

GPS Timing Board

Model TSAT-PC



- **GPS-synchronized timecode generator**
- **GPS, IRIG-A, IRIG-B, NASA36 timecode reader**
- **IRIG-B timecode generator**
- **Freewheel capability**
- **Time-Tag input**
- **Programmable periodic output (pulse/squarewave) and interrupt**
- **Programmable start/stop time output and interrupt**

The TSAT-PC is a complete system package including the GPS receiver/antenna (housed in a common enclosure) and a circuit card assembly for the bus. The board synchronizes its on-board clock to Coordinated Universal Time (UTC). 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 unlikely event that reception of the satellite signals is lost. When the signals are re-established, the board resumes synchronization automatically.

The GPS satellites provide UTC accurate to one microsecond. A programmable time offset allows for compensation for cable delays. They also provide position (longitude, latitude, and elevation).

ISA Interface

The TSAT-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, ± 100 V max

Timecode Output

Code Format

IRIG-B (B122)

Amplitude (Adjustable)

4.0 Vp-p typical (0 V–20 Vp-p)

Modulation Ratio (Adjustable)

3:1

Output Impedance

600 Ohms

Settability

1 μ S

On-Board Clock

Resolution

1 μ S

Range

366:23:59:59:999999

Date Format

Integer (001–366)

Propagation Delay Correction

–1000 μ S through +8999 μ S
(1 μ S resolution)

Propagation Delay Setting

Programmed over bus

Stability

Disciplined to timecode: 2×10^{-7}

Undisciplined: 1×10^{-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 logic 1

Rise/Fall Time

500 nS max

Repetition Rate

1000 events per second maximum

Timing Resolution

1 μ S

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, 450 nS max

Pulse Polarity

Negative

Squarewave

45% to 55%

Timing

Falling edge on-time (pulse or squarewave)

Range

1.000 μ S to 21.845 μ S in 1 μ 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 μ S

Bus Interface

I/O Address

16 consecutive addresses

I/O Base Address

003-3F0 (jumper selected)

Interrupt Level

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

Bus Speed

8 MHz maximum

Time Between Accesses

100 μ 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)

Operating Temperature

–40° to +80° C (–40° to +176° F)

Connectors

BNC and DB15 depending on input/output

GPS Receiver/Antenna

Number of Satellites

12

Acquisition Time

<50 seconds

Reacquisition Time

<2 seconds

Frequency

1575 MHz (receive only)
(L1 band, C/A code [SPS])

Sync to UTC

Within ± 1.0 μ S max

Position

Horizontal: <9 m

Altitude: <18 m

Size

95 mm Dia., 72.5 mm H
(3.74" Dia., 2.85" H)

Pole Mount

1.00" I.D., 14 turns/inch straight (not tapered)

Operating Temperature

–40° to +85° C (–40° to +185° F)

Storage Temperature

–55° to +105° C (–67° to +221° F)

Antenna Cable

Length

30.5 m ± 0.2 m (100' ± 8 ")

Maximum Length

92 m (300')

Cable Size

9 mm (0.35") O.D.

Connector Size

20 mm (0.75") (antenna end)
Industry standard DB-15 (board end and extension cable)

Options

–HB1PPS

Extended frequency range for heart-beat output

–TRIM-CAB-D-D-100

100' extension cable for GPS antenna

–GPS Optic Isolator

Drivers

Major operating systems are supported.

Ordering Information

Model TSAT-PC (+ option #)