

Task Order Statement of Work (SOW)

Date: 08/18/2020

Task Name: Code 569 Electrical Support Task

Task No. / Mod: 29 / 8

Contract number: NNG14WA48C

1. Scope

a. Task Mod Description

Extend the period of performance from November 17th, 2020 to October 15th, 2021. End support on sub-task 29.01 for Restore-L. Adding subtask 29.08 for the assembly of an Optical Communications Lab in building F7, and subtask 29.09 for CODEX Electrical support. Changes or additions to the SOW text are in red, whereas descopes or changes to SOW descriptions are noted with ~~strikethroughs~~.

- 00 – Wallops Electrical Engineering Branch Support*
- 01 – Restore-L Support (End Support)*
- 02 – SRPO Support*
- 03 – Robotics Support*
- 04 – SmallSat Support*
- 05 – RMMO Support*
- 06 – Wallops EMI Chamber Support (End Support)*
- 07 – Senior Radar Systems Engineering Support*
- 08 – Optical Communications Lab Assembly (NEW)*
- 09 – CODEX Electrical Support (NEW)*

b. Summary of Work

Sub-task 00, WEEB Support:

Code 569, the Wallops Electrical Engineering Branch, seeks general engineering and technician support for the analysis, design, fabrication and build, bench and environmental test, systems engineering, integration, installation, operations, and configuration management of power, ordnance, communications, RF (including antenna and EMI chambers), robotics outreach, interconnects, and digital flight and non-flight components, sub-systems, systems, and ground systems.

- Periodic travel may be required in support of various tasks and/or missions. These can range from less than 12 hour trips to the Greenbelt campus to lengthier trips in support of Project specific tasks off-site. However, there is currently no known travel during this performance period. All travel shall be approved by the task monitor.*
- Procurements for test equipment, lab materials, task specific software, and misc. hardware may be required.*
- Training (and any subsequent travel) is allowed following approval by the task monitor.*
- Certification to NASA Standards 8739.3 and 8739.4 is required where applicable.*

- ESD certification to GSFC standards is required.

Sub-task 01, Restore-L Support:

****The contractor has completed the specifications of this sub-task. Therefore, support on this sub-task shall not be extended.****

Subtask 02, SRPO Support:

Provide infrequent ~~periodic~~ electrical support to the Wallops Sounding Rocket Program Office (SRPO), to include ~~provide~~ electrical harness CAD development, harness fabrication and test, schematic layout ~~support~~, and PCB layout and population ~~support~~, among other duties as needed and within the broader scope of this SOW. Infrequent machine shop support may be required to assist with PCB enclosure machining, etc.

- *Procurements for test equipment, lab materials, task specific software, and misc. hardware may be required.*
- *Training for certification (and any subsequent travel) is allowed following approval by the task monitor.*
- *Certification to NASA Standards 8739.3 and 8739.4 is required where applicable.*
- *ESD certification to GSFC standards is required.*

Sub-task 03, Robotics Support:

Provide periodic support to the NASA Wallops Robotics Alliance Project (RAP). The RAP at WFF primarily supports FIRST (For the Inspiration and Recognition of Science and Technology) Robotics activities in the form of FIRST Robotics Competition (FRC), FIRST Tech Challenge (FTC), and FIRST Lego League (FLL). Other RAP-supported programs include VEX Robotics, BEST (Boosting Engineering Science and Technology), and BotBall. FRC and FTC teams are made up of high school students aged 14-18. FLL teams target students ranging in ages from 6-9 years of age (Jr FLL) and students 9-14 years of age (FLL). VEX, BEST, and BotBall include divisions for Elementary, Middle School, and High School. Some programs also have a college division.

The contractor will be tasked to support WFF RAP-sponsored robotics events. Additional support may require mentoring local robotics teams, providing team robot building assistance, providing training on shop equipment usage and safety, the assembly of competition equipment, and will include the transport of robots and associated equipment using the WFF RAP truck and trailer. Assistance with team set-up at competitions, along with the manning of NASA displays and information booths, may also be required. Teaching opportunities may arise on Computer Aided Drafting

(CAD) software usage and other design software packages. The need may arise for a machinist and/or welder to support a FIRST District Event in the NASA Mobile Machine Shop. Small P-Card purchases for equipment, tools, kits, and project-support items may be needed. Electrical and/or mechanical technician may be needed for the assembly, wiring, and installation of electronics and equipment on the RAP trailers.

