Model 1202B/C
GNSS Synchronized Clock

The Arbiter Systems® Model 1202B/C GNSS Synchronized Clock is a multi-satellite system (GPS/GLONASS/Galileo/BeiDou) timing source for precision applications. Arbiter Systems’ next-generation substation clock provides enhanced performance and security (EPS) while supporting the standard outputs and popular options of our existing clocks. EPS benefits include multi-system timing sources, standard holdover oscillator, multiple levels of user security, secure communications, and anti-spoofing technology. The Model 1202B/C is compatible with Arbiter Systems’ earlier clock models, supporting the same legacy options and outputs, while enabling the transition to a more secure device.

The Model 1202 is available in two versions. The Model 1202B has eight status LEDs, an LCD setup/status back-lit display, and a keyboard. The Model 1202C adds a large (20 mm or 0.8 in) LED time display. Both versions have 72 receiver channels, capable of tracking all visible GNSS satellites simultaneously, providing optimum performance. The Model 1202B/C has 100 ns worst-case accuracy to meet the requirements of a broad range of applications from relay synchronization to synchrophasor timing. The standard holdover oscillator maintains 1 ms/24 h accuracy when not tracking satellites. In addition to enhanced performance, Arbiter Systems' new EPS technology provides six levels of user security selectable from Level 0 security (none) to Level 5 security (front panel display, keyboard, and legacy serial commands disabled). Spoofing concerns are a thing of the past with patent pending anti-spoofing algorithms, multi-system satellite tracking, and holdover oscillators that limit the time error to the holdover oscillator specification. If spoofing is suspected/detected, the user is alerted by the ALARM indicator.

Six BNC outputs (3 programmable high-drive and 3 jumper configurable) provide IRIG-B unmodulated, 1 PPS, and Programmable Pulse, Modulated IRIG-B outputs along with an Event Input. The three high drive outputs are independently set to any of the programmable pulse modes and provide ±125 mA of drive current. The three configurable outputs are selectable for 5 V CMOS bus drivers (±75 mA drive capability); 4 Vpp, 20 ohms source impedance (IRIG-B modulated only) drivers; or an event timer channel with 100 ns resolution. The event function may be driven by the start bit of a received character on the serial port or an external 5 V CMOS/TTL signal on one of the BNC connectors. The Model 1202B/C comes standard with one DB-9 communication port and the option to add a second port. An RS-422/485 transmit only driver is standard on the main communication port.

Two SPDT (form C) fail-safe relays are also included and are configurable to Out-of-Lock, Fault, Alarm, Stabilized, or Programmable Pulse. The Model 1202B/C accepts one or two power supplies in a redundant configuration. Standard power options include a universal 100 Vac to 240 Vac/100 Vdc to 350 Vdc or 24 Vdc supplies with secure terminal strip inlets and surge-withstand capability. The surge-withstand network is designed to meet ANSI/IEEE C37.90-1 and IEC 61000-4 specifications. Available options include Four Additional Configurable Outputs; High Drive IRIG-B Outputs; Power System Time, Frequency, and Phase Monitor; NTP/PTP Server.
Model 1202B/C Specifications

Receiver Characteristics

Timing Accuracy
Specifications apply at the 1 PPS/IRIG-B/PP outputs when receiving four or more satellites, as of date of publication.

UTC/USNO ± 100 ns peak
± 40 ns typical

Holdover Oscillator
Standard OCXO, 1 ms/24 h
Patents High-Reliability Holdover Method and Topologies: No. US 9,326,926 & US 9,979,406 B2

Position Accuracy
2 meters, rms

Satellite Tracking
Seventy-two (72) channel receiver: L1 GPS C/A, L1 GLONASS CT, Galileo, BeiDou.

Acquisition
55 seconds, typical, cold start
25 seconds, typical, warm start
3 seconds, typical, hot start

I/O Configuration

IRIG-B
One IRIG-B channel that controls both the unmodulated and modulated outputs. Configurable to Local or UTC time with C37.118.1 on or off, settings independent from Programmable Pulse IRIG-B output.

Relays
Two Form C (SPDT) fail-safe, 8 A at 250 Vac; configurable to Out-of-Lock, Fault, Alarm, Stabilized, or Programmable Pulse

Event
One event timer channel with 100 ns resolution is standard. This function may be driven by the start bit of a received character on the serial port or an external 5 V CMOS/TTL signal at one of the terminal strip connectors (jumper-selectable).

I/O Configuration (Continued)

Programmable Pulse
Four programmable pulse outputs (one jumper configurable to ports 1-3 and 1 each for ports 4-6).

