

Representative Task Order #3

*For pricing purposes only, assume that the task below is for
Contract Years 2 -5:*

A. Science Instrumentation – Development of space flight lidar instrument

The contractor shall support the design, development, fabrication, testing, integration, and calibration of a spaceflight multi-beam imaging laser altimeter for determining the 3-D vegetation structure and topographic changes on Earth. The instrument should be scoped accordingly for an Earth Venture – Instrument (e.g., total cost <\$90M). This flight instrument utilizes solid-state lasers as transmitters, a light-weight optical telescope as receiver, sensitive optical detectors and state-of-the-art electronics signal processing. The objective is to maximize the scientific return from the measurements within the mission requirements and constraints in terms of environmental conditions, mass, power and cost. Proficiency is required in leading remote sensing and engineering teams, and use of advanced electrical and optical test instrumentation for space instrumentation.

In some cases the contractor shall supply completely developed subsystems and systems to be specified below. Ancillary to this effort are equipment installation; data analysis; and documentation. Hardware and equipment support is required for design, development, installation, testing, checkout and support for interfacing new optical, electro-optical, opto-mechanical, mechanical, electrical, and electronic assemblies. Monitoring the status of equipment used in laboratory is required. In addition, the contractor will support the development of bench checkout equipment, the hardware used to test the performance of the instrument before, during (in some cases, i.e. thermal vacuum testing) and after environmental testing.

Engineering support

The contractor shall provide engineering support for most aspects of the design, development, fabrication and verification of an Imaging Laser Altimeter (ILA) instrument. This includes the basic engineering designs and analyses of an instrument, the drafting of component subsystems, the development of mechanical, electrical, and optical assemblies (including fiber optics and electro-optical components), breadboarding, assembly, alignment, field testing, and the performance evaluation and verification of systems, subsystems and instrumentation. Equipment and instrument installation, maintenance, operation, modification, repair, upgrade, and transport will be required. Documentation of all engineering developments shall accompany support.

Certifications:

Contractor employees are required to have laser safety, Electro Static Discharge (ESD) and cleanroom training certifications as appropriate for their position.

Facilities/Materials:

The work will be performed entirely onsite. Access to Goddard cleanroom facilities and laboratories, machining and machine shop facilities, and optical metrology laboratories will be required. Materials including metals, optical components, electrical components and electro-optical components and test equipment will be government provided.

Under this task, the contractor shall provide optical, mechanical, thermal and performance assessment support. In that the contractor shall:

1. Provide the following optical engineering and technician support:
 - a. Participate in the development of the instrument proposal and carry out the instrumentation development phase of part or whole instrument subsystems.
 - b. Provide basic engineering design and analysis of the receiver optical system, and the opto-mechanical mounting of these components.
 - c. Provide support for lead Optical Engineer with performance and environmental testing of optical sub-assemblies (receiver telescope, beam expander, and aft-optics).
 - d. Inspect receiver flight optical components and complete inspection reports for each component, reports due within 1 week of inspection, all inspections shall be completed within two weeks of receiving the component.
 - e. Install optical elements in their mechanical holders, including any bonding required.
 - f. Provide support for lead Optical Engineer with performance and environmental testing of Flight optical sub-assemblies (receiver telescope, and aft-optics) including vibration, thermal performance testing and thermal survival testing, should be completed in Contract Year 4.

2. Provide the following Mechanical engineering and fabrication support:
 - a. Perform detailed opto-mechanical design of receiver telescope, and aft-optics.
 - b. Coordinate mechanical analysis of receiver telescope and aft-optics with mechanical lead and mechanical analyst
 - c. Compute mounting stresses of optical elements over survival temperature range.
 - d. Design and oversee fabrication of mechanical hardware required for breadboard testing of the optical assemblies.
 - e. Present detailed mechanical design of opto-mechanical sub-assemblies at CDR.
 - f. Oversee fabrication of mechanical flight parts for receiver telescope and aft-optics, fabrication should be completed 6 – 9 months after CDR.
 - g. Support functional and environmental testing of opto-mechanical assemblies, including vibration, thermal performance and thermal survival testing, to be completed one year after CDR.
 - h. Participate in opto-mechanical assemblies delivery reviews, which include preparing a power point presentation 1 week prior to scheduled review.

3. Provide the following electrical engineering and fabrication support:
 - a. Develop high speed digitizer for digitizing the outgoing laser pulse and the return echo waveform (2Gsamples/sec) to be completed by the end of the second year of this task order.

Task Assumptions

The following assumptions shall be made in your approach to this representative task:

- Instrument formulation through flight delivery spans 4 years
- This work requires the contractor to provide the complete optical design (optical prescription) of the receiver including the receiver telescope and other ancillary optics using Code V and or Zemax software tools by the end of the first year of this task order. This optical model incorporates coating performance, polarization performance and tolerance for each component.
- Civil servants will be responsible for the fabrication and testing of the flight lasers.
- The Government assumes that this task will be performed onsite (at GSFC).
- Team provides support for preparation and presentation of the instrument and subassembly delivery review packages, and delivers the hardware by an approved method.
- There is no travel associated with this task.

The skill mix and number of contractors required will be up to the contractor to determine.

Additional Task Deliverables

- (a) Hardware test results and data analysis reports for each of the assemblies, subassemblies and the instrument.
- (b) For Configuration management, the generation of WOA's (work order authorization) forms for all components (450), assemblies (13), subsystem assemblies (7) and instrument assembly (1). These forms track materials certifications, designs and record every process that the components have been through, including fabrication and testing.
- (c) Relevant inputs for Engineering Peer Reviews (8 total), instrument PDR (end of task order year 1), CDR (end of task order year 2), and PER (1.5 years after CDR).
- (d) Complete electronic and data system design for high speed digitizer (2Gsamples/sec) by the end of the second year of this task order.

Target Performance Standards

(1) Each stage of the development process (aligned with reviews) shall be documented by the Contractor and provided to the Government on a predetermined schedule referred to in (c) in Task Deliverables above (PDR, CDR and PER).

(2) Spare parts (450), witness samples (80), test procedures (25) and test results shall be maintained by the Contractor.

(3) All the SW and hardware change reports and documents shall be completed and maintained under a change control management. Assume a total of 90.

Task Performance Period: 4 Years