

**Task Order Plan (TOP)**

**Contract Number:** NNM05AB50C  
**TO Title:** *Astrophysics Lab, Flight, and Mirror Experiments Support*  
**TO Number:** 43-060201 **Revision:** 11

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**Period of Performance:** 10/02/2010 to 09/30/2011

**MSFC Initiator:** *Brian Ramsey*

(b)(4)  


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**Emergency:** *No*

Revision 11: The purpose of this revision (11) is to extend this task into Contract Year 6 of the NNM05AB50C ESTS contract. This revision defines and estimates work for the period October 2, 2010 through September 30, 2011. Additionally, the Schedule, Performance Plan and Risk Assessment have been revised to reflect changes in task activities for the new period of performance. Subelement -00 has been renumbered to -RA to conform to the project/program naming convention that has been established for FY11. This revision affects support for the following instruments or programs: HERO (High Energy Replicated Optics), FOXSI (Focusing Optics X-ray Solar Imager), FOXSI-2, Micro-X, Neutron Optics, NIH (National Institutes of Health), and related projects.

*Sub-elements and WBS funding*

| Subelement | Previous Subelement | WBS  | Status                        |
|------------|---------------------|--|-------------------------------|
| RA         | 00                  | 399131.02.01.02.15<br>399131.02.01.02.47<br>595551.01.08.01<br>595551.01.08.40<br>399131.02.01.02.76<br>811073.02.06.02.14 | <i>Mapped to 43-060201-RA</i> |

Revision 10: The purpose of this revision (10) is to extend this task into Contract Year 5 of the NNM05AB50C ESTS contract. This revision defines and estimates work for the period October 3, 2009 through October 14, 2010. Funding for this task is provided per WBS: 399131.02.01.02.15. Additionally, the Schedule, Performance Plan and Risk Assessment have been revised to reflect changes in task activities for the new period of performance. This revision affects support for the following instruments or programs: HERO (High Energy Replicated Optics), CDDF (Center Director's Discretionary Funded) research, FOXSI (Focusing Optics X-ray Solar Imager), Neutron Optics, NIH (National Institutes of Health), and related projects.

Revision 09: The purpose of revision (09) is to identify the following adjustments to the task order estimate and work scope:

1. Decrease the subcontract estimate on Subelement -00 by (b)(4)
  2. Update the Subelement -00 other, material, and travel estimates for the remainder of FY09 per current task requirements. (b)(4)
- (b)(4)

Revision 08: The purpose of this revision (08) is to extend this task into Contract Year 4 of the NNM05AB50C ESTS contract. This revision defines and estimates work for the period September 27, 2008 through October 2, 2009. Funding for this task is provided per WBS: 399131.02.01.02.15. Additionally, the Schedule, Performance Plan and Risk Assessment have been revised to reflect changes in task activities for the new period of performance.

The purpose of revision (07) is to reduce the subcontract labor estimate per the customer's request. The revision also increases the estimate for materials procured during CY3 that are required to perform task activities.

The purpose of revision (06) is to extend this task into Contract Year 3 of the NNM05AB50C ESTS contract. This revision defines and estimates work for the period 29 September 2007 through 26 September 2008. Funding for this task is provided per MSFC PR# 4200198408. Additionally, the Schedule, Performance Plan and Risk Assessment have been revised to reflect any changes in task activities for the new period of performance.

Task Order Revision (05) increases the subcontract labor estimate and the travel estimate to reflect the scope of the customer's current task requirements.

Task Order Revision (04) decreases the subcontract labor estimate to reflect the scope of the customer's current task requirements.

Task Order Revision (03) increases the material estimate to purchase an atomic force microscope dry probe instrument for the customer's task. The estimate has increased to meet the scope of the customer's task requirements.

The purpose of this revision (02) is to extend this task into Contract Year 2 of the NNM05AB50C ESTS contract. This revision defines and estimates work for the period 30 September 2006 through 28 September 2007. Additionally, the Schedule, Performance Plan and Risk Assessment have been revised to reflect changes in task activities for the new period of performance.

