

AE9000-2000S Rugged 2GHz Snapshot Disk Recorder

- Single-/multi-channel* analogue IF recorder
- 3.0 GHz IF centre frequency
- 2.0 GHz Recording Bandwidth
- 8 and 16 Bit Recording Modes
- Optimised Input Filtering
- 16 TB removable Disk Packs as standard
- Built-in down/up-shifting
- Real-time FFT/waterfall display
- Intuitive Graphical User Interface
- Data extraction direct to workstation/network
- Community-standard headers supported
- Longer record durations optional



Avalon AE9000-2000S Snapshot Disk Recorder (front view).

TECHNICAL OVERVIEW

The *New* Avalon AE9000-2000S snapshot SIGINT Disk Recorder in a full-width, 3U chassis, is designed to record a 3.0 GHz analogue IF (intermediate frequency) signal at a bandwidth of up to 2.0 GHz for several seconds before transferring the captured data to disk. The user can define a pre-trigger period which allows the signal of interest to be fully captured. The upper half of the unit incorporates individually removable solid-state disk packs, along with removable system disks. These are designed for easy removal allowing classified recordings to be swiftly transferred to secure storage. The front panel lower half provides status information and a Disk Eject Button, allowing safe removal the disk packs without any loss of recorded signal. Additional disk packs can be quickly installed to increase the recording capacity.

The rear of the recorder contains the key analogue electronics associated with the processing of 3.0 GHz analogue IF signals with up to 2.0 GHz Bandwidth. Multi-channel interfaces with different IF and Bandwidth configurations are available. The rear also contains the digital processing electronics required to store and recover digital data recorded to the removable disk packs. Live data can also be streamed via the 100Gb Ethernet port (QSPF28) in the VITA-49 format.

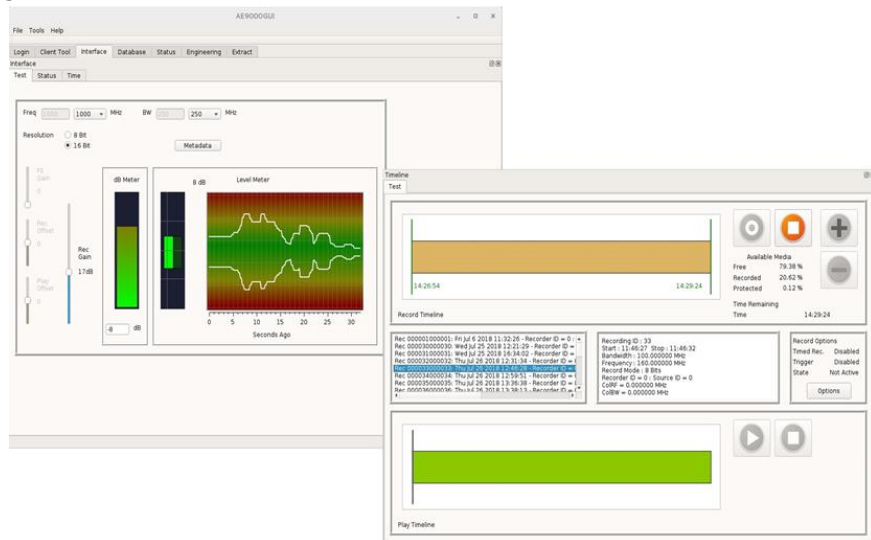
The recorder is also able to reconstruct the recorded digital samples and output these in their original analogue form. With the recorder in *record* or *standby* modes, the output signal is derived from the record input signal. During playback the output signal is derived from the data stored on the disk pack. The data stored on the disk packs may be extracted using the Ethernet port.

Unlike some previous generations of Avalon Disk Recorders, the AE9000-2000S records data in a standard computer file format, thereby dramatically simplifying the selection and copying of critical sections of recorded data.

GRAPHICAL USER INTERFACE (GUI)

The Recorder is typically controlled from either an external PC/Laptop using an Avalon-developed GUI Application or from the pre-loaded version stored on the Recorder. The Avalon GUI Application may be compiled to run under a range of Windows and Linux operating systems.

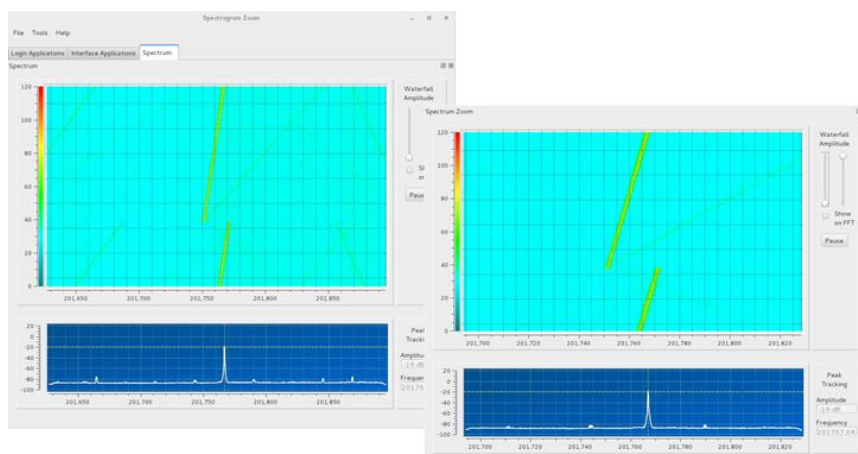
The GUI provides control over all the Recorder functionality, including: RECORD, PLAY, STOP, Data selection (for extraction/forwarding, etc.), Data handling, including transcription to networked storage media and control and monitoring of Input Signals and Levels.



