub (female) x 1 for analog audio input/output,<br>600 Ω or High impedance, 48 kHz, 24-bit   |
| Video Output               | 3G-SDI: 3 Gbps or HD-SDI: 1.5 Gbps or SD-SDI: 270 Mbps, 75 Ω BNC x 4 (2 x 2 outputs)<br>Analog Composite: 1.0 Vp-p, 75 Ω BNC x 2   | Audio Output                   |  |
| Video Output (Option)      | HD Analog Component<br>SD Analog Component   | Embedded Audio                 | 3G/HD: 16 channels (Group 1 to 4), 48 kHz, 16/20/24-bit, synchronous/asynchronous<br>SD: 12 channels (Group 1 to 3), 48 kHz, 16/20/24-bit, synchronous only  |
| Video I/O Process          | 3 inputs (standard) or 4 inputs (maximum input) → 1 processing → 2 x 2 outputs   | AES/EBU                        | Unbalanced, 1.0 Vp-p, 75 Ω BNC x 4 for AES/EBU input/output,<br>Maximum 4 pairs of stereo channels, 48 kHz, 16-bit to 24-bit   |
| Video Processing           | 4:2:2 Digital Component  | Analog Audio                   | Balanced or unbalanced, 4 outputs (2 stereo channels), 25-pin D-sub (female) x 1<br>for analog audio input/output, less than 100 Ω, 48 kHz, 24-bit   |
| Quantization               | 3G/HD/SD-SDI: 10-bit<br>Analog Composite: 12-bit   | Audio Delay                    | 2 ms to 1,000 ms (adjustable in 1 ms steps)  |
| Frequency Response         |  | Audio Processing               | Sampling rate converter (SRC)  |
| NTSC                       | 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,<br>roll off above 5.0 MHz (NTSC, composite)  | Functions<br>(Set per channel) | Gain control, Down mix, Channel re-mapping, Channel mute   |
| PAL                        | 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,<br>roll off above 5.5 MHz (PAL, composite)   | Interfaces                     | Ethernet: 10BASE-T/100BASE-TX/1000BASE-T, RJ-45 x 2<br>Remote (GPI): 9-pin D-sub (male) (7 terminals) x 1,<br>IN: TTL negative logic level signal or Make contact<br>OUT: Rated current 10 mA (each terminal), Absolute maximum current 40 mA  |
| DG/DP                      | 1% / 1° (composite)  | FA-95D-D/FA-95DE-E (Option)    |  |
| S/N Ratio                  | 60 dB (without quantization noise, composite)  | Audio Input                    | AES/EBU: Unbalanced, 1.0 Vp-p, 75 Ω BNC x 1, 48 kHz, 16-bit to 24-bit  |
| Genlock Input              | BB: NTSC 0.429 Vp-p/PAL 0.45 Vp-p or Tri-level Sync: 0.6 Vp-p,<br>75 Ω BNC x 1, loop-through (Terminate with 75 Ω terminator, if unused.)  | Audio Output                   | AES/EBU: Unbalanced, 1.0 Vp-p, 75 Ω BNC x 1, 48 kHz, 16/20/24-bit  |
| Synchronizer mode          | Frame Sync mode, Line Sync mode, AVDL mode,<br>Input Sync mode (minimum delay)   | Reference Input                | BB: NTSC 0.429 Vp-p/PAL 0.45 Vp-p or Tri-level Sync: 0.6 Vp-p, 75 Ω BNC x 1<br>(Internally 75 Ω terminated)  |
| System Phase Control       |  | FA-95AIO (Option)              | (Analog Component I/O)   |
| Frame Sync mode            | H phase: -1/2 H to +1/2 H<br>V phase: -1/2 frame to +1/2 frame<br>Maximum delay: 1 frame + 1H, Minimum delay: +1 H   | Input Video Formats            | 1080/59.94i, 1080/50i, 1080/24PsF, 1080/23.98PsF, 720/59.94p, 720/50p,<br>525/60 (NTSC), 625/50 (PAL)  |
| Line Sync mode             | H phase: -1/2 H to +1/2 H<br>V phase: -1/2 frame to +1/2 frame<br>Maximum delay: 1 H + 1/2 H, Minimum delay: +1/2 H  | Output Video Formats           | 1080/59.94i, 1080/50i, 1080/24PsF, 1080/23.98PsF, 720/59.94p, 720/50p,<br>525/60 (NTSC), 625/50 (PAL), PAL-M   |
| AVDL mode                  | H phase: -1/2 H to +1/2 H<br>V phase: -1/2 frame to +1/2 frame<br>Maximum delay: 5 H + 1/2 H, Minimum delay: +1/2 H (HD)<br>Maximum delay: 1 H + 1/2 H, Minimum delay: +1/2 H (SD) | FA-95ALA (Option)              | (Automatic Loudness Adjustment)  |
| Input Sync mode            | H phase: -1/2 H to +1/2 H<br>V phase: -1/2 frame to +1/2 frame<br>Maximum delay: 1 frame, Minimum delay: +520 clk  | Supported standard             | ARIB TR-B32, ATSC A/85, EBU-R128, ITU-R BS. 1770   |
| Video Delay                | Maximum 8 frames (Frame Sync or Input Sync)  | Temperature/Humidity           | 0°C to 40°C / 30% to 90% (no condensation)   |
| Video Processing Functions | Up/Down/Cross converter<br>Aspect ratio converter<br>Proc Amp<br>Color corrector<br>Automatic video optimizer (AVO)<br>Second converter (Up/Down/Cross/Aspect ratio)               | Power                          | 100 V AC to 240 V AC ±10%, 50/60 Hz  |
| Proc Amp                   | Video level: 0.0% to 200.0%<br>Chroma level: 0.0% to 200.0%<br>Black level: -20.0% to 100.0%<br>HUE: -179.8° to +180°  | Power Consumption              | FA-9500: 50 VA (47 W) (at 100 V AC to 120 V AC),<br>64 VA (52 W) (at 220 V AC to 240 V AC)<br>FA-9500 + FA-95PS: 60 VA (55 W) (at 100 V AC to 120 V AC),<br>73 VA (56 W) (at 220 V AC to 240 V AC)   |
| Video Clip                 | YPbPr mode, RGB mode, Composite mode   | Dimensions/Weight              | 430 (W) x 350 (D) x 44 (H) mm / 3.0 kg (without options)   |
| Color Correction           | Balance mode, Differential mode, Sepia mode  | Consumables                    | Power Unit (to be replaced every 5 years)<br>Cooling fan: IP-1437 (FAN 1 and FAN 2) (within 6 years)   |
|                            |  | Accessories                    | Operation manual, AC cord, rack mount brackets   |
|                            |  | Options                        | FA-95PS: Redundant power supply unit<br>FA-95DACBL: Digital audio expansion connector cable<br>FA-95CO: Changeover function<br>FA-95RU: Remote control unit<br>FA-95D-D: Dolby E / Dolby Digital decoder<br>FA-95DE-E: Dolby E encoder<br>FA-95AIO: HD/SD analog component input/output card<br>FA-95ALA: Automatic Loudness Adjustment<br>FA-10DCCR: Remote Control Unit for color correction |

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