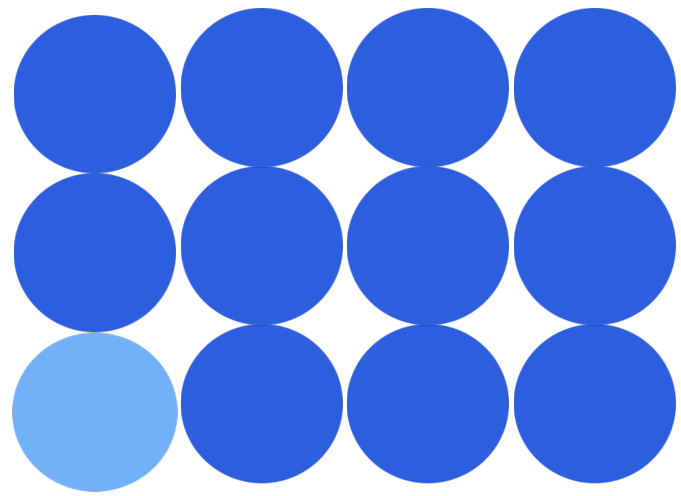


VAADR MIL-EX

Datasheet



Features and Capabilities

- Ultra high write and read bandwidth
- Very fast debrief
- Supports nearly any resolution from RS-170 the HD, and way beyond to very large format video sources
- Supports nearly any frame rate. Full configurable.
- Very large removable storage media, up to 8T
- Record raw, compressed, compressed lossless, compressed HDR (high dynamic range), for post mission forensic image analysis and detail extraction
- Very rugged solution for all sorts of combat applications. Fighter-jet and aircraft ready.
- Multiple video and data source recording. Fully configurable I/O for the widest variety of camera and data source support, including supporting future needs.
- Small high density form factor
- Fully field upgradable
- Low cost
- Support several channels of audio in various configurations.
- Image enhancement ready
- Full debrief ground station with corresponding playback of synchronized metadata and satellite data, and full bookmark capabilities and format conversions. Full plug-and-play with VAADR.
- Wide variety of control/data I/O support. Including Ethernet, 1553, Fibre Channel, USB, several serial ports (including high speed).

DDC's VAADR MIL-EX encompasses the significant innovations of previous generations of VAADRs

General Information

The DDC Video and Advanced Data Recorder (VAADR) provides real-time recording of high frame-rate 16-bit hi-resolution imagery, in ruggedized applications, or in the lab or other industrial setting. It can record RAW or compressed imagery, and associated meta-data (GPS, timestamp, IRIG codes, vehicular info, etc.). The RAW imagery recording and associated playback allows unprecedented advanced image analysis and processing during debriefing. It provides multiple channels, with mixed record/playback, a variety of conventional VCR type controls, and a mix of very advanced image analysis and processing during playback. Additionally, it handles metadata acquisition, synchronization, management, and display.

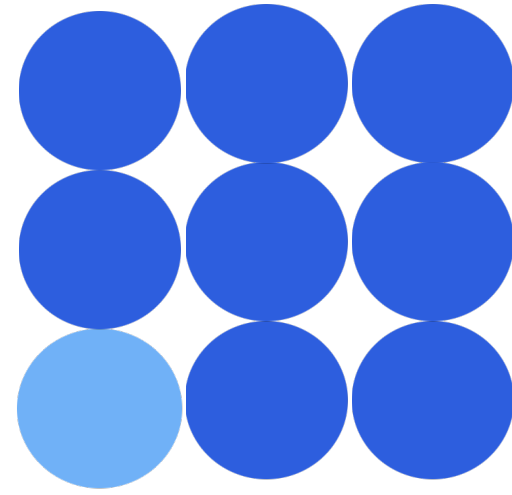
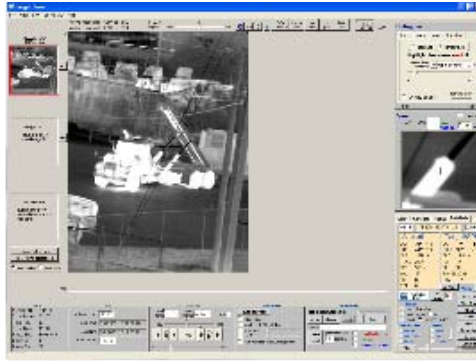


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VAADR Viewer Console and Debriefing Software

Running on almost any PC or laptop, and directly connecting to VAADR hardware via USB2.0 (VAADR shows up as a pen drive on PC/laptop), the VAADR Viewer application can *instantly* open up (or drag and drop) *all* of the VAADR video and data, and pan through it, play it, single step thru it, fast forward, rewind, all while zoomed, or with other contrast, analysis, or processing operations. Works on VAADR or other imagery.