Task Order Revision (01) adjusts the (b)(4) subcontract labor estimate. The estimate has decreased to meet the scope of the customer's task requirements.

This Task Order (TO) replaces TO 04-010202 due to the NASA/MSFC reorganization and the subsequent realignment of the NNM05AB50C ESTS contract. This TO defines and estimates work for the period 1 April 2006 through 29 September 2006. Funding for this task is provided per MSFC PR# 4200144438. Additionally, the Schedule, Performance Plan and Risk Assessment have been revised to reflect changes in task activities for the new period of performance.

## 1.0 Task Order Description & Objectives

This task provides engineering support in the fabrication of replicated mirrors for x-ray astronomy with particular emphasis on the hard-x-ray region. It also provides laboratory and field support as necessary for the development and operation of various laboratory experiments, x-ray detectors, and flight instrumentation payloads.

Instruments or programs supported include: HERO (High Energy Replicated Optics), FOXSI (Focusing Optics X-ray Solar Imager), FOXSI-2, Micro-X, and related projects including research and technology.

## **2.0 Technical Approach (Including required input, guidelines & assumptions)**

### **Subelement -RA Astrophysics Lab, Flight, and Mirror Experiments**

- a. Provide support in the design of electroplating systems and optimizations of plating processes.
- b. Super-polish machined HERO and MSFC x-ray mandrels per customer specifications.
- c. Optimize processes employed to fabricate and super-polish these x-ray mandrels.
- d. Develop cleaning procedures to prepare super-polished mandrel surfaces for subsequent mirror replication processes.
- e. Perform and document optical measurements on x-ray mandrels to insure customer requested mirror shell performance.
- f. Assist customer in the electroplating high-strength, lightweight mirror shells from the x-ray mandrels.
- g. Explore replication processes using metal alloy, polymer, or composite materials to fabricate mirror shells from the x-ray mandrels.
- h. Provide field support as necessary for the development and operation of various laboratory and flight experiments in the MSFC astrophysics program.

## **3.0 Discussion of Skills Required**

### **Subelement -RA Astrophysics Lab, Flight, and Mirror Experiments**

This task requires multi-disciplined engineers having experience in the following areas:

- Electro-forming nickel and its alloys
- Polishing and figuring nickel substrates
- Replicating nickel, composite, or polymer mirror shells
- Optomechanical design of coating fixtures and x-ray mandrels
- Geometric optical design

## **4.0 Special Tools Required**

None identified.

## **5.0 Participating Subcontractors**

(b)(4)

## **6.0 Milestones & Deliverables**

### **Subelement -RA Astrophysics Lab, Flight, and Mirror Experiments**

- a. Monthly activity reports
- b. Refurbished x-ray mandrels
- c. Super-polished x-ray mandrels
- d. Replicated mirror shells
- e. Monthly budget reports--planned vs. actual.

## **7.0 Special Considerations (Recruiting, Special Equipment / Material, Safety, etc.)**

## Subelement -RA Astrophysics Lab, Flight, and Mirror Experiments

- a. (b)(4)
- b. A travel estimate is included for travel to workshops, presenting technical papers at conferences, customer meetings, and on-site meetings with vendors.
- c. (b)(4)

### 8.0 Work Shelf

The following activities could be accomplished as part of the Task Order performance by personnel that are temporarily available due to program or funding delays on other Tasks. Specific assignments will be coordinated with the Task Initiator to ensure appropriate skills and experience.

| TO/Subelement | Description | Due Date | Skill |
|---------------|-------------|----------|-------|
|---------------|-------------|----------|-------|