Occasional travel will be required. There may be occasional single day trips during this task period where all will be less than 12 hours. There may be extended duration trips to potential competition locations pending the participation and placement of the local robotics teams. Exact locations and durations cannot be specified at this time. For travel, the use of the WFF RAP truck and trailer (both GOV) will be required, and a government issued gas card will be provided so that there will be no fuel charges to the contractor. The contractor must have experience and knowledge in driving an over-sized diesel truck, towing a 20ft trailer, and fastening loads within the trailer with proper weight distribution.

Sub-task 04, SmallSat Support:

Provide infrequent general, systems, and electrical engineering services in support of SmallSat architecture development, mission planning, and proposal development.

Sub-task 05, RMMO Support:

Provide infrequent electrical support to the Wallops Range and Mission Management Office (RMMO), to provide electrical harness CAD, harness fabrication and test, schematic layout support, and PCB layout and population support, among other duties as needed and within the broader scope of this SOW. Infrequent machine shop support may be required to assist with PCB enclosure machining, etc.

Sub-task 06, Wallops EMI Chamber Support:

****The contractor has completed the specifications of this sub-task. Therefore, support on this sub-task shall not be extended.****

Sub-task 07, Senior Radar Systems Engineering Support:

Provide a Senior Radar Systems Engineer with expertise in RIR-706, RIR-716 and RIR-778 tracking Radars, Weibel X-Band multi-object tracking Radars, ASR-8 Air Surveillance Radars, APS-143 and Furuno S and X-Band sea surveillance Radars, Lightweight Surveillance Target Acquisition Radar (LSTAR), and testing of C-Band transponders. The engineer should have in depth knowledge of Range-related support requirements for tracking and surveillance Radars, link analysis and loop gain

calculations, maintenance schedules and procedures, transportation of mobile Radar systems, and Radar Calibration systems such as RADCAL and DMSP.

Duties will include providing Radar subject matter expertise to the Range Chief Engineer and the Range and Mission Management Office, transferring knowledge to Code 569 Radar engineer(s) and technician(s), advising on the maintenance of the RADCAL ground station, interfacing with other Ranges regarding Radar systems, coordinating DMSP- calibrations, consulting regarding the Instrumentation Radar Support Program (IRSP), and assisting the Wallops Spectrum Manager with identifying and eliminating sources of external interference with Range Radar systems.

The nominal level of effort for this position will be approximately half time (20 hrs/week) for the period of performance of this task.

In addition, provide technical support to develop CAD drawings of the code 569 transponder test benches, to include rack elevation and interconnect drawings. These drawings shall be archived in Atrium at the direction of the technical monitor.

Sub-task 08, Optical Communications Lab Assembly:

Develop an optical communications lab capability at WFF in Building F7 room 110. This work is to be performed under the direction of the Code 569 Wallops Electrical Engineering Branch lead Optical Engineer for the Science Enabling Technologies for Heliophysics (SETH) mission. Capabilities of the lab shall include two level optical benches with isolators, test equipment and materials to allow for laser generation, optical beam redirection, optical power measurement, and mirror actuators to verify pointing control. The test setup is to be compatible with 1064 and 1550 nm lasers. Specific tasks for this work includes:

Coordinate with the building F7 FOM and Optical Engineer to identify the minimum required space within room 110. Note that modifications are anticipated within room 110 to add new partitions, partition entrances, and additional outlets. The optical lab shall conform to the new partitioned areas.

- Clear the identified area in room 110 to allow for assembly of the lab.*
- Produce a detailed lab layout drawing identifying the optical communications lab boundaries, outlet locations, and ground bar locations within room 110 and depicting the components within the lab space (including identifying any future capabilities that may not be funded under this SOW). The Optical Engineer will provide input and final approval of the lab layout.*
- Develop an equipment/materials list to enable the function of the optical communications lab (this may be incorporated in the above drawing). This list shall include at minimum the manufacturer, model number, selected options, quantity, and cost for all identified equipment and materials. The Optical Engineer will provide final approval of the equipment/materials list.*
- Procure the items identified from the equipment/materials list. A reference list is provided below, with potential manufacturer and pricing information provided.*