GUI examples

REAL-TIME FFT / WATERFALL DISPLAY

AE9000-2000S features a powerful, real-time FFT function that can be used to visualise the incoming signal. In Record and Standby modes, the spectrogram display reflects the Record Input signal, during Playback the spectrogram will display the reconstructed signal. Typical examples of real-time FFTs are shown below...



Examples of FFT displays

TECHNICAL SPECIFICATIONS

Number of Channels:	1 standard. *Multi-channel interfaces also available.
Input Centre Frequency:	3.0 GHz.
Input Filtering:	High precision anti-aliasing filtering is provided, 2GHz bandwidth as standard.
ADC Sample Rate:	8.8 GHz.
ADC Resolution:	Sampling is at 12-bits.
Recording Depth:	High Resolution Mode: 12-bit samples recorded as 2 Bytes (16-bits) Lower Resolution Mode: 1 Byte (with LSBs discarded by rounding after internal signal processing)
Decimation:	2:1
Record Sample Rate (IQ pairs):	1.1 x Bandwidth. i.e. 2.2GHz for a 2GHz Bandwidth
Recording Data Rate:	4.4 GBytes/sec (2.0 GHz BW, 8-bits) 4.4 GBytes/sec (1.0 GHz BW, 16-bits).
Recording Duration (16 TB, no looping):	30 minutes (2.0 GHz BW, 8-bits), Snapshot recording 30 minutes (1.0 GHz BW, 16-bits), Snapshot recording 1 hour (500 MHz BW, 8-bits), Continuous recording 1 hour (250 MHz BW, 16-bits), Continuous recording 2 hours (250 MHz BW, 8-bits), Continuous recording
Recorded Spur-free dynamic range:	>55 dB (16-bit recording).
Max signal level for FS rec.:	-10 to +10 dBm adjustable for full-scale recording.
Input impedance:	50 Ω (nominal).
Input Coupling:	AC.
Output Level:	0 dBm (typical) from full-scale recording.
Output Impedance:	50 Ohms (nominal)
Output Centre Frequency:	3.0 GHz.
Output Bandwidth:	2.0 GHz (8-bit mode) 1.0 GHz (8-bit and 16-bit modes) 500MHz (8-bit and 16-bit modes) 250MHz (8-bit and 16-bit modes)

Internal Reference Freq.:	10 MHz +/- 1 ppm after 10-minute warm up. Note: The internal sampling and translation oscillator is locked to this reference. This internal reference is available for use by other equipment.
External Reference Freq.:	10 MHz, +10 to +16 dBm, +/- 1 ppm or better - to lock the internal reference.
Network Comms. Applications:	Interface for networking communications. Support for fibre optic or copper cable. Protocols supported include Ethernet (10Gbits/s, 40Gbits/s). <i>See options below...</i>
Data/Control Port:	1 Gb Ethernet. <i>See options below...</i>
Storage Capacity (baseline):	Total capacity (typically): 16 TB (8 x 2 TB SSD) Note: Other storage configurations (e.g. extra long-life SSD) optional.
Media Life:	2,500 hours warranted minimum life at maximum bandwidth. Typical media life more than 10,000 hours.
Dimensions:	Full-width 19" (426mm) x 3U height (135mm). Rack Depth: 510mm; Total depth, including front handles: 550mm
Weight:	~ 25 Kg.
Power:	100 to 240 Volts, 47 to 63 Hz, 600 Watts maximum.
Environmental:	EMC/RFI: Designed to conform to the applicable sections of MIL-STD-461. Shock/Vibration: Designed to conform to the applicable sections of MIL-STD-810, and US Navy specifications. Similar construction approved for flight in USAF Rivet Joint and other military and civilian turbo-jet and propeller aircraft.
System Control:	Stand-alone, fully-featured Avalon-designed GUI (graphical user interface) running on an external laptop/PC (via Ethernet port).
File Format:	Midas Blue (Platinum 2.0) or MATLAB™ see note 1

Note 1: MATLAB is a trademark of The MathWorks Inc.

OPTIONS

- An Additional Ethernet card (10Gbit/s or 40Gbit/s) can be factory-fitted.
- Extra-long-life SSD packs – refer to Avalon Electronics Ltd. for details.