

Event Timer Specification

1. Introduction

The Advanced Technology Branch of the U. S. Naval Research Laboratory has a requirement for an Event Timer. The Event Timer must be capable of generating extremely precise epoch time-tags for the NRL satellite laser ranging system. The Event Timer will enable measurement of events with extreme precision and accuracy to allow very precise satellite laser ranging measurements.

2. Specifications

2.1. Functional Specifications

- 2.1.1. Size: Unit must be mountable in a 19 inch rack-mount, or incorporated into a Linux-based personal computer (PC).
- 2.1.2. Power: Device must operate on 115 volts (VAC) at 60 Hertz (Hz) wall pluggable.
- 2.1.3. Environment: The unit must operate from 10°Celsius (C) to 35°C with a relative humidity from 5% to 90% non-condensing.
- 2.1.4. The contractor shall provide an internal clock of at least 500 MHz that must lock to an NRL supplied 10 MHz rubidium (Rb) source.
- 2.1.5. Unit must operate under computer control on a Linux platform.
- 2.1.6. System must have a minimum of 3 NIM-type inputs (negative pulse -0.75V into 50 Ohms) with Subminiature Version A (SMA) jacks.
- 2.1.7. The maximum required single-event rate is 2 kilohertz (kHz) per channel. The unit shall operate, at a minimum, over a continuous single event rate range from 5 Hz to 2 kHz per channel.
- 2.1.8. The user interface must be Ethernet-based and must support a 2kHz event rate on all channels simultaneously.
- 2.1.9. The output data format requires that events are specified and reported as time-of-day coordinated universal time (UTC). To achieve this, NRL will provide both: (a) a 1 Hz timing pulse synchronized to the NRL-supplied 10 MHz Rb source in 2.1.4 above, and (b) an network time protocol (NTP) server capable of time synchronization better than 1 millisecond.

2.1.10. The contractor shall provide an external calibrator to the Government to validate Event Timer performance periodically. Accessories and a written calibration procedure shall be provided to the Government. In the event that additional test equipment is required, the contractor shall either provide the equipment as part of the delivered system or provide a detailed list of performance data and requirements for said test equipment.

2.1.11. The contractor shall provide detailed operation instructions and a description of software commands to the Government.

2.2. Performance Specifications

2.2.1. The event timer must demonstrate better than 2 picoseconds (2×10^{-12} seconds) of resolution for the standard NIM input signals representing events (APD signals, or laser start time signals).

2.2.2. The jitter for event time measurement must be less than 5 picoseconds (5×10^{-12} seconds) root mean square (RMS) over a sample size of 100 measurements.

2.2.3. The dead time, or minimum measurement time between events, must be no longer than 100 nanoseconds (100×10^{-9} seconds).

2.2.4. The contractor shall provide detailed performance measurements of event time resolution and RMS jitter to the Government.

2.3. Timeline

2.3.1. Within 30 days of award: The contractor shall provide a Critical Design Review to designated Government personnel at the contractor's facility.

2.3.2. Within 90 days of award: The contractor shall modify the design based on NRL's critique as performed during the CDR.

2.3.3. Within 270 days of award: The contractor shall deliver (1) Event Timer to the Government for testing and evaluation.

2.3.4. Within 270 days of award: The contractor shall deliver detailed performance measurements showing that the device meets the performance specifications listed in Section 2.2.

CONTRACT DATA REQUIREMENTS LIST

Form Approved
OMB No. 0704-0188

The public reporting burden for this collection of information is estimated to average 440 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing the burden, to the Department of Defense, Executive Services and Communications Directorate (0704-0188). Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number. **Please do not return your form to the above organization. Send completed form to the Government Issuing Contracting Officer for the Contract/PR No. listed in Block E.**

A. CONTRACT LINE ITEM NO.	B. EXHIBIT	C. CATEGORY: TDP _____ TM _____ OTHER _____	
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D. SYSTEM/ITEM	E. CONTRACT/PR NO.	F. CONTRACTOR
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1. DATA ITEM NO.	2. TITLE OF DATA ITEM	3. SUBTITLE
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4. AUTHORITY <i>(Data Acquisition Document No.)</i>	5. CONTRACT REFERENCE	6. REQUIRING OFFICE
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7. DD 250 REQ	9. DIST STATEMENT REQUIRED	10. FREQUENCY	12. DATE OF FIRST SUBMISSION	14. DISTRIBUTION		
8. APP CODE	11. AS OF DATE	13. DATE OF SUBSEQUENT SUBMISSION	a. ADDRESSEE	b. COPIES		
				Draft	Final	
					Reg	Repro

16. REMARKS						
				15. TOTAL →		

17. PRICE GROUP
18. ESTIMATED TOTAL PRICE

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G. PREPARED BY	H. DATE	I. APPROVED BY	J. DATE
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