

Ground Systems



- Complete dual PCM stream acquisition and decommutation system on a single VME board
- Bus-mastering DMA channels can support both input and output channels
- Extract clock and data from noisy PCM data streams at rates to 10 Mbps
- Simultaneously decommutate two PCM bit streams and optionally sort or tag telemetry data into on-board buffers up to 64 kwords and up to 20 Mbps
- Program your synchronization patterns and strategies
- Decode, translate, or generate IRIG-A, -B, or -G time
- Time tag PCM input frames with 1 microsecond resolution optionally synchronized to an external source
- Status tag PCM input frames, including sync state, bit slip, and CRC error detection
- Extract two asynchronous embedded frames, or fully decommutate a primary and an embedded stream on one card
- Simulate arbitrary telemetry data and formats to 20 Mbps



communications

Telemetry-West

Excellence You Can Measure

Multifunction VME Telemetry Board

L-3 VME-MFT



L-3's Multifunction VME Telemetry board brings a new level of integration to the system designer. The functions of four previous boards are now combined into just one 6U VME slot, accommodating more telemetry applications from a single platform. A rich, robust, and proven set of embedded functions typically off-loads the host processor and can be applied to a wide variety of data communications solutions.

The Multifunction VME Telemetry board includes the functions of two decommutators, two simulators, two bit synchronizers, and a full-function IRIG time code generator/translator. Embedded software configuration options include:

- 2 bit syncs, 2 decom/sims, internal time clock
- 1 bit sync, 2 decom/sims, 1 IRIG time code input, internal time clock
- 2 decom/sims, 1 IRIG time code input and output, internal time clock
- Satellite commanding with ternary I/O and loop-back echo-checking support (2 channels)*

Digital synthesizers provide high-resolution frequency programming and low jitter output for two independent PCM outputs at rates up to 20 Mbps for simulation and commanding applications.

Proprietary embedded digital processing optimally acquires and tracks PCM and IRIG time signals and rejects noise. IRIG time functions are closely coupled with decommutation, providing high accuracy time-tagging of input data for both real-time or tape playback applications.

Software Support

L-3 can provide sample source code for telemetry system designers writing application and driver software. A programming interface manual is also available.

* Factory quote

L-3 VME-MFT Specifications

Bit Synchronizers

Codes	NRZ-L, NRZ-M, NRZ-S, BiΦ-L, BiΦ-M, BiΦ-S, randomized NRZ-L (11, 15, 17, 20, V35, Intelsat) DM-M, DM-S, RZ
Method	Second order, phase-locked-loop
Bit rate	NRZ codes: 100 bps to 10 Mbps; Other codes: 100 bps to 5 Mbps
Tuning resolution	0.1% (percent of bit rate)
Loop bandwidth	0.1%, 0.2%, 0.4%, 0.8%, 1.6% (percent of transition rate)
Outputs	Tape, clock/data, phase, polarity, TTL/RS-422, frame search toggle

Input Channels (decommutators)

Inputs	
Data rates	0 to 20 Mbps per stream; 0 to 20 Mbps max. aggregate at 8 bpw
Input code	NRZ-L or randomized NRZ-L
Data polarity	Normal/Inverted/Auto
Data alignment	MSB/LSB first per stream
Input levels	TTL (data/clock) or RS-422 (data/clock)
Clock input phase	0° or 180°
Clock duty cycle	.50 ± 5%
Data Buffer	
VME data pass qualifier	Frame and subframe not-search and per-word programmable in sorted or tag/data modes
Data buffers	Two independent 32- or 64-kword double buffers
Format	Telemetry, status, and time words sorted per application setup, tag-data, or pass-through
Buffer access method	Bus-mastering DMA controllers or slave reads and interrupts
Other Outputs	
Data pass qualifier	Frame and subframe not-search and per word
Embedded data streams	2 max.
Status to host	Frame sync state, subframe sync state, frame search detector, subframe search detector, bit slip detector, CRC error detector, interrupt state, interrupt overrun, active buffer size, bit rate
Frame and Subframe Characteristics (Sorted Mode or Tag-Data)	
Sync pattern	64 bits max.
Subframe sync method	SFID, unique sync code, URC, FCC, or none
Search-to-lock	1 to 4 valid sync words
Lock-to-search	1 to 4 valid sync words
Error threshold	0 to 3 bits
Sync aperture	±0 or ±1 bit
Frame size	2 to 32,768 telemetry words with simulator; 65,536 without simulator
CRC error checking	Programmable polynomial and word location to 16th order

Time-Tagging (Sorted Mode)

Time source	Internal time clock optionally synchronized to external IRIG
Format	BCD — microseconds to hundreds of days
Trigger source	End of minor frames
Resolution	One microsecond

Status Tagging (Sorted Mode)

Trigger source	End of minor frames
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Output Channels (simulators)

Modes of Operation	
Repetitive	On-board current value buffer for simulation data

Command	Send one command sequence at a time, including sync, data, and fill bits under host control
Streaming encoder	Alternately from double buffers using DMA or slave writes and interrupts; continuous or burst modes supported
Data Buffer	
Current value buffer	1 to 65,532 telemetry words
Outputs	
Data rates	PCM NRZ codes: 0 to 20 Mbps aggregate max. in combination with decomm @ 8 bpw; PCM other codes: 0 to 10 Mbps
Data rate resolution	.1 bps
Data rate accuracy	Stratum 3 (±4.6 ppm) with internal reference
PCM data codes	NRZ-L, NRZ-M, NRZ-S, BiΦ-L, BiΦ-M, BiΦ-S, randomized NRZ-L (11, 15, 17, 20, V35, Intelsat) DM-M, DM-S, RZ
Output levels	TTL (data/clock) or RS-422 (data/clock)
Output drive	TTL high-level: -32 mA max.; RS-422: -20 mA max. TTL low-level: 64 mA max.; RS-422: 20 mA max.
Clock output phase	0° or 180°
Clock source	Internal/external

Time Code Reader/Generator/Translator

Inputs (applies to Reader Mode only)	
Format	Analog: IRIG-A, -B, or -G forward
Playback rates	$\frac{1}{16}$, $\frac{1}{8}$, $\frac{1}{4}$, $\frac{1}{2}$, 1, 2, 4, 8, or 16 times real time
Carrier frequency range	±5% of nominal in a wide loop bandwidth mode
Mark amplitude	200 mV to 10V (auto-range)
Impedance	1 MΩ or 75Ω programmable
Modulation ratio	2:1 to 6:1
Error detection	Error frame bypass option
Phase-locked loop	Tracks IRIG input time and generates time on signal loss, wide or narrow loop bandwidth (programmable)
Internal Time Clock	
Modes of operation	Translate or generate forward
Resolution	One microsecond
Stability in Generate Mode	±4.6 ppm
Interface	Host can read or set time to 1 μsec
Outputs	
Format	Analog: IRIG-A, -B, or -G encode of internal time clock
Carrier frequency range	100 kHz maximum
Modulation ratio	3:1 nominal

I/O Connectors and Cables

Front Panel Connectors	
Telemetry I/O	.DB-50 (female)
Auxiliary	.05 Mini D Ribbon (MDR); one 26 and one 40 position
Cables (optional — order separately)	
TTL I/O cable assembly	.DB-50 to 12 coax cables
RS-422 differential external cable assembly	.DB-50 to 8 triax and 4 coax cables

General

VME interface	Fully supports VME64 Master/Slave
Physical characteristics	One 6U VME slot; 160mm x 233mm

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