



# Timecode Reader/Generator

## Model TPRO-PC



- IRIG-A, IRIG-B, NASA36 timecode reader
- IRIG-B timecode generator
- IRIG-B output
- Freewheel capability
- Time-Tag input
- Programmable start/stop time output and interrupt capability

The TPRO-PC performs timing and synchronization functions referenced to an input timecode signal and synchronizes its on-board clock to the incoming timecode. The on-board clock's time is also provided as an IRIG-B output. Other features include a time-tag TTL input, a programmable "heartbeat" pulse or squarewave output (with interrupt capability), and a programmable "match" start/stop time output (with interrupt capability).

The board continues to increment time ("freewheel") in the absence of an input timecode. Thus, the board can be used as an IRIG-B timecode generator by setting the initial time via the bus.

The input timecode format (IRIG-B, IRIG-A, or NASA36) is detected automatically. Synchronization to the input timecode is also automatic and can be enabled/disabled via the bus. A propagation delay offset can be specified to compensate for cable delays.

The timecode input is an amplitude modulated sine wave. An automatic gain control (AGC) circuit offers a wide range of input amplitudes. The timecode input is differential; the board does not reference this signal to ground. A single-ended input (referenced to ground) is also acceptable.

The board can be ordered with Option "-M" to synchronize to a one-pulse-per-second (1 PPS) input instead of an incoming timecode. In this case, the initial time is programmed via the bus and the board begins the count on the next 1 PPS pulse.

### ISA Interface

The TPRO-PC occupies 16 consecutive addresses in I/O (not memory) space. Jumpers allow for selection of base address. A separate jumper can be used to select the interrupt level. All board functions can be used without interrupts, if desired.

All functions can be accessed using 8-bit transfers. In addition, the time can be read with four 16-bit transfers. The board uses binary-coded decimal (BCD) format for setting and reading the time.





## Specifications

### Timecode Input

#### Code Format (Autodetect)

IRIG-A (A132), IRIG-B (B122), NASA36

#### Amplitude

1.2 Vp-p min, 8.0 Vp-p max

#### 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,  $\pm 100$  V max

### Timecode Output

#### Code Format

IRIG-B (B122)

#### Amplitude (Adjustable)

2.6 Vp-p typical

#### Modulation Ratio (Adjustable)

3:1

#### Output Impedance

600 Ohms

### On-Board Clock

#### Resolution

1  $\mu$ S

#### Range

366:23:59:59:999999

#### Date Format

Integer (001–366)

#### Propagation Delay Correction

–1000  $\mu$ S through +8999  $\mu$ S

#### Propagation Delay Setting

Programmed over bus

#### Stability

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

### Time-Tag Input

#### Input Voltage

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

#### Input Current

<5 mA for logic 0 and 1

#### Rise/Fall Time

500 nS max

#### Repetition Rate

1000 events per second maximum

#### Timing Resolution

1  $\mu$ S

### 1 PPS Sync Input

#### Input Voltage

2.4 V min, 16.0 V max (high)

#### Rise/Fall Time

500 nS max

#### Trigger Edge

Rising

#### 1 PPS Accuracy

Must be 100 ppm or better

### Heartbeat Output

#### Output Voltage

High: 3.8 V min at 6 mA  
Low: 0.4 V max at –6 mA

#### Wave Shape

Pulse or squarewave

#### Pulse Width

150 nS min, 450 nS max

#### Pulse Polarity

Negative

#### Squarewave

45% to 55%

#### Timing

Falling edge on-time (pulse or squarewave)

#### Range

1.000  $\mu$ S to 21.845 mS in  $\mu$ S steps  
(1 MHz to 45.7771 Hz)

#### Power-on Default Rate

100 PPS (pulse)

### Match Output

#### Output Voltage

High: 3.8 V min at 6 mA  
Low: 0.4 V max at –6 mA

#### Settability

1  $\mu$ S

### Bus Interface

#### I/O Address

16 consecutive addresses

#### I/O Base Address

000–3F0 (jumper selected)

#### Interrupt Level

IRQ 2–7, 10–12, 14, 15 (jumper selected)

#### Bus Speed

8 MHz max

#### Time Between Accesses

100  $\mu$ S minimum

#### DMA Transfers

None

### General

#### Size

H 107 mm, L 168 mm

#### Power (from ISA bus)

+5 Vdc @ 0.7 mA max  
+12 Vdc @ 175 mA max  
–12 Vdc @ 20 mA max

#### Operating Temperature

–30° to +70° C (–22° to +158° F)

#### Storage Temperature

–40° to +80° C (–40° to +176° F)

#### Connectors

BNC and DB15 depending on  
input/output

### Options

#### –M

Sync to 1 PPS input instead of timecode

#### –HB1PPS

Heartbeat output range (with 1 PPS as  
factory default)

#### –LOR1

Three outputs on three-pin header  
(1 MHz, 1 PPS, GND)

#### –TLLAY2

Reports decoded IRIG-B input bits  
50–98 in the FIFO, in response to user  
command

### Drivers

Major operating systems are supported.

## Ordering Information

Model TPRO-PC (+option #)

0407-TPRO-PC(B)

Specifications subject to change or improvement without notice.  
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