AE9000HW-500G
Wideband SIGINT Recorder

Rugged 1-channel 1 GHz/160 MHz IF Disk Recorder

- **Single-channel, multi-mode analogue IF recorder/ reproducer**
- **IFs: 1 GHz and 160 MHz**
- **BWs: 500 MHz (1 GHz IF), 100, 50, 25 and 12.5 MHz (160 MHz IF)**
- **8- and 16-bit recording modes (menu-selectable)**
- **Optimised input/output filtering**
- **Built-in down- and up-conversion**
- **Real-time FFT and Y/T Displays**
- **Disk Pack: 8 TB**
- **Data extraction direct to workstation/network**

Figure 1: Avalon AE9000HW-500G single channel IF SIGINT Disk Recorder.

Introduction

The compact, self-contained **Avalon AE9000HW-500G SIGINT Disk Recorder** is designed to record, reproduce and export a single channel of wideband analogue IF (intermediate frequency) data at centre frequencies of 1 GHz IF or 160 MHz IF at pre-defined bandwidths. Depending on the selected IF, recording bandwidths of up to 500 MHz (1 GHz IF) and 100 MHz (160 MHz IF) are supported.

As shown in Figure 2, two separate input paths are provided; one for the 1 GHz IF and one for the 160 MHz IF. Each path incorporates input signal conditioning (including gain control) and high-precision anti-alias filtering. When the user selects one of the input paths, the analog-to-digital converter is automatically programmed to sample the analogue input at the appropriate sample rate (3.3 GHz for the 1 GHz IF and 440 MHz for the 160 MHz IF). The sampling depth for both IFs is 12-bits. 1 GHz IF signals are recorded at 8-bit resolution and 160 MHz IFs are recorded at 16-bit (2 byte) resolution. The resultant data stream is passed to the DSP block which handles time-stamping, down-conversion (to complex baseband IQ format), data management and writing to the 8 TB (standard) removable disk pack. When the user wishes to record at lower bandwidths, the DSP block also decimates the data stream by the appropriate number of divisions. Data is stored on the disk pack as a series of fixed file-size 'clusters', each with a community-standard (Midas Blue) header.

During Playback, the recorded data is up-converted back to its full data rate within the DSP block and then reconstructed into its original full-bandwidth analogue IF form before being passed through the appropriate filtering path. During digital Extract tasks, the DSP block combines the appropriate number of recorded clusters into a single file which is then typically networked to a remote server or other storage device.

AE9000HW-500G is supplied with a fully-featured stand-alone graphical user interface (GUI) which can be run either on the recorder itself (with attached monitor, mouse and keyboard), or on a remote laptop/PC (via Ethernet). The GUI can be compiled to run under most popular operating systems, including Debian, Windows, etc.).

In common with all Avalon recorders, AE9000HW-500G is designed for a wide range of 'platform' applications including, laboratory, mobile, field-portable, surface ships, submarines and jet/turbo-prop 'passenger' aircraft.

In addition to normal analog replay, recorded data can be exported in digital form. For example, it is possible to BACKUP selected passages of data to a 1 TB (or larger) 2.5 inch SSD, or an optional built-in Audavi or USB media pack using software utilities running on the recorder itself. Data stored on external media can be RESTORED to the same or another AE9000HW-500 for analog replay or transcribed to conventional storage media at a remote digital analysis facility. Alternatively, data can be exported directly to solid state disk, workstation/network or optional built in USB-3 Disk Pack.

