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# Model GPS-VME

## GPS Synchronized VME Plug-In Card

The Model GPS-VME is a 6U, VME compatible circuit card that supplies precise time to a VME-based computer. The GPS-VME operates as a stand-alone generator or it may be synchronized to either the GPS system or an external IRIG reference. BCD time, microseconds through years, is supplied to the computer bus. In the stand-alone mode, the generator time can be preset by the user and started and stopped under software control.

GPS time information and status is available to the VME computer bus in five, packed, 16-bit BCD words. Since no time ready flags must be set before time information can be read, the time data is available with zero latency. On-board DIP switches select the memory address space where the board resides.

Two independent time-freeze registers provide time on request from the VME bus, or in response to an externally generated pulse. The rate generator can be configured to output a pulse and produce interrupts at selected intervals. Four independently programmable interrupts are available and each has software selectable priority. The dual time compare feature can generate output pulses and interrupts with microsecond resolution. In the stand-alone mode, generator time is preset, started and stopped under software control.

The IRIG B code generator provides the capability to generate and output both 1 kHz amplitude modulated IRIG B and IRIG B using RS-422 levels. The code generator feature enables the GPS-VME to provide time code for remote displays, tape recorders, and other time code equipment in locations where IRIG B is not otherwise available.

The front panel display option provides time, date, position and operational status to the user. The display consists of four lines of high-intensity LED alphanumeric characters and a push-button select switch.

In a master/slave configuration IRIG B with RS-422 levels can be used to transfer time. The RS-422 format is useful when long cable runs and/or precise time transfer are required.

## Specifications GPS-VME

### GPS SYNCHRONIZED MODE

**Timing Accuracy:** Less than 1 microsecond to UTC

**Position Accuracy:** 25 meters (without SA)

**Receiver Input:** 1575 MHz L1 C/A code

**Tracking:** 6 parallel channels

**Internal Oscillator:**  $1 \times 10^{-6}$ , 0°C to +50°C

**Aquisition Time:** <20 minutes per initial acquisition,  
5 minutes thereafter

**Local Offset:**  $\pm 12$  hours

**Antenna:** A-1575MS-DSK. 1575 MHz, microstrip with 40 dB gain. All-weather, outdoor mounting. 100' cable supplied.

### SYNCHRONIZED GENERATOR MODE

**Analog Input Code:** IRIG B

**Ratio:** 2:1 to 5:1

**Amplitude:** 0.1 to 10 Vpp

**Impedance:** 10k ohms to GND; DC shift (RS-422)

**Timing Accuracy:** 1 microsecond

**Connector:** BNC or P2

**RS-422 Input Code:** IRIG B  
**Timing Accuracy:** 500 nanoseconds  
**Connector:** P2

**Error Bypass:** 3 frames

## STAND-ALONE GENERATOR MODE

Generator time may be started, stopped, and preset to within 1 millisecond.

## GENERAL SPECIFICATIONS

### IRIG B Serial-Code Output (Analog):

**Amplitude:** Adjustable 0 V to 10 Vpp  
**Impedance:** 10k ohms to ground  
**Ratio:** Adjustable 2:1 to 5:1  
**Connector:** Front panel BNC, P2

### IRIG B Serial Code Outputs, Level Shift:

**DC Shift:** 0 V, 5 V @  $\pm 6$  mA  
**RS-422:** RS-422, TTL levels  
**Connector:** Both signals on P2 connector

### Oscillator:

**Accuracy:** Disciplines to input code to  $1 \times 10^{-8}$   
**Stability:** 1 PPM, 0°C to +50°C

### 1 PPS Pulse Rate:

**Level:** 0 V, 5 V @  $\pm 6$  mA  
**Timing:** Positive going on time  
**Duty Cycle:** 20%

**Leap Year:** Calculated automatically using year information

### Programmable Pulse Rate Output:

**Rates:** Configured to produce interrupt and freeze time at selected rates (1 PPS, 10 PPS, 100 PPS, 1 kPPS, 10 kPPS)  
**Timing:** Positive going  
**Level:** 0 V, 5 V @  $\pm 6$  mA  
**Connector:** P2

### External Event Input:

**Edge:** Selectable rising or falling  
**Input Voltage:** 0 V low, 2.5<5 Vdc high  
**Input Impedance:** 4.7k ohms to 5 Vdc  
**Connector:** BNC or P2  
**Resolution:** Days through microseconds

### External Generator Start Input:

**Timing:** Selectable positive or negative edge  
**Level:** 0 V, 5 Vdc  
**Impedance:** 4.7k ohms  
**Connector:** P2

### Dual Time Compare Output:

Outputs a pulse at the programmed compare time #1  
 Outputs a pulse at the programmed compare time #2  
**Resolution:** Days through microseconds  
**Pulse Width:** Two milliseconds  
**Compare Mask:** Days through milliseconds  
**Outputs:** On P2 connector  
**Level:** Positive going at the respective compare time

## CONTROLS

The GPS-VME is configured as an A16/D16 slave board responding to the Address Modifier codes hex 29 (short nonprivileged) and hex 2D (short supervisory). The GPS-VME can be memory mapped on any 256-byte boundary of the VME bus short address space using the eight position DIP switch located on the board.

All controls are software selectable via the VME bus.

**Data Format:** Time of year and status are supplied to the VME bus in five packed, 16-bit, BCD words as follows:

Word	1	2	3	4	5
Word 1 -	Umsec	Husec	Tusec	Uusec	
Word 2 -	Tsec	Usec	Hmsec	Tmsec	
Word 3 -	Thours	Uhours	Tmin	Umin	
Word 4 -	Status	Hdays	Tdays	Udays	
Word 5 -	THyear	Hyear	Tyear	Uyear	

**Access Time:** Falling edge of /DSA to falling edge of /DTAK is 400 ns

**Interrupts:** Each of the four independent interrupts can be configured to any of the seven priority levels. Available interrupt sources are:  
 INT0 - External event  
 INT1 - Programmed rate generator  
 INT2 - Programmed compare time #1  
 INT3 - Programmed compare time #2

**Indicator LEDs:** Phase lock and error status 1 PPS and power.

## ENVIRONMENTAL & MECHANICAL

**Operating Temperature:** 0°C to +50°C

**Storage Temperature:** -17°C to +85°C

**MTBF:** >23,000 hours (per MIL-HDBK-217-E)

**Humidity:** To 95%, noncondensing

**Power:** 5 V @ 1A (1.2 A with optional display)  
 12 V @ 50 mA  
 -12 V @ 50 mA

**Size:** Standard VME single-wide board (6U)

### Antenna:

**Mounting:** 3/4" NPT pipe  
**Operating Temperature:** -40°C to +70°C  
**Storage Temperature:** -55°C to +85°C  
**Size:** 2.6" x 1.5"  
**Weight:** 1 lb. (.48 kg)

## Options

- **Optional LED Display:** 4 lines, 16 characters. Time of year, date, mode, sync status, and self-test. Increases size to double-wide.
- **VXI Converter Option:** A VME-to-VXI adapter permits the VME-SG 2 to operate in a VXI environment. Full control of the VME-SG 2 is available, including access to the P2 connector signals. Please consult the factory for details.
- **Input Codes:** Various input formats such as IRIG A and MILA

Several other bus-level products meet a wide array of input and output code requirements. Contact TrueTime to identify the most appropriate product for your needs.

*Specifications subject to change without notice.*



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