- *Create an Optical Communications Lab space within Atrium (under ETD Wallops/Test Facilities) to organize and archive the lab layout drawing, the equipment list, and any equipment manuals, certifications, or records received.*
- *Assemble the lab and install the procured equipment and materials within the space.*
- *Complete all items by March 31st, 2021.*

Reference equipment list (miscellaneous mounting kits and cabling are included in Item 11):

Qty, Item, Manufacturer or Vendor, Unit Cost

- 1) *Qty 2, S425C Laser Probe Thermopile, Thorlabs, \$840*
- 2) *Qty 1, PM400 Power Meter, Thorlabs, \$1,430 (compatible w/Item 1)*
- 3) *Qty 2, Part # 35-577 Protected Gold off axis parabola mirror, 101.6 x 516.8mm, Edmunds Scientific, \$850*
- 4) *Qty 2, Model 8816-8 Motorized Mount, Newport, \$1,620*
- 5) *Qty 1, Model 8742-4-kit 4-Axis PicoMirror controller, Newport, \$1,129*
- 6) *Qty 1, QLD106L-6430 DFB laser, Tunable to 1064nm QD Laser, \$3,500*
- 7) *Qty 1, Model 205 with TEC, DFB Butterfly Laser Mount, to be compatible with Item 6. Arroyo Instruments, \$495*
- 8) *Qty 1, Model 6310 ComboSource Laser Diode controller, and Temp Controller (60W), Arroyo Instruments, \$2,395*
- 9) *Qty 1, VOA50PM-APC variable fiber attenuator, Thorlabs, \$685*
- 10) *Qty 2, Optical Workstation with Isolators 3' x 5', Newport, \$8,000*
- 11) *Qty 1, Optical mounting kits estimate, Thorlabs, \$2,181*
- 12) *Qty 1, MSOS204A 2 GHz oscilloscope, Keysight, \$33,334*

Sub-task 09, CODEX Electrical Support:

Provide electrical harness, electrical ground support equipment (EGSE), and component testing support to the COronal Diagnostic Experiment (CODEX) mission.

- *For electrical harness support, this will include the development of CAD drawings for test and flight harnesses, harness fabrication, bench testing of harness builds, and assistance with installation of the harnesses on flight articles.*
- *For EGSE support, this will include the development of CAD rack elevation and interconnect drawings, assistance with EGSE 19" rack component assembly, EGSE harness fabrication and installation, and development of EGSE operational procedures. Minor machine shop support may be required for the installation of custom interface panels or similar.*
- *For component testing support, this will include the setup and monitoring of devices under test for vibration, thermal cycle, and thermal vacuum testing in compliance with project provided procedures. All component testing will be conducted in WFF buildings E109, F7, and/or F10. Test requests for F10 personnel support will be handled by the project.*

- *The total anticipated level of effort including all support areas defined above is one full-time technician beginning on November 1st, 2020 thru the end of this task period.*
- *The project will provide all identified harness, EGSE, and component test materials. However, small incidental purchases may be required to facilitate the above support and is allowed following approval by the task monitor.*
- *No project related travel is anticipated for this sub-task.*
- *All CAD drawings noted above shall adhere to the project provided drawing format and shall be developed in a project approved software package (ex. Microsoft Visio 2016 or later, Autodesk 10 or later, etc.).*
- *Training for certification (and any subsequent travel) is allowed following approval by the task monitor.*
- *Certification to NASA Standards 8739.3 and 8739.4 is required where applicable.*
- *ESD certification to GSFC standards is required.*

c. **Sub-Task Requirement**

Accounting for this task shall be tracked at the sub-task level.

d. **Security Requirements**

ITAR Regulations apply, otherwise N/A.

2. **Period of Performance**

Period of performance is extended from November 17th, 2020 thru October 31st, 2021.

3. **Deliverables/Schedules/Milestones/ (Specifically required for this task)**

The contractor shall provide a monthly progress report for the overall task in accordance with clause B1 and C2.

4. **Place of Performance**

This work shall be performed on-site at the Wallops Flight Facility.

5. **Special Requirements/Other Comments**

Per the work element descriptions, certification to NASA Standard 8739.3 and 8739.4 and ESD certification to GSFC standards are required.