Model 1088B
GPS Satellite-Controlled Clock

The Arbiter Systems®, 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 350 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.

ARBITER SYSTEMS

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 ±50 ns rms, when receiving 4 or more satellites and Position-Hold Mode on

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

UTC/USNO ±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, ±50 ns, maximum.

IRIG-B modulated, ±1 µs, 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

10 meters, rms, 90% confidence

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

150 seconds typical, cold start

15 minutes, 90% confidence, cold start

40 seconds, typical, with almanac < 1 month old

15 seconds, typical, with ephemeris < 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; ±5 V at 10 µs/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

Power Requirements

Standard

Voltage	85 to 264 Vac, 47 to 440 Hz, 20 VA max. or 110 to 350 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 Specifications

<table>
<tr><td colspan="2">

Options

</td><td colspan="2">

Certifications and Approvals

</td></tr>
</table>

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.

I/O

Description	Order No.
Four Additional Configurable Outputs	1088opt03[1]
Parallel BCD Output 1 ms Resolution	1088opt04[2]
BCD with Second RS-232 Port	1088opt17[2]
Second RS-232	1088opt17A[2]
Self-Monitor IRIG-B Distribution System and Second RS-232 Port	1088opt18[2]
Out-of-Lock Relay 1 Form C (SPDT)	1088opt19[2]
Four Configurable Fiber-Optic Outputs	1088opt20A[1]
COMTRADE Sample Rate Generator	1088opt23[3]
Extended BCD Output	1088opt24[2]
8-Channel High-Drive IRIG-B Output	1088opt27[2]
Power System Time, Frequency and Phase Monitor	1088opt28[1]
Four Additional Outputs with Dry Contact and +25/50 Vdc	1088opt29[2]
Network Time Protocol (NTP) / Precision Time Protocol (PTP) Server	1088opt34[2]

Power (select only one)

Description	Order No.
IEC-320 Power Inlet, 85 to 264 Vac, 110 to 370 Vdc	Included
Terminal Power Strip, 85 to 264 Vac, 110 to 370 Vdc	1088opt07
Terminal Power Strip, 10 to 60 Vdc	1088opt08
Terminal Power Strip, Surge Withstand 110 to 170 Vdc	1088opt15A
Terminal Power Strip, Surge Withstand 110 to 300 Vdc	1088opt15B

Oscillator and Timing

Description	Order No.
OCXO and Four Additional Configurable Outputs	1088opt12[1]

General

Description	Order No.
LCD Backlight	1088opt01

Certifications and Approvals

CE mark/label and certificate

Accessories

Included

Description	Order No.
GPS Antenna, pipe mountable	AS0087800
15 m (50 ft) RG-6 Antenna Cable	CA0021315
19 in. Rack Mount Kit	AS0028200
Operation Manual	AS0029900
Power Cord	P09

Available

Description	Order No.
Power Cord	P01-P10
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 Preamplifier	AS0044700[4]
Antenna Grounding Block Kit	AS0048900
GPS Surge Protector	AS0094500
GPS Antenna Cable Splitter	AP0013400
BNC (Male) Breakout to 100 mm Wires	AP0003400
BNC (Female) Breakout to 100 mm Wires	AP0008900
300 m (1000 ft) Roll RG-6 Cable	WC0005000
RG-6 Stripping Tool	TF0013200
RG-6 Type F Crimp Tool	TF0006400
RG-6 Type F Male Crimp-on Connector	CN0027700
300 m (1000 ft) Roll RG-11 Cable	WC0004900
RG-11 Stripping Tool	TF0013300
RG-11 Type F Crimp Tool	TF0006000
RG-11 Type F Male Crimp-on Connector	CN0027800
19 in. Rack Slide Kit	AS0033100
24 in. Rack Mount Kit	AS0056600

[1] Uses Option Slot A
[2] Uses Option Slot B
[3] Uses either Option Slot A or B
[4] Used for cable length greater than 75 m (250 ft)

Model 1088B Specifications

Cordset and Plug Styles

The following are the available IEC-320 mating cordset plug style and specifications:

Option No.	Country	Specification	Voltage Rating
P01	Continental Europe	CEE 7/7	220V
P02	Australia/NZ/ PRC	AS 3112- 1981	240V
P03	U.K.	BS 1363	240V
P04	Denmark	Afsnit 107-2-01	240V
P05	India	BS 546	220V
P06	Israel	SI 32	220V
P07	Italy	CEI 23-16/VII 1971	220V
P08	Switzerland	SEV 1011.1959	220V
P09	North America and ROC	NEMA 5-15P CSA C22.2 #42	120V
P10	Japan	JIS8303	120V