



### High Performance Compact Portable Telemetry System Model 4022

#### Features:

- Compact, Notebook Size (2.25" H x 11.75" W x 9.2" D)
- < 7 lbs.
- High Performance Multi-Band Receiver Option
- Just Plug-in Antenna!
- Multi-Band, IRIG Std
- Laptop size Receiver / Bit Sync / Decom / Time / Sim
- 0-40 Mbps Decom, IRIG Chpt 4, 5, 8, 9, 10
- Range Quality Tunable 40 Mbps Digital Bit Sync
- 0-64 Mbps Rec/Playback
- Real-Time Processing
- Standalone or Network to any Windows PC or LT
- Fully Supported AP!
- ILIAD-LITE Windows Processing Option

#### General Description

The Model 4022 Compact Telemetry System is a remarkably size and cost effective single stream PCM storage and processing solution, capable of ingesting serial PCM with or without synchronous clock in any IRIG approved PCM code format. The Model 4022 enables users to process and record PCM data using powerful native "real-time" card level embedded Frame Sync/Decom processors. Flexible, card level "soft decom" processing techniques are optimized for "quick-look" flight-line, instrumentation lab, and range recording, processing, data display and networked data analysis. The Model 4022 may be ordered configured in its base Frame Sync/Decom/IRIG Time/PCM Simulation configuration, or with standard options such as internal 474DM advanced Digital Bit sync Ch 5 CVSD voice, and integrated high performance multi-band Quasonix receiver supporting ARTM Tier 0, Tier 1, and Tier 2 demodulation technology.



The Model 4022 chassis is very compact and portable, allowing transport with a laptop in a standard briefcase/tote. The Model 4022 is easily interfaced to any standard Win 7 or XP laptop or desktop, or can be operated directly using a standard local keyboard and monitor. Included Acroamatics CTS software suite (ATSS) supports bit sync and decom set-up, time correlated data recording, Ethernet "Gateway" PCM data delivery, output to third party processing applications, post test analysis/playback (including serial PCM playback and simulations), native data frame display, and more.

When used in conjunction with provided Acroamatics Telemetry Software, the 4022 CTS delivers a seamless high performance single stream, telemetry ground station decom processing, display, and recording solution - with support for TMATS set-up and Chapter 10 data exchange. Optional ILIAD-LITE software is also available with the Model 4022 CTS for flight test instrumentation engineering specific applications.



### Bit Synchronizer

#### Signal Inputs

Source	1 single ended or RS-422 (specify on order). Unit may be configured with dual program selectable inputs optionally.
Isolation	Greater than 60dB at 20MHz
Impedance	Program selectable: Hi-Z/Lo-Z, Single Ended: 4kΩ/75Ω
Signal Level	0.2 to 20V 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 Hz-40 MHz, All PCM 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 1dB of ideal bit error rate performance curves, absolute (not average) in all modes

### Real Time Frame Sync/Decommutation

#### Function

Sources	Program selectable. Front Panel NRZ-L Data and 0° Clock and internal bit sync decom inputs standard (with bit sync option). To five program selectable decom inputs supportable on an optional basis.
Subframe Sync	Six independent synchronizers are capable of decommutating sub-frames within subframes. Subframes synchronize to fixed recycle patterns, complement frame sync patterns, and various ID patterns. Both recycle and ID patterns may be assembled from multiple word locations. Recycle patterns may be up to 32 bits long.
ID Sync	Two types of ID synchronization are supported: JAM patterns of arbitrary values, and incrementing or decrementing frame counters with limit checking. IS 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	16 testable flags store the results of select input stream bit and word comparisons to control 4022 CTS PCI card level real-time user input 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.

#### Outputs

Standalone Data Output	Data is processed in specialized card resident real-time processors, independent of any Windows (or similar) operating system. Processing latency is minimal, and related solely to access to rate parameter data. Decommutated data are available to the system internal PCI bus as memory-mapped frame buffers.. Current Value Table (CVT), or as a data stream selectively transferred by PCI bus DMA. 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 complete suite of GUI Windows compatible system set-up and operating programs in support of user decom and mission system data management, data display, alarming, limit setting, recording, analog and networked data I/O processes and local operator status display, and networked remote system management and data operations.
Frame Quality	Frame quality is word generated containing bit sync and frame sync status for downstream data validation.
2 Serial PCM Outputs	Two program controlled RS-422 compatible serial output channels are supported.
Sim-encoded Data Mode	The Model 4022 CTS supports transparent playback of recorded PCM stream data directly from disk. Output is via the system front panel PCM SIMULATOR OUT output jack (single ended, unless Optional RS-422 Sim output is specified) and is both code and output data rate selectable (see PCM Simulator section for additional details).
CVSD Audio (option)	Optional IRIG Ch 5 CVSD or PCM encoded digital audio format decommutated audio output is available. CVSD processing is in real-time, maintaining extremely low system latency. Voice output is delivered directly from Model 4022 CTS card level real-time processor DAC outputs, and is user programmable as to output gain, format and sampling characteristics.



### Programmable PCM Simulator

#### PCM Format Simulator 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	1024 static registers Two user-defined dynamic data memories. Two 16-bit module up/down counters. Two 16-bit external inputs. One 16-bit pseudo-random number generator. One 16-bit program counter
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 16kB RAM's. Presettable to ramp, sine, triangle and square wave functions or user-defined input. Selectable data type: 1's complement, 2's complement, signed magnitude, offset binary, Programmable time base.

#### 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, Bi0-L/M/S, DBi0-M/S, MDM-M/S, RNRZ 11/15/17/23

### IRIG Time Code Translator/Generator

#### Functional

Amplitude	0.5 to 20 Vpp, Single-ended
Impedance	12K Ohms minimum
Input Codes	Translates IRIG G, A and B
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

#### 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

#### Acroamatics Telemetry Software Suite (ATSS)

Processing Environment	Real-time, Windows OS independent processing. Dynamic "Change on the Fly" capable conditional format switching. Embedded PCI Module based "soft decom" on functionally dedicated, card based micro-coded processors.
Standards Compliant	IRIG Chpt 4, 5, 8 and 10 compatible TMATS database import, integral IADS Data Server, LabVIEWS and Matlab API support.
Data Display Types	Scalable multi display/page, 32 pages - Horizontal and vertical strip chart, tabular, bar graph, annunciator, controls/meters, each with dynamic limit checking, alarming, scalable, parameter and E/U annotation.
Data Recording	The ATSS Data Recording Client provides local operator control of the 4022 CTS record function, and can operate as a standalone application or in conjunction with ATSS software managed real-time telemetry processing operations.
Networking	The Model 4022 CTS supports both networked system set-up and operation admin and real-time data communications. ATSS Remote operations software (\$225 option) provides remote users all functions offered to the local user, including data recording, data display, system status and set-up GUI applications.

### Hardware Features

#### General

Physical	Size: 11.7" x 9.20" x 2.25", Weight: 6.5 lbs. (typ.) w/o RCVR
Power	12-24 VDC, AC adapter 110/220V provided. Battery optional.
Attributes	128GB solid state drive, Dual ENET & USB-3, and local SVGA interfaces.
Configuration Options:	
4022 CTS	Basic single stream decom/PCM Sim/IRIG Time/ATSS, software suite.
4022CTS-B	Adds integral high performance 474DM Bit Sync mezzanines.
4022CTS-BR	Adds integral high performance Quasonix multi-band RF receiver.
option code - RD	Substitutes rear panel removable carrier based SSD for internal unit.
ILIAD-LITE	Adds local ILIAD processing software application - may not be used when ATSS is active.

Specifications subject to change without notice.