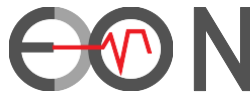# FEATURES

E⊙N HD-SDI Video Inserter/Recorder

- **RECORDS TO VOLATILE & NON-VOLATILE MEMORIES**
  - ➢ **Continuously to removable SSD (1TB, non-volatile) up to 175K Frames 1080p/60 Uncompressed**
  - ➢ **DDR3 (volatile) event/Loop up to 5.5K Frames 1080p/60 Uncompressed**
  - ➢ **Save more than 32 event clips to SSD**
  - ➢ **Live Monitor Video while recording**
  - ➢ **Recording Format is Compliant with SMPTE 2022-6**

- **INSERTS**
  - ➢ **Metadata**
    - o **MISB 0605.3 compliant timestamp**
    - o **2 KLV metadata blocks of user formatted data in VANC space**
  - ➢ **Text & crosshairs, bore site graphics**

- **PLAYBACK**
  - ➢ **Delivers uncompressed SDI video at 1/16x, 1/8x, 1/4x, 1/2x, 1x, 2x, 4x, 8x or 1-frame stepping from DDR3 or SSD**
  - ➢ **Decodes, Overlays, Extracts Metadata**
    - o **Overlays none, some or all user defined fields in each metadata key**
    - o **Extracts data in KLV to data file frame x frame with/without timestamps**

- **CLEAN DDR3 (VOLATILE) OR SSD (NON-VOLATILE) COMPLIANT WITH DOD 5220.22-M**

- **ACCEPTS SD, HD SDI SMPTE 259M/292M/424M SDI VIDEO SOURCES**

- **CAMERA SYNC (OPTIONAL); GPS/IRIG PHASE LOCKED; ADJUSTABLE OFFSET**
  - ➢ **TTL DATA SOURCE STROBE; GPS/IRIG PHASE LOCKED; ADJUSTABLE OFFSET**

- **DISCIPLINED STRATUM 3 FREE RUN CLOCK (OPTIONAL); < 4µSEC/HR UNLOCKED DRIFT**

- **CONTROL VIA WEB SERVER OVER ETHERNET, REMOTE PANEL OR WITH ROBUST COMMAND SET**

- **DISCRETE TRIGGER INPUT**

DESCRIPTION

The HD-SDI Video Inserter/Recorder is a ruggedized SDI video inserter-recorder (I-R) that records and plays uncompressed SDI video. Source video may be 480i, 720p, 1080i or 1080p at 25, 30, 50 and 60 frames/sec (also at the NTSC comparable rates). The unit will detect the input video format and synchronize to it automatically. The SDI video source may be monitored live while recording with less than 8µsec of in-out latency. The unit records all HANC (AES audio and other metadata) and VANC metadata. The I-R can overlay text and crosshairs (fixed and movable) while recording or during playback. More importantly, the HD-SDI Video Inserter/Recorder can insert VANC KLV metadata including the MISB Microsecond Timestamp (0605.3). All timestamps are accurate to within 4µsec of the selected time reference (GPS or IRIG). The user may design a custom metadata KLV key using the **KLV SOFTWARE TOOLKIT** currently delivered with our HD- SDI video products. When metadata is recorded, the recorder may be commanded during playback to decode and overlay metadata as well as extract and send it out as a data record per frame stream. There are three modes of recording possible; Event Record (ER) to DDR3 (volatile), ER to DDR3 (volatile) and save event clips to the removable SSD (non-volatile) or Continuous Record (CR) to the removable SSD[1]. All of these modes record UNCOMPRESSED SDI video at the native resolution and frame rate received. When in ER mode, the recorder will continuously record to DDR3 the number of frames set by the user (up to 60,000) in a loop. When an event is triggered by an Ethernet command or a discrete input, the recorder will save the last n frames (set by the user) in DDR3 and complete recording the loop. The clip data may be played back from the DDR3 as SDI to the output video port, saved to SSD as a clip, or downloaded to the Ethernet port formatted as SMPTE 2022-6 at 1G max. The recorder I-R can also continuously record to the removable SSD to the full 1TB capacity (e.g. 49 minutes of 1080p/60). During any playback, the video may be stopped, played back 1 frame at a time or at ½, ¼, $^1/_8$, $^1/_{16}$, 1x, 2x 4x or 8x speed either forward or reverse. Playback may be one clip at a time, or continuous (all clips concatenated). Clips saved to SSD may be any mix of the input formats. When the camera sync option is purchased, the recorder tri-level sync (TLS) may be programmed or auto-sync'd to match the camera format (must be one of the supported formats). TLS is phase locked to GPS or external IRIG B and may also be delayed in 1µsec steps enabling synchronization of picture taking across a variety of imaging technologies (e.g. CMOS, CCD or IR). Supporting data collection time coherent to imagery, the camera sync option also provides a TTL strobe output that may be adjusted relative to the TLS ±16ms in 1µ steps to help align data acquired with the image of each frame. A built in DOD 5220.22-M clean function implements method C for the volatile DDR3 record memory and when there is an SSD (non-volatile) the function implements method C; then method H.