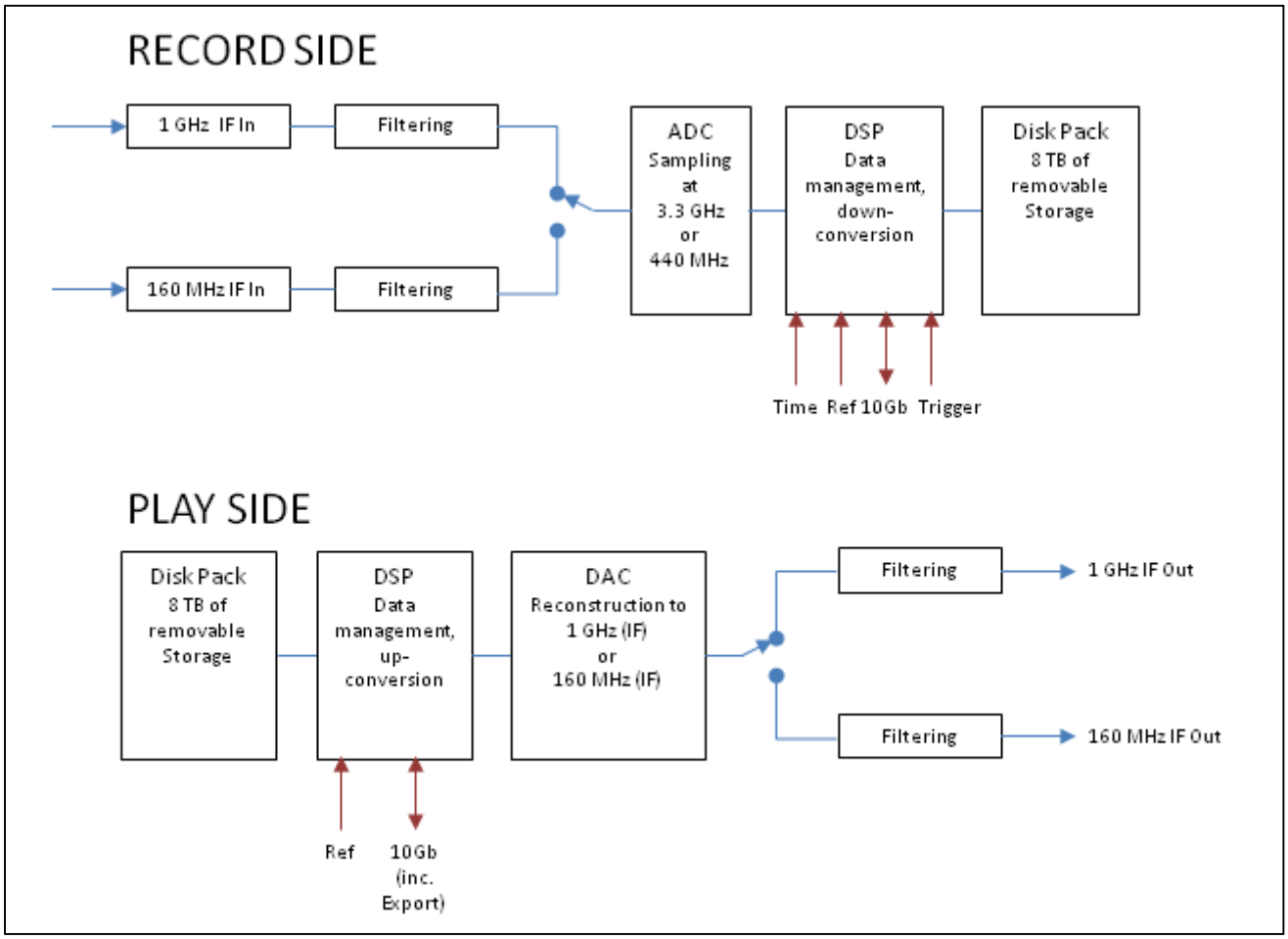

Figure 2: Simplified System Block Diagram.

Technical Specifications (AE9000HW-500G)

Number of Channels:	1.				
Supported IFs:	1 GHz and 160 MHz (two paths, user-selectable).				
Maximum Bandwidths:	**IF Path**	**Bandwidth**	**8-bit**	**16-bit**	**Lower Bandwidths (user-selectable)**
	1 GHz	500 MHz	YES	NO	250, 125 and 62.5 MHz
	160 MHz	100 MHz	YES	YES	50, 25 and 12.5 MHz
Frequency Response:	+/-1 dB (typical) with optimised (internal) anti-alias filters.				
Recording Duration (8 TB):	500 MHz (8-bit) mode: 100 minutes.				
	100 MHz (16-bit) mode: 300 minutes.				
Recording Format:	IQ pairs (centred on 0 Hz), 2s complement.				
Backup / Transfer / Archive:	To a remote server via 40 Gb Ethernet port.				
Replay (analogue):	Same format and bandwidth as recording (with automatic detection of recording mode).				
Replay (digital):	Binary files for computer analysis, c/w Midas Blue headers.				
Input Levels for FS rec.:	-20 to +10 dBm from 50 Ω source (AC coupled).				
Output Level from FS rec.:	0 dBm into 50 Ω load (AC coupled).				
Spur Free Dynamic Range:	Typical figures: ~50 dB (1 GHz mode), ~67 dB (160 MHz mode).				

