Marshall Space Flight Center
Engineering, Science & Technical Services

JACOBS
ESTS Group

Task Order Plan (TOP)

Contract Number: *NNM05AB50C*
TO Title: *Electrical Power Branch*
TO Number: *37-040101* **Revision:** *08*

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

MSFC Initiator: *Jeffrey Brewer*

(b)(4) [redacted]

Emergency: *No*

Revision -08: The purpose of this revision 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.

This revision affects the programs listed in the table below:

Subelement	Previous Subelement	WBS/ Project	Program
JA	-02	401769.06.08.02.04.05 / ECLSS 2010 Spares	ISS

The subelement has been renamed to conform to the project/program naming convention that has been established for FY11.

Revision -07: The purpose of this revision is to increase the scope of support for the ECLSS work. Changes made to each affected subelement are as follows:

Subelement -02: The estimated labor for this subelement was increased by (b)(4) [redacted] due to an increase in the power system support required for this task. The travel and ODC estimates have been increased by (b)(4) [redacted] and (b)(4) [redacted] respectively for costs associated with training. In addition, the ODC estimate has been increased by (b)(4) [redacted] for estimated costs of relocation.

Subelement -CV: This subelement was administratively closed.

This revision to the Task Order affects the following Science Programs and Projects:

- ECLSS 2010 Spares (subelement -02)

Task Order Subelement Mapping:

Subelement	WBS/ Project
02	401769.06.08.02.04.05 / ECLSS 2010 Spares
03	099844.04.03.02 / IMAX Accommodations Task
CV	136905.02.06.08.06 / Crew Launch Vehicle Ares Vehicle Integration

Revision -06: The purpose of this revision is to reduce the scope of the task due to a decrease in the power system support required, and to increase the scope to include equipment required for the IMAX work. Changes made to each affected subelement are as follows:

Subelement -02: The ODC estimate has been increased by (b)(4) for additional anticipated training and relocation costs. The original estimate for relocation was the based on the best information at the time. The material estimate has been increased by (b)(4) for safety equipment. The estimated labor for this subelement was decreased by (b)(4) due to a reduction in ECLSS testing required.

Subelement -03: The Material estimate has been increased by (b)(4) for the additional purchase of equipment required for this task. The estimated labor for this subelement was increased by (b)(4) due to an increase in the power system support required to procure the equipment.

Subelement -CV: The Travel estimate has been increased by (b)(4) to support a TIM at KSC. The ODC estimate has been increased by (b)(4) for additional training. The estimated labor for this subelement was decreased by (b)(4) due to a decrease in the support required for SIL/SITF testing.

Changed the Task Order Lead from Thomas Perry to Michael Cox.

This revision to the Task Order affects the following APO elements:

- Vehicle Integration (subelement -CV)

This revision to the Task Order affects the following Science Programs and Projects:

- ECLSS 2010 Spares (subelement -02)
- IMAX Accommodations Task (subelement -03)

Task Order Subelement Mapping:

Subelement	WBS/ Project
02	401769.06.08.02.04.05 / ECLSS 2010 Spares
03	099844.04.03.02 / IMAX Accommodations Task
CV	136905.02.06.08.06 / Crew Launch Vehicle Ares Vehicle Integration

Revision -05: The purpose of this revision is to reduce the scope of the task due to a decrease in the power system support required, and to increase the scope to include equipment required for the IMAX work. Changes made to each affected subelement are as follows:

Subelement -02: The ODC cost has been increased by (b)(4) to add training costs. The Travel cost has been increased by (b)(4) to add training costs.

Subelement -03: The estimated scope of support for this subelement was decreased by (b)(4) from the original estimate, due to a decrease in the power system support required.