Modes:
• IRIG-B unmodulated (UTC/Local, C37.118.1 On/Off)
• IRIG-B manchester (UTC/Local, C37.118.1 On/Off)
• Every 1 to 60,000 seconds, starts top of the second
• Hourly at a specified offset
• Daily at a specified time of day
• One shot at a specified time of year
• Slow Code (UTC/LCL)
• DCF-77
• 1 KHz
• 100 Hz

Pulse polarity and pulse duration are programmable, duration from 0.01 to 600 seconds, except in one-shot mode, where the output is Low prior to the specified time and High thereafter. IRIG-B settings independent from main IRIG-B signal.

Connectors
Six BNC connectors:
Port 1: IRIG-B unmodulated, 1 PPS, Programmable Pulse or Event Input; jumper-selectable
Port 2: IRIG-B unmodulated, 1 PPS, Programmable Pulse, IRIG-B Modified Manchester or IRIG-B modulated; jumper-selectable
Port 3: IRIG-B unmodulated, 1 PPS, Programmable Pulse or IRIG-B modulated; jumper-selectable
Port 4: High-drive Programmable Pulse
Port 5: High-drive Programmable Pulse
Port 6: High-drive Programmable Pulse

Jumper-selectable outputs are 5 V CMOS bus drivers with 10 ohms source impedance and ± 75 mA drive capability or 4 Vpp, 20 ohms source impedance (IRIG-B modulated only). High-drive outputs are 5 V FET drivers with ± 125 mA drive capability.
**Model 1202B/C Specifications**

### Interface

#### Operator
- **Display**: 2 x 20 character supertwist LCD
- **White LED backlight**
- **20 mm (0.8 in) LED; 6 digits (Model 1202C)**

#### Functions
- **Time and date**
- **Antenna status and position**
- **Timing status**
- **System status**

#### Status LEDs
- Normal (green)
- Learn (orange)
- Unlocked (red)
- Alarm (red)
- Operate (green)
- Power A (green)
- Power B (green)
- Fault (red)

#### Keypad
- 8 keys; select display functions or setup menus

#### Setup
- **COM 1 (RS-232 port 1)**
- **Local time offset**
- **Out-of-Lock Time**
- **Relay Configuration**
- **Backlight Control**
- **Event/Deviation**
- **Programmable Pulse**
- **System Delays**
- **IRIG Time Data**
- **Option Configuration**

#### System
- **RS-232**: 1200 baud to 230400 baud; 7 or 8 data bits; 1 or 2 stop bits; even/odd/no parity
- **2 Male 9-pin D-subminiature**
- Includes the following broadcast modes: Interrogate (default), standard ASCII (IRIG-J), Vorne large-display, status/alarm, extended ASCII, event data, ASCII with time-quality, ASCII with year and user configurable serial time code

- **COM1**
  - RS-232 (TXD, RXD, GND)
  - RS-422/485 (TXD+, TXD-)

- **COM2** (optional)
  - RS-232 (TXD, RXD, GND)

### Power Requirements
- Accommodates any combination of the two available power supplies in a single or redundant configuration. Choices include an universal supply or a low dc supply, both with surge withstand capability.

#### Universal
- **Voltage**: 100 Vac to 240 Vac, 47 to 440 Hz, 20 VA max.
- **Inlet**: Secure Pluggable Terminal Strip

#### Low DC
- **Voltage**: 24 Vdc/48 Vdc (22 Vdc to 67 Vdc), 30 W max.
- **Inlet**: Secure Pluggable Terminal Strip

### General

#### Physical
- **Size**: 438 mm x 280 mm x 44 mm (17.25 in x 11 in x 1.75 in)
- **Weight**: 2 kg (4.5 lbs), net
- **5.5 kg (12 lbs), shipping**

- **Ground Block**: Antenna protective ground
- **Copper, with M5 (10-32) stud and nut**
- **Internal lightning surge suppressor (GDT)**

- **Antenna**: 3/4 in NPT (1 in - 14 marine) thread
- **Cable Connection**: F-type
- **Temperature**: -55 °C to + 65 °C
- **Size**: 80 mm dia. x 84 mm (3.2 in x 3.3 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: - 40 °C to + 65 °C
  - Nonoperating: - 40 °C to + 75 °C

- **Humidity**: Noncondensing

- **EMC**: 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 61000-4
# Model 1202B/C Specifications

## Options

One option can be selected from each of the categories listed below; except Power Supply which accommodates two. One power supply and holdover oscillator must be specified.

