

## Model 1088B GPS Satellite-Controlled Clock



The Arbiter Systems<sup>®</sup>, Inc. Model 1088B GPS Satellite-Controlled Clock provides unprecedented flexibility, performance, and value for worldwide timing applications. Combining GPS accuracy and ease of use with exceptionally flexible interface features and options in a space-saving package, the Model 1088B offers unparalleled value in GPS-synchronized clocks.

### Flexibility

Offering standard operation from worldwide AC power sources, plus 110 to 275 Vdc sources (also standard), the Model 1088B integrates into most environments with no options required. Optional power configurations include terminal-strip power inlet (1088opt07), surge-withstand capability (1088opt15) and 10 to 60 Vdc operation (1088opt08).

Standard user-configurable input/output (I/O) capabilities provide over 260,000 possible configurations, with 22 different available signals, in the standard unit alone. With the addition of the available options, trillions of combinations are possible!

The available I/O options add a wide variety of capabilities to the Model 1088B. Additional outputs are available in a variety of formats, including fiber optic. High-performance internal oscillators are also available.

With Option 28, the Model 1088B is a Power System Time, Frequency and Phase Monitor with state-of-the-art accuracy.

### Performance

The Model 1088B offers full-specified GPS timing accuracy of 100 ns rms from UTC/USNO. Typical performance is less than 40 ns rms. The Model 1088B provides this performance 24 hours a day, anywhere in the world.

### Value

The Model 1088B GPS Satellite-Controlled Clock was designed from the beginning to offer the greatest possible flexibility and value for a wide range of applications. See what we mean – compare the unmatched flexibility, performance, and value for yourself – put the Model 1088B to work in your system today!

### Related Products

If your application does not require the outstanding flexibility and configurability of the Model 1088B, consider Models 1084A/B/C, 1092A/B/C and 1093A/B/C. All offer significant cost savings and many of the most-needed features of the Model 1088B.

Redundant configurations are available for applications that require even more resistance to loss of GPS synchronization. The redundant configuration consists of two clocks with clock-to-clock communications and an interconnect arbiter.

## Model 1088B Specifications

### Receiver Characteristics

#### Timing Accuracy

Specifications apply at the 1 PPS output, in the presence of Selective Availability (SA), as of date of publication.

UTC/USNO  $\pm 50$  ns rms, when receiving 4 or more satellites and Position-Hold Mode on

UTC/USNO  $\pm 100$  ns rms, receiving a single satellite and Position-Hold Mode on

UTC/USNO  $\pm 200$  ns rms, when receiving 4 or more satellites and Position-Hold Mode off

#### Synchronization

CMOS output signals are synchronized to the 1 PPS output,  $\pm 50$  ns, maximum.

IRIG-B modulated,  $\pm 1$   $\mu$ s, maximum

The leading edge of the start bit of a received RS-232 data message may be selected to trigger the Event A input, providing synchronization with 100 ns resolution.

#### Position Accuracy

25 meters, SA off

100 meters, SA on

Altitude, 140 meters, SA on

All specifications rms, 95% confidence, with Position-Hold Mode off and receiving at least four satellites

#### Satellite Tracking

Twelve (12) channel, GPS-L1, C/A code (1575.42 MHz). Receiver simultaneously tracks up to twelve satellites. Results from all tracked satellites are averaged in Position-Hold Mode or, with Position-Hold Mode off, using least-squares estimation.

#### Acquisition

2 minutes typical

25 minutes, 90% confidence, cold start

66 seconds, 90% confidence, with almanac less than 1 month old

30 seconds, 90% confidence, with ephemeris less than 4 hours old

The GPS Data Backup Battery is included in the Model 1088B. This feature improves acquisition time by supplying constant power to the real-time clock and RAM in the GPS receiver module.

### I/O Configuration



#### Connectors

Four, BNC, user-configurable. Each connector is configurable as a specific input function or as any one of 22 output functions, listed below, by means of internal, push-on jumpers. Each output connector is independently buffered. Configuration is easily changed in the field. Refer to the options section for more outputs.

