DATA PROCESSING

Model 1632AP

DELTA TELEMETRY SYSTEMS

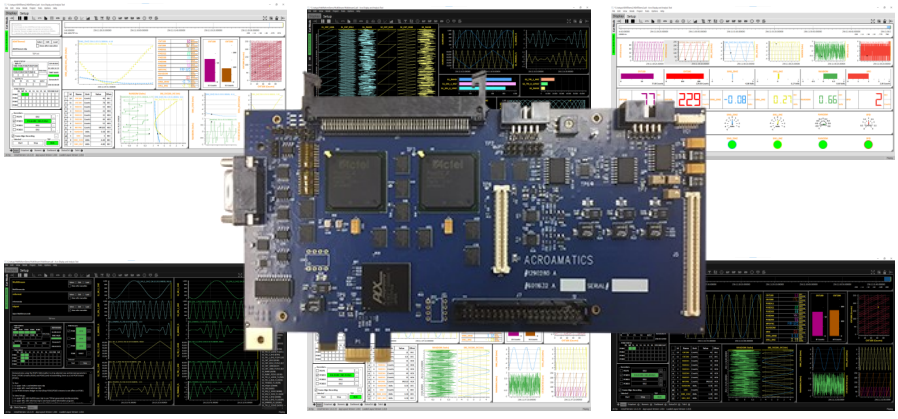
DUAL PCIE TELEMETRY DECOM PROCESSOR CARD

ACROAMATICS TELEMETRY SYSTEMS

KEY FEATURES

- Single or Dual Stream Third Generation0-50+ Mbps PCIe multi-function "all-in-one" PCM Decom Processor
- State-of-the-art integrated Bit Sync, Chpt 4Class 2 Decom, IRIG Time Xlate, PCM Simulator, and PCM Output Encoder
- Compliance with IRIG 106 Chpt 4 (class 1 & 2), CVSD, Chpt 8, Chpt 9, Chpt 10 / 11 & CCSDS in streaming, burst, & packetized forms
- DOD STIG compliant OS agnostic card embedded dynamic "soft-decom" processors
- Supports 1 to 16 stream system multi-card configurations
- NEW companion Model 1635AP PCIe PDSP 6MS/sec EU processor module
- Card direct PCM data-driven low latency recording & playback
- Acroamatics GUI Telemetry System Software (ATSS) included - *Lifetime Support* included - no charge!
- Native support for 3rd party display, analysis, and instrumentation support software such as IADS, DeweSoft & ILIAD
- IRIG Ch 10 format file export 0-50 + Mbps Programmable PCM Simulator & Stream Reconstructor
- NASA CCSDS & packet TMoIP & DQE encoded stream compatible decom & system EU processing

GENERAL DESCRIPTION



The new Dual Channel PCIe Model 1632AP multi-function telemetry data processing module features the fastest end-to-end decom processing speeds in the industry - yet supports data format and mission project set- up interchange with existing Acroamatics PCI TDP products and systems.

Utilizing the latest in FPGA component technology, the new Model 1632AP dual channel telemetry processing card provides increased decom & stream processing rates while consuming less power (1/3 that of the preceding generation) and delivering improved functionality. The 1632AP employs real- time, deterministic card embedded stored program processing technology, supporting real-time decommutation of multiple software program driven sub, super, and asynchronous embedded framed TM streams – with support for dynamic conditional format switching and user defined conditional data product generation in its multiple onboard memory stored program locations.

Once loaded and initialized, the new 1632AP PCIe decom operates wholly independent of its host Windows chassis administrative OS and is designed to employ standard Windows services to independently record data to disk, directly drive local quick-look display processes, and deterministically support directly coupled networked data services connections - making it the most effective standalone all-in-one card level telemetry processing device on the market today.