I/O

- Reads RAW, jpg, gif, png, tiff, FTS, MPEG2
- Write out AVI movies in RAW or compressed for playback in Windows Media Player (or other). Also writes bmp, jpeg, png, gif, tiff of selected images
- Extract selected raw images for own processing
- Supports drag and drop of countless amount of video
- Completely configurable RAW data dialog box, to view your RAW imagery: resolution, byte ordering, header bytes, timestamps, rotation, decimation, etc.

Look/Feel

- Multiple 'skins' for simple or advanced controls
- Many view modes: Native size, Fit To Window, Rotated, PixelText, and hex-dump
- Other data: actual pixel data with mouse, histogram (line, frame, and area), line intensity

Bookmarks

- Add bookmarks during debriefing, or display operator inserted bookmarks during recording.
- Add highlight-boxes, captions, etc. to each bookmark
- Playback only bookmarks, or index thru them
- Write out an AVI movie of bookmarks only
- Selectable playback time of each individual bookmark
- Different individuals can bookmark the same video with their own points of interest.
- Save bookmarks off for future use

Multiple Videos

- Supports 2 movies loaded simultaneously, so that they might be compared to one another. Also a mosaic mode to view 2 movies simultaneously
- Any field or frame from one movie can be differenced with any field or frame from another movie

Processing

- Dynamic controls for zoom, contrast, rotation, flip, brightness, LAP, sharpen, histogram stretch, AGC, invert, color corrections, interpolate, white hot / black hot, etc.
- RAW video untouched, despite the processing done to enhance the playback.
- Supports plugins. Simple API to create other processing functions
- Bring out the most amount of detail with plugins such as: LAP (dynamic gamma), sharpening, various filters, tracker, thresholding, TRZ (translate/rotate/zoom), etc.
- Statistical and histogram analysis to analyze and detect defects or oddities in your sensor.
- Declassify mode for black boxing desired areas


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Applications

Applications include military or commercial airborne recording, ground vehicle recording, reconnaissance, UAV, man portable, mission training, hostile environments, medical, research, camera characterization, industrial, security, automotive, etc. Strengths reside in the ability to record almost any FLIR/CCD camera, sensor, or other video source, and provide instant access to the data, and world-class image processing and enhancement of the video during playback.

Interfaces

12V-28V input

- 12V power barrel for desktop operation
- 28V thru rear connector

Network capabilities

- USB2.0
- GigE (10/100/1000)

Video In ports

- 2 HOTlink II (VAADR1) 8 HOTlink II (VAADR2)
- 1 Cameralink
- 2 RS-170 / NTSC / PAL
- 1 RS-422 16-bit digital video input
- Mezz card expansion for additional video ports

Video Out / data retrieval ports

- 1 USB2.0
- 1 GigE (10/100/1000)
- 2 RS-170 / NTSC / PAL (plus 1 copy), or... RGB component (S-Video and YPrPb also available)
- DVI

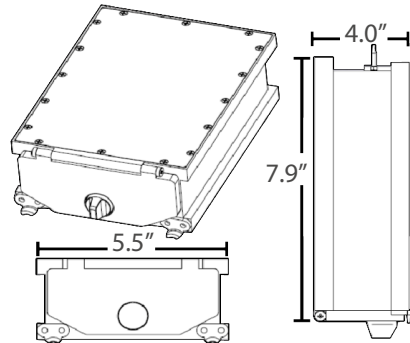
Serial ports, configurable for control, metadata, and IRIG

- 3 RS-422 (up to 40 Mbps)
- 1 RS-232

GPIO: 12 protected digital I/O

Front Panel

- USB2.0
- 4 LEDs (2 Red: record, full; 2 green: power, spare)
- 8 position DIP switch
- Power barrel for desktop power / data retrieval



Features

- Records multiple channels of 16-bit high frame-rate video and meta-data
- Multiple drive configurations (48GB-768GB)
 - Embedded ruggedized solid-state drive
 - Also supports COTs ruggedized drives
 - Supports generic disk drives for lab use
 - SATA drive compatible
- High record bandwidth. Bandwidth can be divided into any frame rate and resolution. Some examples of capabilities:
 - 3 channels of 16-bit 640x512 at 60 frames/sec and 2 channels of RS-170
 - 1 channel of 16-bit 1024x1024 at 60 frames/sec, 2 channels of 16-bit 640x512 at 60 frames/sec, and 2 channels of RS-170
 - Record RAW, MJPEG, or MPEG-2.
 - RAW for unadulterated imagery needed for post process recon ops
 - MJPEG for 8x visually lossless compression
 - MPEG-2 for 8x-30x compression
- Stream or pull video and/or data off:
 - Plug and play USB2.0 (i.e. simply shows up as a drive on PC or laptop)
 - GigE 10/100/1000: network drive capable, GigE Vision capable
- Metadata recorded with video:
 - Each frame time-stamped to 1/100th second with real-time clock or digital IRIG codes.
 - Position, heading, speed, targeting, etc. recorded synchronized with video
- Powerful yet simple user interface application
 - View your VAADR (or other) imagery
 - Instantaneous loading and manipulation
 - General purpose and high end image analysis
 - High tech image processing during debrief
 - See last page for more details
- 5 lbs, approx 7.9" x 5.5" x 2.6" (other configurations available, smaller)