Reference Frequency:	Stable internal 10 MHz clock, or external 10 MHz source.
Time Source:	Internal, Network (via Ethernet), IRIG-B.
GPS:	GPS data supplied to recorder by the system controller as Ethernet messages.
Local Control:	Avalon GUI (Figure 3) running on recorder, with attached monitor/mouse/keyboard.
Remote Control:	Via 10/100/1000BASE-T Ethernet), using Avalon GUI (or user-furnished equivalent) running on remote laptop/PC. Most popular OS's (including Windows Server 10) supported. APIs also available from Avalon.
Trigger Mode:	From Ethernet command or TTL level change.
Voice Log:	Audio 'channel' presented to the laptop/PC built-in/external speakers.
LOOP recording:	The recording media can be configured as a simulated 'endless loop' for record and play.
SKIP mode:	Permits the user to tag selected passages of data with SKIP flags to avoid accidental overwriting. SKIP flags can be set either while recording or when the recorder is stopped.
Real-time FFT & Y/T display:	Real–time calculation and display of FFT (waterfall/spectrogram) and Amplitude vs. Time (remote laptop/PC only).
Data Extraction Ports:	10 GbE (standard) USB-3 (specify at time or ordering).
Power:	Standard: 85 –240 VAC, 50- 60 Hz (auto-ranging). 200 VA nominal. 270 VA peak demand. Optional (interchangeable): 16-50 VDC.
Physical:	½ rack x 4u x 530 mm.
Environmental:	Designed to the applicable sections of MIL-STD-461E (EMC) and MIL-STD-810E (Shock and Vibration).

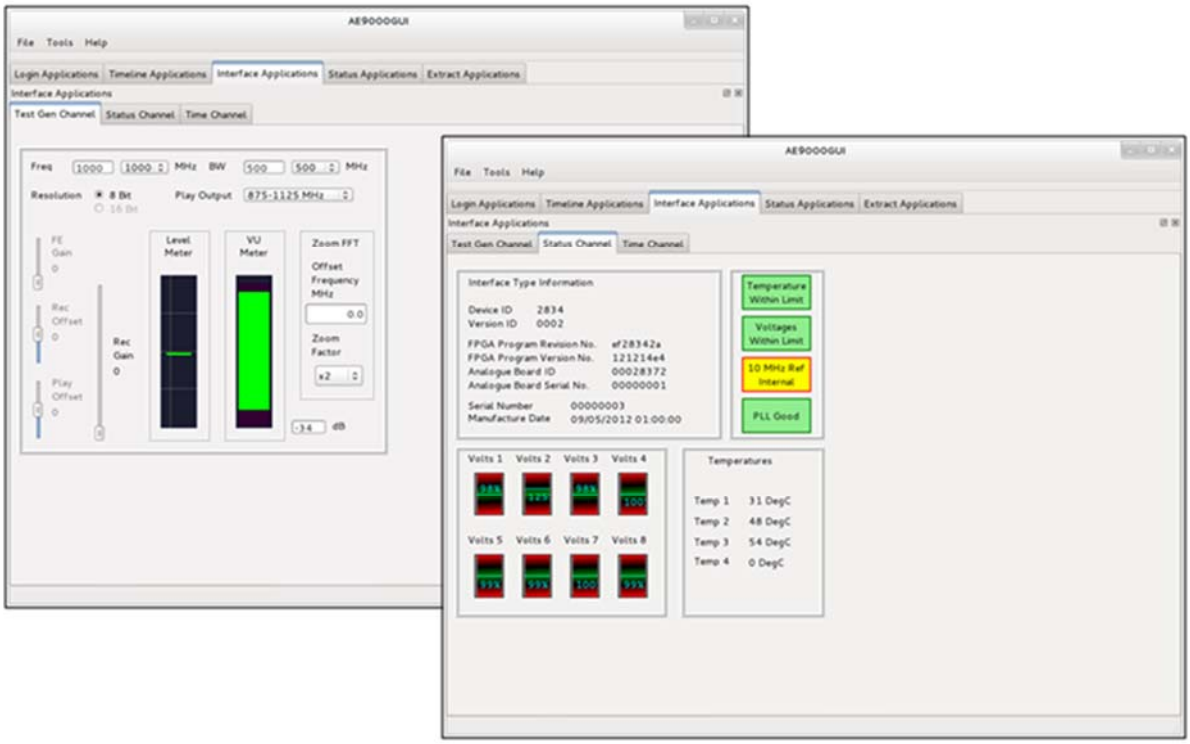

Figure 3: Typical GUI tabs.

These specifications are provisional and subject to change without notice. Please contact Avalon for full technical details.

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