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[1] SSD modes require the optional SSD function and port.

SPECIFICATIONS

Video In	Standard SD/HD/HD-3G SDI digital video. Formats supported and auto-detected:

SD	480i at 29.97 Hz, 576i at 25 Hz; *Metadata is not supported w/SD* (SMPTE 259M video)
HD	720p and 1080p at 60, 59.94, 50, 30, 29.97, 25 Hz, 1080i at 30, 29.97 and 25 Hz;1080p/60 SMPTE 424M (3G)

Video Out — SDI identical to video input or recorded except with graphics, annotation, and metadata as added; video clips as data may also be sent out via Ethernet in SMPTE 2022-6 format.

Event Record

Video Format	Frames/time (DDR3 Volatile Memory)		
	16 GB Event Record	**32 GB Event Record**	**64GB Event Record**
480i	15,255F/ >8 min	30,500F/ >16 min	61,000F/ >33 min
720p/60	5,550F/>90 sec	11,100F/ >3 min	22,200F/ 6 min
1080p/30	2,775F/>90 sec	5,500F/>3 min	11,100F/6 min
1080/60	2,776F/>45 sec	5,500F/>1.5 min	11,100F/3 min

Loop length is programmable from 10 frames to capacity. Multiple loops may be configured to support a rapid sequence of events. History before trigger (frames), 1 to loop length -1; Post trigger recording from trigger to loop length

SSD (option) — Record Clips to removable SSD (Event clips); Event clip capacity depends on loop length and frame capacity of SSD. Recorded format compliant with SMPTE 2022-6.

Continuous Record to removable SSD; capacity depends on media. Currently 1,000 GB capacities are available.

Record Times w/	
1TB SSD	480i/60, >975,000 frames; >540 minutes
	720p/60, >355,000 frames; >98 minutes
	1080p/30, >176,000 frames; >98 minutes
	1080p/60, >176,000 frames; >49 minutes

Memory Cleaning — per DOD 5220.22-M: **SSD** (NV) method C; then method H; **DDR3** (Volatile) method C(requires manual power down)

Playback — Speeds $1/_{16}$, $1/_8$, ¼, ½, 1x, 2x , 4x, 8x single-frame-step forward or reverse, Rewind = start of clip.

Time Overlay — Resolution selectable from 1 sec to 1 µsec in 7 steps, 1.0, 0.1, 0.01, 0.001 seconds, 100, 10, 1 µsec

GPS Timing Accuracy

When Locked After Fix	Drift from last synchronized time when NOT locked	
	After 24 hours of GPS lock	After >20 min of GPS lock w/S3 Option
±300 ns RMS @ 1 sec	<540 µsec/hr	< 4 µsec/hr
±30 ns RMS @ 100 sec	<1300 µsec/day	< 100 µsec/day

Position — Inserts Latitude, Longitude and Altitude. Position accuracy : five meters circular error probability (CEP)

GPS Performance — 12 channels, track all satellites in view; Time-to-first-fix <25 sec (warm start), <180 sec (cold start) Reacquisition < 3 sec

GPS Antenna — Active Patch Magnetic Mount Antenna, 5 VDC via antenna cable. Antenna with 5-meter cable is included.

IRIG B Input — IRIG B (IRIG Standard 200-04). Input level 500mv p-p to 5 v p-p w/ mod ratio of 2:1 to 3:1, Formats B120 - B127.

Metadata — Metadata Timestamp is recorded in the vertical ancillary packets (VANC) of the SDI stream IAW MISB STD 0605.3

Up to 2 SMPTE 291M type 02 KLV packs w/user defined keys & content. Includes ITS KLV Software Toolkit

Ethernet Port — Standard TCP/IP protocol, 10/100/1000 Mbit/sec, user settable IP, Subnet Mask, Gateway and port

Remote Interface — For optional remote control used to PLAY< or >, RECORD, REWIND, EVENT, Record to SSD, SAVE to SSD.

Alphanumeric Characters — From 24 to 54 lines of characters depending on video input format and size selection. Number of characters per line is 20, 40, 60, 80 or 120 depending on the input format and size selection. Individual characters are 7X9 pixel matrix.

Camera Sync — Option; Tri-level sync IAW SMPTE 296M (720p/1080i) and SMPTE 274M (1080p); TTL strobe on each vertical sync.

Package and Environment

Size   3.5" H x 10" W (including mounting flanges) x 8" D ruggedized aluminum enclosure.
19" Rack Mount version also available.

Weight   8/12 lbs. SM/RM (est.)   **Temp**   Op -20°C to +55°/ Non-Op -40°C to +80°   **Humidity**   85% non-condensing

Power Input — AC or DC power input may be specified; 12-36 VDC, or 115/240VAC 50/60 Hz <25 watts
A universal power adapter for 115/240 VAC 50/60 Hz is available to support the DC power input.