**Timecode Reader/Generator**

**Model TPRO-PC104**

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

The TPRO-PC104 performs timing and synchronization functions referenced to an input timecode signal, synchronizing its on-board clock to this timecode and providing its clock time as an IRIG-B output. Other features include a time-tag TTL input, programmable “heartbeat” pulse or squarewave output (with interrupt capability), and programmable “match” start/stop time output (with interrupt capability).

The board continues to increment time (“freewheel”) in the absence of an input timecode. It can serve as an IRIG-B timecode generator after initial time is set via the bus.

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

An automatic gain control (AGC) circuit permits a wide range of input timecode 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. One-pulse-per-second (1 PPS) input synchronization is also available (Option “–M”). In this case, the initial time is programmed via the ISA bus and the board begins counting on the next 1 PPS pulse.

**PC104 Interface**

The board occupies 16 consecutive addresses in I/O (not memory) space. Base address and interrupt level are selected using jumpers. All board functions can be used without interrupts and can be accessed using 8-bit transfers. The time can also be read using four 16-bit transfers. Binary-coded decimal (BCD) format is used 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):** 2.6 Vp-p typical
- **Modulation Ratio (Adjustable):** 3:1
- **Output Impedance:** 600 Ohms

### On-Board Clock
- **Resolution:** 1 μS
- **Range:** 366:23:59:999999
- **Date Format:** Integer (001–366)
- **Propagation Delay Correction:** –1000 μS through +8999 μS
- **Propagation Delay Setting:** Programmed over PC104 bus
- **Stability:** Disciplined to timecode: 2 x 10^-7
  Undisciplined: 1 x 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 μS

### 1 PPS Sync Input (Option –M only)
- **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 32 mA (source)
  Low: 0.4 V max at –645 mA (sink)
- **Wave Shape:** Pulse or squarewave (programmable)
- **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 μS to 21.845 μS in μS increments
  (1 MHz to 45.7771 Hz)
- **Power-on Default Rate:** 100 PPS (pulse)

### Match Output
- **Output Voltage:**
  High: 3.8 V min at 32 mA (source)
  Low: 0.4 V max at –64 mA (sink)
- **Settability:** 1 μS

### Bus Interface
- **I/O Address:** 16 consecutive addresses
- **I/O Base Address:** 0000–0FF00 (jumper selected)
- **Interrupt Level:** IRQ 2–7, 10–12, 14, 15 (jumper selected)
- **Time Between Accesses:** 100 μS minimum
- **Necessary Accesses:**
  4 (read time, 16-bit mode)
  14 (read time, 8-bit FIFO mode)
  12 (read time-tag, 8-bit FIFO mode)
  11 (set time, heartbeat, or match)
- **DMA Transfers:** None

### General
- **Size:** H 95.89 mm, L 90.17 mm
- **Power (from ISA bus):**
  +5 Vdc @ 0.7 mA max
  +12 Vdc @ 175 mA max
  –12 Vdc @ 20 mA max
- **Operating Temperature:** –30º to +70º C (–22º to +158º F)
- **Storage Temperature:** –40º to +80º C (–40º to +176º F)
- **Connectors:** BNC and DB15 depending on input/output

### Drivers
- Major operating systems are supported.

### Ordering Information
- **Model TPRO-PC104 (+option #)**

### Options
- **–M:** Sync to 1 PPS input instead of timecode
- **–HB1PPS:** 1 PPS heart beat output
- **–FXB:** RS-422 driver for heart beat output (includes -HB1PPS)
- **–LOR1:** Three outputs (1MHz, 1 PPS, GND)