This revision to the Task Order affects the following Science Programs and Projects:

- ECLSS 2010 Spares (subelement -02)
- IMAX Accommodations Task (subelement -03)

Task Order Subelement Mapping:

Subelement	WBS/ Project
02	401769.06.08.02.04.05 / ECLSS 2010 Spares
03	099844.04.03.02 / IMAX Accommodations Task
CV	136905.02.06.08.06 / Crew Launch Vehicle Ares Vehicle Integration

Revision -04: The purpose of this revision 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. 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 to the Task Order affects the following APO elements:

- Vehicle Integration (subelement -CV)

This Task Order affects the following Science Programs and Projects:

- ECLSS 2010 Spares (subelement -02)
- IMAX Accommodations Task (subelement -03)

Task Order Subelement Mapping:

Subelement	WBS/ Project
02	401769.06.08.02.04.05 / ECLSS 2010 Spares
03	099844.04.03.02 / IMAX Accommodations Task
CV	136905.02.06.08.06 / Crew Launch Vehicle Ares Vehicle Integration

Revision -03: The purpose of this revision is to adjust the task order estimate as follows:

Subelement -01: The ODC cost has been increased by (b)(4) to add recruiting costs.

Subelement -02: The labor estimate has been increased by (b)(4) to reflect an increase in scope to add a new labor resource.

This Task Order affects the following Science Programs and Projects:

- International Lunar Nodes (subelement -01)
- ECLSS 2010 Spares (subelement -02)

Task Order Subelement Mapping:

Subelement	WBS/ Project
01	278083.02.50.01 / International Lunar Nodes
02	401769.06.08.02.04.05 / ECLSS 2010 Spares
03	099844.04.03.02 / IMAX Accommodations Task
CV	136905.02.06.08.06 / Crew Launch Vehicle Ares Vehicle Integration

Revision -02: The purpose of this revision is to reduce the scope of the task due to a decrease in the power system support required, and to increase the scope to include equipment required for the IMAX work. Changes made to each affected subelement are as follows:

Subelement -01: The labor estimate has been reduced by (b)(4). A travel cost estimate of (b)(4) was added for this task.

Subelement -02: The labor estimate has been reduced by (b)(4).

Subelement -03: The labor estimate has been reduced by (b)(4). A material cost estimate of (b)(4) was added for the purchase of equipment required for the IMAX task.

Subelement –CV: The labor estimate has been reduced by (b)(4).

This revision to the Task Order affects the following APO elements:

- Vehicle Integration (subelement -CV)

This Task Order affects the following Science Programs and Projects:

- International Lunar Nodes (subelement -01)
- ECLSS 2010 Spares (subelement -02)
- IMAX Accommodations Task (subelement -03)

Task Order Subelement Mapping:

Subelement	WBS/ Project
01	278083.02.50.01 / International Lunar Nodes
02	401769.06.08.02.04.05 / ECLSS 2010 Spares
03	099844.04.03.02 / IMAX Accommodations Task
CV	136905.02.06.08.06 / Crew Launch Vehicle Ares Vehicle Integration

Revision -01: The purpose of this revision is as follows:

Subelement -01: The estimated scope of support for this subelement was decreased from the original estimate, due to a decrease in the power system support required. Therefore, this subelement has been reduced by (b)(4) decreasing the estimated cost by (b)(4).
Subelement -02: Added this subelement for Electrical Power support for the ECLSS 2010 Spares project. This support is estimated to require (b)(4) of direct labor at an estimated cost of (b)(4)

Subelement -03: Added this subelement for Electrical Power support for the IMAX Accommodations Task. This support is estimated to require (b)(4) of direct labor at an estimated cost of (b)(4).

Subelement –CV: Revised the subelement to delete the planned subcontractor support. The support was replaced with a new hire which increased the estimated direct labor by (b)(4), increasing the estimated cost by (b)(4)

Revision -00: This Task Order (TO) is being generated for a new Electrical Power engineering support to be performed for NASA MSFC Electrical Power Branch (ES41) of the NNM05AB50C ESTS contract. This TO defines and estimates work for the period of 2 February 2009 through 2 October 2009.The purpose of this TO is to add subelements (-01 and -CV) for Electrical Power support to the International Lunar Nodes and Crew Launch Vehicle projects.

1.0 Task Order Description & Objectives

Provide Electrical Power engineering support to be performed for the MSFC Electrical Power Branch (ES41) for the International Lunar Nodes, ECLSS 2010 Spares, IMAX Accommodations Task and Crew Launch Vehicle projects.