<table>
<thead>
<tr>
<th>Description</th>
<th>Order No.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Power Supply</strong></td>
<td></td>
</tr>
<tr>
<td>Terminal Power Strip, Surge Withstand, 100 Vac to 240 Vac, 100 Vdc to 350 Vdc</td>
<td>A01/B01</td>
</tr>
<tr>
<td>Terminal Power Strip, Surge Withstand, 24 Vdc/48 Vdc (22 Vdc to 67 Vdc)</td>
<td>A02/B02</td>
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<tr>
<td><strong>Holdover Oscillator</strong></td>
<td></td>
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<tr>
<td>Holdover OCXO 1 ms/24 h</td>
<td>C01</td>
</tr>
<tr>
<td><strong>Main Board I/O</strong></td>
<td></td>
</tr>
<tr>
<td>Single Configurable Fiber-Optic Output</td>
<td>D01</td>
</tr>
<tr>
<td><strong>Slot A</strong></td>
<td></td>
</tr>
<tr>
<td>Second RS-232 Port</td>
<td>E01</td>
</tr>
<tr>
<td><strong>Slot B</strong></td>
<td></td>
</tr>
<tr>
<td>Four Configurable Outputs</td>
<td>F01</td>
</tr>
<tr>
<td>Four Configurable Fiber-Optic Outputs</td>
<td>F02</td>
</tr>
<tr>
<td>Eight-Channel High-Drive IRIG-B Output</td>
<td>F03</td>
</tr>
<tr>
<td>Power System Time, Frequency and Phase Monitor</td>
<td>F04</td>
</tr>
<tr>
<td>Four Additional Outputs with Dry Contact and +25/50 Vdc</td>
<td>F05</td>
</tr>
<tr>
<td>NTP/PTP Server Copper/Copper</td>
<td>F06</td>
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<tr>
<td>NTP/PTP Server Copper/Fiber</td>
<td>F07</td>
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<tr>
<td>NTP/PTP Server Fiber/Fiber</td>
<td>F08</td>
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## Accessories

<table>
<thead>
<tr>
<th>Description</th>
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<tbody>
<tr>
<td><strong>Included</strong></td>
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<tr>
<td>GNSS Antenna, pipe mountable</td>
<td>AS0099200</td>
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<tr>
<td>Quick Setup Guide</td>
<td>PD0055700</td>
</tr>
<tr>
<td>15 m (50 ft) RG-6 Antenna Cable¹</td>
<td>CA0021315</td>
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<tr>
<td>Rack Mount Kit</td>
<td>AS0094800</td>
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<tr>
<td><strong>Available</strong></td>
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<tr>
<td>Operation Manual</td>
<td>AS0107900</td>
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<tr>
<td>Antenna Mounting Kit</td>
<td>AS0044600</td>
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<tr>
<td>15 m (50 ft) RG-6 Antenna Cable¹</td>
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<tr>
<td>30 m (100 ft) RG-6 Antenna Cable¹</td>
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<tr>
<td>45 m (150 ft) RG-6 Antenna Cable¹</td>
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<td>60 m (200 ft) RG-6 Antenna Cable¹</td>
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<tr>
<td>75 m (250 ft) RG-6 Antenna Cable¹</td>
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<tr>
<td>21 dB In-Line Antenna Preamplifier</td>
<td>AS0044700</td>
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<tr>
<td>Antenna Surge Protector</td>
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<tr>
<td>Antenna Grounding Block Kit</td>
<td>AS0048900</td>
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<tr>
<td>BNC (Male) Breakout to 100 mm Wires</td>
<td>AP0003400</td>
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<tr>
<td>BNC (Female) Breakout to 100 mm Wires</td>
<td>AP0008900</td>
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<td>BNC (Male) Breakout to Screw Terminal</td>
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<tr>
<td>BNC (Female) Breakout to Screw Terminal</td>
<td>AP0015000</td>
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</table>

¹ RoHS compliant

## Order Guide

<table>
<thead>
<tr>
<th>Model</th>
<th>Power Supply A</th>
<th>Power Supply B</th>
<th>Holdover Oscillator</th>
<th>Main Board I/O</th>
<th>Option Slot A</th>
<th>Option Slot B</th>
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<tbody>
<tr>
<td>1202B</td>
<td>A01</td>
<td>B00*</td>
<td>C01</td>
<td>D00*</td>
<td>E00*</td>
<td>F00*</td>
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<td>1202C</td>
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<td>E01</td>
<td>F01</td>
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<td>B02</td>
<td></td>
<td></td>
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<td>F03</td>
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</table>

*Indicates option not installed.