

## Specifications

### Standard Reference Instrument Series 6004

#### Time Transfer Receiver (TAI-1)

**Description:** The NIST TAI-1 Time Transfer Receiver (TTR) is a low-cost time transfer receiver that stores data in the Common GPS GLONASS Time Transfer Standard (CGGTTS) format. This data format is accepted by the Bureau International des Poids et Mesures (BIPM) for contributions to International Atomic Time (TAI) and Coordinated Universal Time (UTC). It is intended for use in timing laboratories that want to begin contributing to UTC, or that need time transfer data in the CGGTTS format for other purposes.

The receiver utilizes a 12-channel single frequency (L1 band) GPS receiver, an integrated time interval counter, and a single board computer that runs the Microsoft Windows operating system. It also includes a GPS antenna that the customer must mount on a rooftop location, and an antenna cable (with a length specified by the customer) that is long enough to extend from the antenna site to the receiver location.

The receiver has been engineered to be reliable and easy to use. It features a touch-screen interface, and automates the process of data transfer to the BIPM. The receiver's automated data uploads are frequent enough to support contributions both to UTC, which is published monthly with measurements reported at five-day intervals; and to Rapid UTC (UTC<sub>r</sub>), which is published weekly with measurements reported at one-day intervals.

Design, assembly and technical measurements leading to the production of this SRI were performed by Michael Lombardi and Andrew Novick of the NIST Time and Frequency Division.

Support aspects involved in the issuance of this SRI were coordinated through the NIST Office of Reference Materials.

Thomas R. O'Brian, Chief  
Time and Frequency Division

Gaithersburg, MD 20899  
Certificate Issue Date: 12 July 2017

Steven J. Choquette, Director  
Office of Reference Materials

**Specifications:** The TTR has only one configuration, as specified in the table below.

Category	Parameter	Specification
GPS receiver	Receiver frequency	1575.42 MHz (L1 band)
	Number of channels	12
	Timing output	1 pulse per second
	Antenna	Novatel GPS-701-GG or equivalent
	Antenna cable	Times Microwave LMR-400 or equivalent (length must be specified by customer)
GPS Software	Control software	NIST TAI-1 software
	File Format	CGGTTS multi-channel GPS
Time Interval Counter	Manufacturer	NIST
	Time base	External, 5 or 10 MHz
	Single shot resolution	< 50 ps
Computer	Microprocessor	Intel Atom or equivalent
	Operating System	Microsoft Windows 7, 32-bit
	Architecture	Single Board computer, passive backplane, ISA and PCI slots, 2 GB of memory, solid state drive
Chassis	Description	Rack mount with touch screen interface
	Display size	264 mm diagonal (10.4 in) LCD
	Display resolution	1024 × 768
	Dimensions	21.7 cm (height) × 48 cm (width) × 48 cm (depth)
	Power requirements	Accepts 100 V to 240 V, at either 50 Hz or 60 Hz

**Delivery and Shipping:** Unless otherwise agreed by the parties, shipping terms shall be [EXW \(Incoterms 2010\)](#). NIST will prepare packaging for shipment of the PVS SRI. Shipping crate dimensions and weight will be included in each quote. Customers are responsible for arrangement of shipping pickup at NIST as well as all customs duties and import fees (HTC 9106.90.75).

**Installation:** Customer is responsible for setup at their location. Manuals and/or quick start guides will be provided for setup procedures.

**Support:** NIST staff will provide manuals for training and will respond to any questions or assistance needed during the setup or initial operation of the time transfer receiver.

**Technical requirements at installation site:** Customers must provide the following:

- A) A laboratory that is temperature stabilized to  $\pm 3$  °C.
- B) A flat surface or a standard instrument rack where the receiver can be located.
- C) A rooftop location free from obstructions for the mounting of the GPS antenna, with a conduit so the antenna cable can be routed from the roof to the receiver location.
- D) An Internet connection for data transfer to the BIPM.
- E) A cesium clock or time scale with a 1 pulse per second (pps) output that can be measured against GPS.
- F) A stable source of frequency (5 MHz or 10 MHz) to serve as the receiver time base.
- G) Any documentation required for transfer of property or receiving of property/freight at your facility.

*Commercial equipment, instruments or materials used in this SRI were found to meet requirements specified. Such identification does not imply recommendation or endorsement by the National Institute of Standards and Technology, nor does it imply that the materials or equipment identified are necessarily the best available for the purpose.*

*Users of this SRI should ensure that the Specifications Certificate in their possession is current. This can be accomplished by contacting the Office of Reference Materials: telephone (301) 975-2200; fax (301) 948-3730; e-mail [srminfo@nist.gov](mailto:srminfo@nist.gov); or via the Internet at <http://www.nist.gov/sri>.*