As part of an integrated multi-card / low latency real time telemetry processing system, up to four independent 1632AP cards are able to be joined together to operate in conjunction (via dedicated 64-bit I- Bus) and companion 1635AP and associated Acroamatics PCIe and PCI system EU processing software and hardware modules.

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OPTIONAL BIT SYNCHRONIZER

Model 674DM Dual bit Sync - companion mezzanine module included in Model 4032AP

PCM Signal Inputs

Source	Two each analog baseband user selectable PCM inputs Per Bit Sync Channel - #1 single ended, #2 RS-422
Isolation	Greater than 60dB at 20MHz
Impedance	Program selectable: Hi-Z/Lo-Z, Single Ended: 4kΩ/75Ω, Differential 10kΩ /150Ω
Signal Level	Single Ended 0.2 to 20V P-P, Differential 0.2-10V P-P
DC Offset	20V max Hi-Z
PCM Codes	Program selectable: NRZ-L/M/S, Biø-L/M/S, DBiø-M/S, DM-M/S, MDM-M/S, RZ
Derandomizer	Program selectable: RNRZ 9/11/15/17/23, forward/reverse

Synchronization

Bit Rate Range	8 bps - 44 Mbps, NRZL, 8 bps - 44 Mbps Biø Codes
Capture Range	3 times the programmed loopwidth, typical
Loop Bandwidth	0.1% to 3.2%, program selectable in 0.1% increments
Sync Threshold	0dB for NRZ-L and Biø-L codes
Sync Maintenance	(LW=0.1%) —2dB NRZ-L and Biø-L codes
Sync Acquisition	(LW=1.6%, SNR > 12dB) Typically less than 32 bit periods
Sync Retention	(LW=0.1%, SNR >3dB) Retains sync through >1028 + consecutive dropouts, all modes
Bit Error Rate	(LW=0.1%) to within 0.25 to 0.50 dB of ideal bit error rate performance curves, absolute (not average) in all modes

REAL TIME FRAME SYNC/DECOMMUTATION

Model 1632AP-2 Dual Channel Low Latency Frame Sync, Decom, IRIG Time, and Output Distribution

PCM Input

PCM Input Sources	0 - 40 Mbps clk/data inputs supported for each decom channel. TTL NRZ-L Data and 0° Clock. When configured with optional Model 474DM bit syncs, program selectable internal bit sync input paths are provided.
Impedance	50 Ohm input impedance, TTL compatible.
Bit Rate	From 0 to 44 Mbps, burst, jam, and streaming mode compatible.
Polarity	Programmable, automatic polarity correction.
Word Length	Programmable, 1 to 32 bit word length for each input.
Word Orientation	Programmable, MSB/LSB orientation for each input word.
Parity	Selectable leading, trailing, or no parity checking for each word.

Synchronization

Mainframe Sync	Provides for programmable sync pattern and mask, complement pattern recognition, and variable length frame decommutation. The pattern may be up to 64 bits in length.
Subframe Sync	Six independent synchronizers (per decom channel) are capable of decommutating sub-frames within subframes. Subframes synchronize to fixed recycle patterns, complement frame sync patterns, and various ID patterns.
ID Sync	Both recycle and ID patterns may be assembled from multiple word locations. Recycle patterns may be up to 32 bits long. Two types of ID synchronization are supported: JAM patterns of arbitrary values, and incrementing or decrementing frame counters with limit checking. ID sync words may be up to 16 bits in length.
Sync Strategy	Programmable Search-Check-Lock sync strategy, bit error tolerance, and bit slip window provide reliable frame synchronization.
Asynchronous Formats	Subframe synchronizer may be programmed to decommutate embedded formats having unique frame sync patterns and format structures.
Format Switching 1	6 testable flags store the results of select input stream bit and word comparisons to control real-time format switching. Frame Sync / Decom format switching is loss-less and immediate. Multiple card resident micro-coded decom processing programs are stored in local decom memory in support of such conditional format switching events.

