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# Model TPRO-VME

Revision 1.0

## Multi-function Timecode Reader/Generator



The TPRO-VME performs timing and synchronization functions referenced to an input timecode signal. The board synchronizes its on-board clock to the incoming timecode. The clock is also provided as an IRIG-B output. Other features include a time-tag TTL input, a 1Mhz TTL output, and two user-configurable TTL pulse rate outputs.

The board continues to increment time ("freewheel") in the absence of an input timecode. Thus, the host computer can set the on-board clock over the VMebus, and the board can be used as an IRIG-B generator.

The input timecode format (IRIG-B, IRIG-A, NASA36, XR3, or 2137) is automatically detected. Synchronization to the input timecode is also automatic and a propagation delay offset may be specified to compensate for cable delays.

Front panel indicators include presence of input timecode and successful synchronization. An option seven segment LED display shows day and time in DDD:HH:MM:SS format.

The timecode input is an amplitude modulated sine wave. The peak amplitude can be between 0.5Vp-p and 8.0Vp-p. The timecode input is differential; the board does not reference this signal to ground. A single-ended input (referenced to ground) is also acceptable.

## VME Interface

The board supports A32, A24, and A16 addressing modes using the standard address modifiers. Other address modifiers can be supported by custom modifications.

All board functions can be generated when time is available or when a time-tag event has occured. The interrupt level (IRQ1-IRQ7) is selected by jumpers, or the user can disable interrupts and poll the status register instead. Customized periodic interrupts are also available.

The VME bus specification permits rows A and C of the P2 backplane connector to be user-defined. The on-board clock time is output as 54 TTL signals on these pins, providing continuous time with zero latency. However, this usage may conflict with other user-specific boards in the system. To prevent such a conflict, order the board with the -32P2 option to eliminate these outputs.

## Features

- IRIG-A, IRIG-B, NASA36, XR3 and 2137 Timecode Reader
- IRIG-B Timecode Generator
- Time-Tag Input
- Two Configurable Pulse Rate Outputs
- A32, A24, or A16 Configurable Base Address
- D08 (O) or D32 Data Words
- Continuous Parallel Time Output

### Ordering Information

Model TPRO-VME (+ option #)

### Options

**–D**
LED Display

**– 32P2**
Eliminate 54-bit output on VME P2 Connector

**–APL1**
Timecode input connected through rear-panel VME P2 connector

**–BO1**
Adds two DC-shift code outputs to the VMEbus P2 connector (cannot be used w/ -32P2 Option)

**–INT32**
Adds a selectable and driven rate output via the BNC connectors

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# Model TPRO-VME

**Multi-function, Customizable, User-programmable**

## Specifications

### Timecode Input

Code Format (Autodetect)
IRIG-A (A132), IRIG-B (B122), NASA36, 2137, XR3

Amplitude
2.6Vp-p (0Vp-p - 6Vp-p)

Polarity
Detected Automatically

Modulation Ratio
2:1 min, 3:1 typ, 4:1 max

Input Impedance
> 10K ohms

Input Time Accuracy
Better than 100 ppm
(not suitable for tape playback)

Common Mode voltage
Differential input, ± 200V max

### IRIG-B Output

Code Format
IRIG-B (B122)

Amplitude (Adjustable)
2.6Vp-p typical

Modulation Ratio (Adjustable)
3:1

Output Impedance
600 Ohms

### Time-tag Input

Input Voltage
-0.5V min, +0.8V max for logic 0
+2.0V min, +5.5V max for logic 1
Tags rising edge

Input Current
<-1.2 mA for logic 0
< 0.5 mA for logic 1

Rise/Fall Time
500 nS max

Repetition Rate
1000 events per second max

Timing Resolution
1 µS

### Parallel Time Outputs

Output Voltage
Logic 1: 2.4V min at 15 mA max
Logic 0: 0.5V max at 2.7 mA max

Strobe
1 Mhz squarewave

Format
BCD, 54-bits, days thru microseconds

### Rate Outputs 1 & 2

Pulse Rates
1 pps, 5 pps, 10 pps, 20 pps, 100 pps, 1 Kpps, 10 Kpps, 50 Kpps, 100 Kpps

Output voltage
Logic 1: 2.4V min at 800 µA max
Logic 0: 0.4V min at 16 mA max

Pulse Width
1.5 µS positive, typical

Timing
Rising Edge on-time

### On-Board Clock

Resolution
1 µS

Range
366:23:59:59:999999

Date Format
Integer (001-366)

Propagation Day Correction
-1000 µS through +8999 µS

Propagation Delay Setting
Programmed over VME Bus

Synchronization Time
<20 seconds

Stability
Disciplined to timecode: $1 \times 10^{-6}$
Undisciplined: $2 \times 10^{-7}$

### VME Interface

Addressing Modes
A32 with address modifiers 09 or 0D
A24 with address modifiers 39 or 3D
A16 with address modifiers 29 or 2D

Data Modes
All functions accessible with D08 (O) (D07-D00)
D16 supported with D15 D08 unused. Time can also be read as two D32 long words.

Time between Accesses
100 µS min

Access Needed
2 (read time, 32-bit mode)
14 (read time, 8-bit mode)
12 (read time-tag, set time)

Interrupts
IRQ1-IRQ7 (jumper selected)
(all functions can be used without interrupts if desired)

Interrupt controller
MC68153

### General

Size
H 261.8 mm, L172.2 mm, D 22.6 mm

Power (from VMEbus)
+5Vdc @ 1.5 Amps max
+12Vdc @ 150 mA max
-12Vdc @ 100 mA max

Operating Temperature
0 to +50 C (+32 to + 122 F) Storage

Storage Temperature
-40 to +60 C (-40 to + 140 F)

### 1Mhz Output

Output Voltage
3.8V min at 4.0 mA max
0.3V max at 4.0 mA max

Duty Cycle
45% min, 50% typ, 55% max

Timing
Rising Edge on-time

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