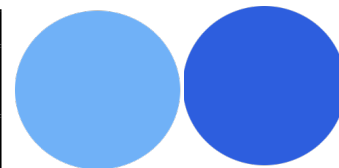


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Environmental

- Power/Temp:
 - 19W maximum dissipation
 - exceeds MIL-STD-704A, Type B
 - supports 10 – 80V transient operation
 - 40 to +60C ambient operation (all component rated to -40 to +85C)
 - Storage -55 to +125C
- Operational Envelope: The VAADR is capable of being carried within a 7.5g envelope, with the operational capability expanded to the envelope in the table to the top-right.
- Mechanical Shock: The assembly operates within specified performance requirements after being subjected to mechanical shocks per MIL-STD-810F, Method 516.5, in opposite directions along each of three orthogonal axes, with waveform and amplitude of the shock impulse characteristics as follows: Operating: ± 20 G, all shocks are half sine pulses, 11 milliseconds (ms) in duration in all 3 axes.
- Vibration: The assembly withstands vibration levels as outlined in MIL-STD-810F, Method 514.5, Procedure 1. The assembly shall withstand vibration levels as shown in the figures below.

Condition	Maximum Value
Vertical Maneuver	7.5G - Operating
	7.5G - Non -Operating/ Off Mode
Altitude	40Kft-Operating
	50Kft - Non-Operating/Off

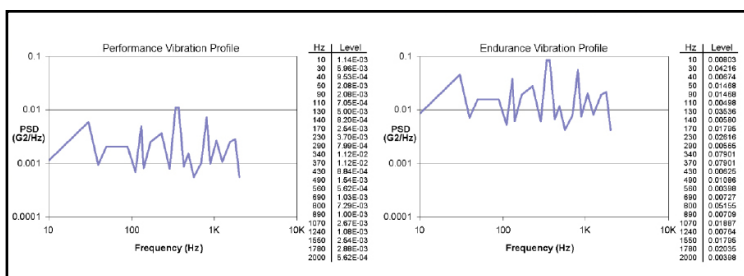


Configuration

- Support drive sizes and configurations are as follows:
- VAADR1 (conventional bandwidth)
 - Ruggedized: 64GB, 100GB, 120GB, and other COTS SSD drives
 - Non-ruggedized: most PC or laptop drives
- VAADR2 (high bandwidth, removable cartridge)
 - 2009: 48GB, 128GB, 512GB, 768GB

Meta Data

- All data and video is time stamped with a real time clock to 1/100th of a second, and all meta data is written time synchronized along with the video.
- The VAADR viewer console displays the metadata window simultaneously with the video during play-back
- Metadata is plotted in 3D over Google Earth (track, position, etc.)
- Can include whatever metadata is made available to VAADR via the various ports, or embedded within the video.



VAADR Example Record Times

Video	48 GB		128 GB		512 GB		768 GB		1 TB		1.5 T		3T	
	RAW	MPEG2	RAW	MPEG2	RAW	MPEG2	RAW	MPEG2	RAW	MPEG2	RAW	MPEG2	RAW	MPEG2
RS-170	1.5h	24h	3.7h	60h	14.8h	240h	22.2h	360h	1.2d	20d	1.8d	30d	3.7d	60d
640x480 (16 bit, 30 fps)	47m	12.4h	1.8h	10h	7.2h	40h	10.8h	60h	14.4h	3.4d	21.6h	5.1d	1.8d	10.2d
640x512 (16 bit, 60 fps)	22m	5.8h	55m	5.8h	3.6h	23.2h	5.5h	34.8h	7.2h	1.9d	10.8h	2.9d	21.6h	5.8d
1024x1024 (16 bit, 30 fps)	14m	3.6h	35m	9h	2.3h	36h	3.5h	54h	4.6h	3d	6.9h	4.5d	13.8h	9d
1024x1024 (16 bit, 60 fps)	7m	1.8h	18m	4.5h	1.2h	18h	1.8h	27h	2.4h	1.5d	3.6h	2.3d	7.2h	4.5d