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Outputs

Standalone Data Output	Data is available to the host computer as memory-mapped frame buffers, Current Value Table (CVT), or as a data stream selectably transferred by via DMA independently from each decom channel. Data is 32 bits with programmable MSB/LSB output word justification, sign extension, or zero insertion for LSB output. Acroamatics Telemetry System Software (ATSS) suite provides a host of Windows compatible (XP and Windows 7 compatible) which support user decom set-up, mission set-up management, and a host of real-time data display, alarming, recording, discrete/analog, and networked data I/O processes and local operator status display, and remote system management and data operations support.
I-Buss Data Output	When used in a system configured with additional 1632AP and PCI 1615AP PDSP EU & Distribution card, the messages containing thirty two bits of data, twelve bits of fine time (microseconds), two bits of status, and 17 bits of data identification. I-bus data can be formatted in either MSB or LSB justified form. LS-justified data can also be sign extended. I-bus timing and decom data is shared in real-time with other I-bus connected cards to insure deterministic time coherent extended decom and EU processing. The 1615AP PCI module is capable of merging data from any of up to four 1632AP cards in asystem to support single file merged “raw” and EU multi-stream data recording and formatted data distribution of data fromup to 8 high rate TM streams, supporting display and networked data communications processes. Decom and bit syncdata quality status words are shared for downstream data validation and real-time TDP system status reporting.
2 Serial PCM Outputs	Two program controlled serial outputs, one per Model 4032AP PCM decom channel.

PCM SIMULATOR/ENCODER

Model 1632AP Dual Programmable 1 bps - 50 Mbps PCM Simulator/Encoder

Dual Programmable PCM Format Simulator/Encoder Functions

Format	Storage Stores two complete, selectable PCM formats. Performs asynchronous frame insertion and format switching.
Subframe Capability	Generates up to three subframes within mainframe. Generates subframe within subframe.
Frame Length	Up to 65,536 words for the mainframe and 16,384 per subframe
Data Sources	1M unique user programmable fixed value word registers and 64K unique user defined dynamic function word register onboard library. Two 16-bit module up/down counters. Two 16-bit external inpouts. One 16-bit pseudo-random number generator. One 16-bit program counter. Two complete user-defined 1M data word onboard stream simulation memories, with dynamic switching.
Word Length	Programmable for each data source: static data words 1 to 32 bits; all others 1 to 16 bits.
Word Orientation	Program selectable: MSB/LSB for each data word
Parity Generation	Program selectable: leading, trailing, or no parity for each data word.
Dynamic Data	Memories 2 unique, user-defined 256kB RAM’s. Presettable to ramp, sine, triangle and square wave functions or user-defined input functions. Selectable data type: 1’s complement, 2’s complement, signed magnitude, offset binary, Programmable time base.

PCM Outputs

Bit Rate	Program selectable: 1Hz to 64MHz, tunable to 0.1% of programmed rate.
Clock	0° clock
Data	NRZ-L
Output Codes	Program selectable: NRZ-L/M/S, Biø-L/M/S, DBiø-M/S, MDM-M/S, RNRZ 11/15/17/23
PCM Output	TTL compatible NRZ-L data and 0° clock

IRIG TIME CODE TRANSLATOR/GENERATOR

Integrated IRIG Time Code/Reader/Generator/Translator, one per Model 1632AP card. Shared in multi-card system applications via “I-bus” card interconnect

IRIG Time Code Reader/Generator/Translator

Amplitude	0.5 to 20 Vpp, Single-ended
Impedance	12K Ohms minimum
Input Codes	Translates IRIG G, A, B and NASA-36
Input	Frequency 125 Hz to 400,000 Hz
Modulation	Index 2:1 through 5:1
Polarity	Program selectable, Invert or Normal Polarity
Internal Time	Base 40MHz crystal oscillator

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Operational

Generate Mode	Time is generated from the onboard crystal oscillator and is presettable from the Host.
Translate Mode	Time is read from an external source.
Translate Carrier	Mode The internal timing is based on the input carrier. This mode enables the system to translate time as the input carrier rate varies during playback of an analog recording.
Translate Failsafe Mode	The internal timing is phase-locked to the input carrier. In the event of a time dropout, the translator continues generating time without interrupt.
Frame Bypass	Automatic frame bypass compares previous time frame with current one, and Time accumulator updated when they agree.