### 9.0 Schedule

| Task Order # | Subelement | Task/Work Element   | 2011    |     |     |     |     |     |     |     |     |     |     |     |
|--------------|------------|---|---------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
|              |            |   | Sep     | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug |
| 43-060201    | --         | <b>Astrophysics Lab, Flight, and Mirror Experiments Support</b> | ↓-----↓ |     |     |     |     |     |     |     |     |     |     |     |
| 43-060201    | 00         | Astrophysics Lab, Flight, and Mirror Experiments                | -----   |     |     |     |     |     |     |     |     |     |     |     |
| 43-060201    | --         | Monthly Activity Reports (MARs)                                 | -----   |     |     |     |     |     |     |     |     |     |     |     |

# ESTS Contract Task Order Request Performance Plan

Task Order Title: [Astrophysics Lab, Flight, and Mirror Experiments Support](#)

Task Order Number: [43-060201](#)      Revision: 11

| Category  | Weighting<br>Technical %                                   | End of Period<br>Technical Score                                |
|---|--|---|
| <b>Technical Objectives</b>   | 65%  | X <u>65%</u> =<br><b>Justification</b>                          |
| <p>Provide laboratory and field support, as necessary, for the development and operation of various x-ray laboratory and flight experiments in the MSFC astrophysics programs.</p> <p>Explore replication processes using metal alloy, polymer, or composite materials to fabricate mirror shells from x-ray mandrels. Perform and document optical measurements on x-ray mandrels to ensure customer requested mirror shell performance. Optimize x-ray mandrel fabrication processes and x-ray mirror replication processes. Assist customer in replicating lightweight mirror shells from these x-ray mandrels.</p> <p>Super-polish x-ray mandrels to customer requirements.</p> |  |   |
| <b>Schedule Objectives (Milestones)</b>   | <b>Weighting<br/>Schedule %</b><br><u>10%</u><br>(min 10%) | <b>Schedule Score</b><br>X <u>10%</u> =<br><b>Justification</b> |
| <p>Provide all deliverables in accordance with program schedules.</p>   |  |   |
| <b><u>Cost (actual vs. negotiated)</u></b>  | <b>Weighting<br/>Cost%</b><br><u>25%</u><br>(min.25%)      | <b>Cost Score</b><br>X <u>25%</u> =<br><b>Justification</b>     |

# ESTS Contract Task Order Request Performance Plan

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| Weighting | Total Score |
|-----------|-------------|
| Total %   |             |
| 100.00%   |             |

## Technical, Schedule, and Cost Grading Scale

| Score    | Description  |
|----------|--|
| 9.0-10.0 | Exceeded TO Performance Plan objectives resulting in major benefit(s)  |
| 8.0-8.9  | Exceeded TO Performance Plan objectives resulting in modest benefit(s)   |
| 7.0-7.9  | Met TO Performance Plan objectives   |
| 3.0-6.9  | Did not meet all TO Performance Plan objectives resulting in minimal impact or requiring additional agency funds     |
| 0.0-2.9  | Did not meet TO Performance Plan objectives resulting in substantial impact and/or requiring additional agency funds |

## ESTS Contract Task Order Request Performance Plan

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**Comments:**

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**Risk Assessment**

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(b)(4)

**Task Order Risk Assessment to Cost, Technical, and Schedule**

List identified risk associated with Task Order performance as related to task cost, technical, and schedule. Classify the risk(s) according to probability of occurrence and impact as defined below and enter the risk into risk matrix.

**Subelement -RA Astrophysics Lab, Flight, and Mirror Experiments**

| Risk    | Risk Type | Probability (1-4) | Impact (1-4) | Risk Description                   |
|---------|-----------|-------------------|--------------|------------------------------------|
| Risk C1 | Cost      | 1                 | 1            | Meet cost estimates to within 10%. |
| Risk C2 | Cost      |                   |              |                                    |
| Risk T1 | Technical | 1                 | 1            | Meet all technical objectives.     |
| Risk T2 | Technical |                   |              |                                    |
| Risk S1 | Schedule  | 1                 | 1            | Meet schedule deadlines.           |
| Risk S2 | Schedule  |                   |              |                                    |

\*Note: See page 2 for risk mitigation plan for those risks which are Primary Risk Drivers.