Analog outputs are op-amp (LF353) followers with 560-ohm protective resistors.

CMOS outputs are buffer type (74HC126) with 47-ohm source resistors.

#### Input Functions

Channel A	Event or 1 PPS: 5 V TTL/CMOS level
Channel B	Event or 1 PPS: 5 V TTL/CMOS level
Freq. Reference	5 V TTL/CMOS or AC-coupled; 100 kHz, 1 MHz, 5 MHz, or 10 MHz

#### Output Functions

Analog	IRIG-B, 1 kHz modulated, 10 Vp-p 1 PPS deviation; $\pm 5$ V at 10 $\mu$ s/V
5 V CMOS	IRIG-B, E, D, or H, DC level-shift 1 PPS, 1 PPM, 1 PPH 1, 10, 50, 60, or 100 PPS 1k, 10k, or 100k PPS 1M, 5M, or 10M PPS Locked Programmable Pulse IRIG-B modified Manchester (IEEE Standard 1344)

#### Event A/B Inputs

Two inputs are available, each having 100 ns timing resolution. Each input may be configured to accept an external 1 PPS signal, and measure the deviation from 1 PPS/GPS or to record up to 300 sequential events (separated by 11 ms). Event data is logged in battery-backed RAM and may be read or cleared from the front panel or RS-232 interface.

## Model 1088B Specifications

### I/O Configuration (Continued)

#### Programmable Pulse Output

Four modes:

- Every 1 to 60,000 seconds, starts top of the minute
- Hourly at a specified offset
- Daily at a specified time of day
- One shot at a specified time of year

Pulse duration is programmable from 0.01 to 600 seconds, except in one-shot mode, where the output is Low prior to the specified time and High thereafter.

### Interface

#### Operator

Display	2 x 20 character supertwist LCD
Functions	Time: UTC or local Position: latitude, longitude, altitude Receiver and clock status 1 PPS (input) deviation Event time
Status LEDs	Operate (green) On Line (green) Unlocked (red) Fault (red) Battery Charge (green) Battery in Use (green) Battery Low (red)
Keyboard	Eight keys
Setup	Local time offset Output code select: Local/UTC Daylight Saving Time: On/Off/Automatic Backlight control: On/Off/Automatic Event input: Event/1 PPS, for each input A and B Programmable Pulse setup Antenna delay Clock offset Out-of-Lock time: 1 to 99 minute(s), Off, or Zero Delay Auto-Survey: On/Off, Survey duration Position Hold: On/Off, Position Auto/Manual Option Configuration and Setup Recorder output A/B Frequency Reference: standard (internal) or external Serial port: RS-232

### Interface (Continued)

#### System

RS-232	1200 to 19,200 baud; 7 or 8 data bits; 1 or 2 stop bits; even/odd/no parity Has Interrogate (normal) and six Broadcast modes: standard ASCII (IRIG-J), Vorne large-display, status/ alarm, extended ASCII, event data, and ASCII with time-quality Male 9-pin D-sub
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### Power Requirements

#### Standard

Voltage	85 to 264 Vac, 47 to 440 Hz, 20 VA max. or 110 to 275 Vdc, 15 W maximum
Inlet	IEC-320 with fuse and mating cordset. Specify cordset P1-P10.

### General

#### Physical

Size	1 RU rack mount or tabletop; 260 mm deep FMS. Rack mounts included. 508 x 381 x 203 mm (20 x 15 x 8 in.), shipping
Weight	2 kg (4.5 lbs), net 5.5 kg (12 lbs), shipping
Antenna	0.75 in. pipe (1 in. - 14 marine) thread Cable Connection: F-type Size: 77.5 dia. x 66.2 mm (3.05 x 2.61 in.) Weight: 170 grams (6.0 oz)
Antenna Cable	RG-6 type, 15 m (50 ft) provided Weight: 0.69 kg (1.52 lbs) per 15 m