SYSTEM SOFTWARE ATSS FEATURING ACROAMATICS DISPLAY AND ANALLYSIS TOOL (ADAT)

Acroamatics Telemetry Software Suite (ATSS)

Processing Environment	OS independent application processing. Dynamic “Change on the Fly” capable conditional format switching. Embedded PCI Module based “soft decom” on functionally dedicated, card based processors
Standards Compliant	Win 11 Pro or RHEL 8.x. IRIG Chapter 4, 5, 8, 9 and 10/11, 218-10/20. TMATS Import, NASA CCSDS, IADS, ADAT, Dewesoft, LabVIEWS, MatLab and similar analysis software tool data export.
Data Display Types	ADAT Display and Analysis Tool widget based user configurable data display and analysis system dashboard application. ADAT supported in both Windows 10/11 or RHEL 8.x, IADS supported in Win 11.
Data Recording	The ATSS Data Recording Client provides local operator control of the 4032AP record function, and accommodates operation as a standalone application or in conjunction with the ATSS software managed real-time telemetry processing environment.
Networking	The Model 4032AP CTS supports both local and remote networked turn-key operation.

Physical

Format	Standard PCIe X1 format, Half Length
Cooling Requirements	30 Linear FPM
Power Requirements	+3.3VDC at < 1.0 Amp + 12 VDC at 0.10 Amps, (opt. mezzanine bit sync, TMoIP, PDSP modules not incl.)
Dimensions	4.2” (10.67cm) H x8” (120.32cm) W x .55” (1.4cm) D
Temperature	Operating: 0° to +40° C, Non-Operating: -40° to +86° C
Relative Humidity	Up to 90% non-condensing
Shock	Operating: 6G, Non-Operating: 50G
Vibration Operating	0.5G, 5 to 2000Hz, Non-Operating: 1.2G, 5 to 500Hz

ADAT DISPLAY, ANALYSIS, & OPERATIONS SOFTWARE

ADAT is a virtual TM processing platform console program that allows users to create customized control, status, and data display layout pages using widget based set-up tools. Simple to master and powerful to use, ADAT serves as a superior display and analysis environment and an effective TM front-end operations console.

ADAT supports Acroamatics’ TM card direct mission recording, playback, and analysis of measurement data with an assortment of user control, status, and configurable display types. ADAT setup and display development can be done without hardware on any computer platform, as can playback and analysis of recorded mission data files. Most importantly, ADAT is fully integrated with all Acroamatics hardware telemetry processing products. ADAT supports operation in both Windows 10 and Linux RHL7 environments and is the ideal complement to our data processing card and system products hosted by either of those common operating systems.

CONFIGURATION OPTIONS

Model 1632AP-1	Single stream PCIe 0-50+ Mbps PCM Frame Sync / Decom / PCM Simulator and Output Data Formatter
Model 1632AP-2	Dual stream PCIe 0-50+ Mbps PCM Frame Sync / Decom / PCM Simulator and Output Data Formatter
Model 674DM	Model 674DM 8 Hz to 40 Mbps Advanced Tunable PCM Bit Sync Mezzanine Module (per stream)
Model 1635AP-2	PCIe Programmable Data Stream EU and Derived Data Processor and Distribution Card
Model 4032AP	Single or Dual stream multi-function Compact Telemetry Data Processing System
Model 2900AP	Single to Sixteen Stream Portable & Rackmount Telemetry Data Acquisition/ Processing/Display/Server

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