#### Environmental

Temperature	Operating: 0° to +50° C (-20° to +70° C typical) Nonoperating: -40° to +75° C
Humidity	Noncondensing
EMC	Radiated susceptibility: passes walkie-talkie test Conducted emissions: power supply complies with FCC 20780, Class A and VDE 0871/6.78 Class A Surge withstand capability (SWC), power inlet: designed to meet ANSI/IEEE C37.90-1 and IEC 801-4

## Model 1088B Options

### Certifications and Approvals

CE mark/label and certificate

### Options

There are two internal option slots in the Model 1088B and options fit into two categories: those that require internal option slot space, and those that do not. Only one option may occupy the individual Option Slots. Available options are listed below and described in the Options and Accessories section, starting on page 32.

#### I/O

Description	Order No.
Four Additional Configurable Outputs	1088opt03 <sup>1</sup>
Parallel BCD Output 1 ms Resolution	1088opt04 <sup>2</sup>
BCD with Second RS-232 Port	1088opt17 <sup>2</sup>
Second RS-232	1088opt17A <sup>2</sup>
Self-Monitor IRIG-B Distribution System and Second RS-232 Port	1088opt18 <sup>2</sup>
Out-of-Lock Relay 1 Form C (SPDT)	1088opt19 <sup>2</sup>
Four Configurable Fiber-Optic Outputs	1088opt20A <sup>1</sup>
COMTRADE Sample Rate Generator	1088opt23 <sup>3</sup>
Extended BCD Output	1088opt24 <sup>2</sup>
8-Channel High-Drive IRIG-B Output	1088opt27 <sup>2</sup>
Power System Time, Frequency and Phase Monitor	1088opt28 <sup>1</sup>
Four Additional Outputs with Dry Contact and +25/50 Vdc	1088opt29 <sup>2</sup>
Internal Network Time Protocol (NTP) Server	1088opt32 <sup>2</sup>

#### Power (select only one)

Description	Order No.
IEC-320 Power Inlet, 85 to 264 Vac, 110 to 275 Vdc	Included
Terminal Power Strip, 85 to 264 Vac, 110 to 275 Vdc	1088opt07
Terminal Power Strip, 10 to 60 Vdc	1088opt08
Surge Withstand & Terminal Strip 125 Vdc	1088opt15A
Surge Withstand & Terminal Strip 250 Vdc	1088opt15B

Available cordset plug style and specifications are described in the *Options/Accessories* section, page 35.

### Options (Continued)

#### Oscillator and Timing

Description	Order No.
OCXO and Four Additional Configurable Outputs	1088opt12 <sup>1</sup>

#### General

Description	Order No.
LCD Backlight	1088opt01

### Accessories

#### Included

Description	Order No.
GPS Antenna, pipe mountable	AS0076200
15 m (50 ft) RG-6 Antenna Cable	CA0021315
Rack Mount Kit	AS0028200
Operation Manual	AS0029900
Power Cord (see page 35)	P01-P10

#### Available

Description	Order No.
15 m (50 ft) RG-6 Antenna Cable	CA0021315
30 m (100 ft) RG-6 Antenna Cable	CA0021330
45 m (150 ft) RG-6 Antenna Cable	CA0021345
60 m (200 ft) RG-6 Antenna Cable	CA0021360
75 m (250 ft) RG-6 Antenna Cable	CA0021375
GPS Antenna Mounting Kit	AS0044600
21 dB In-Line Preamplicifier	AS0044700 <sup>4</sup>
GPS Surge Protector Kit	AS0049000
Antenna Grounding Block Kit	AS0048900
300 m (1000 ft) Roll RG-11 Cable	WC0004900
RG-6 Crimp Tool	TF0006400
RG-11 Crimp Tool + 25 F-type Connectors	AS0044800
High Interference GPS Antenna and Mounting Adapter Kit	AS0062000
Rack Slide Kit	AS0033100

<sup>1</sup> Uses Option Slot A

<sup>2</sup> Uses Option Slot B

<sup>3</sup> Uses either Option Slot A or B

<sup>4</sup> Used for cable length greater than 75 m (250 ft)