Subelement Specific Objectives:

Subelement 01: ILN Support
This Subelement provides electrical power engineering support for developing, designing, and testing the electrical power system used in the International Lunar Nodes (ILN) Project. This subelement was closed in Revision 4.

Subelement 03: IMAX Accommodations Support
This subelement was closed in Revision 8.

Subelement CV: Ares SIL/SITF Support
This subelement was administratively closed on July 3, 2010.

Subelement JA: ECLSS 2010 Spares Support
This Subelement provides electrical power engineering support for developing and testing the electrical power system used in the ECLSS 2010 Spares Project. This subelement was formerly -02 and was changed on Revision 8.

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

1. Support the development, design and testing of power emulators to enable SITF and SIL to adequately test validate and verify the CLV electrical power system. Also, determining and documenting the emulator hardware and software requirements as necessary; creating design schematics, drawings, and procedures; coordinating the development, formal documentation, and fabrication or procurement of the hardware; and testing and verifying the emulator hardware.
2. Support the development and testing of the Power Module (PM) for the spare ECLSS UPA Firmware Controller Assembly (FCA).
3. Support the development, procurement, designing, and testing of a universal battery charger to be used in the IMAX Accommodations Task project. Also, determining and documenting the key requirements to be met with the universal battery charger, creating design schematics and / or drawings, developing test plans and procedures, procuring various items required for use in the testing, as well as procuring a video recorder, conducting charger concept testing, and writing test reports.
4. Support the development, design, test, and verify the ILN electrical power system. Typical space rated power systems being considered for the project include the following types of subassemblies: space rated batteries, solar arrays, ~100-200 Watt nuclear power systems, power distributors, and power conditioning and monitoring equipment. Experience with the design, development, and usage of these types of power systems is preferred. Also, determining and documenting the electrical power system requirements; creating design schematics, drawings, and procedures; coordinating the development, formal documentation, and fabrication or procurement of the hardware; and coordinating the delivery, testing, verification, and on-orbit operation requirements of the hardware.

The Jacobs ESTS Group will perform the work described above using standard office automation software including Microsoft Project, Excel, Word and PowerPoint. The Internet will be used to obtain NASA standards, military standards and contractor documents as appropriate.

The Jacobs ESTS Group will support meetings, teleconferences, Technical Interchange Meetings, (TIMs), etc., as required by ES41.

3.0 Discussion of Skills Required

Scientists or engineers with electrical engineering skills and power systems background are required. Power Systems support also requires personnel with paraprofessional skills and a familiarity with computer systems, including Schematic Design Capture software such as Mentor Graphics Design Capture and electronic circuit software such as Microcap or Mathlab with Simulink.

4.0 Special Tools Required

None Identified.

5.0 Participating Subcontractors

None Identified.

6.0 Milestones & Deliverables

Products include requirements, schematics, drawings and procedures, monthly activity reports, updates to ES41 monthly review charts, procurement documentation, Review Item Discrepancies, presentations, and technical papers where appropriate.

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

Some domestic travel is possible for subelement -JA, but no travel is identified at this time or included in this estimate. If travel is required this Task Order Plan will be revised.

ODC is estimated for training for subelement -JA.

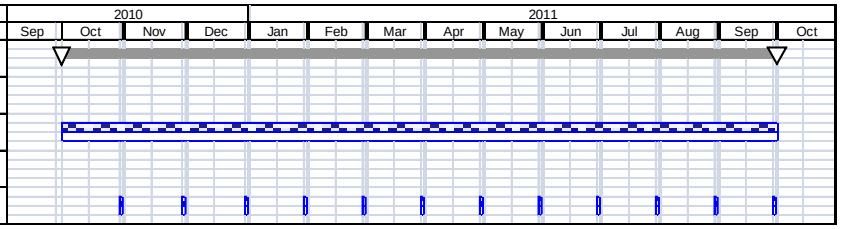
8.0 Work Shelf

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	s/e	Task Work Element
37-040101	00	**Electrical Power Branch**
37-040101	JA	ECLSS 2010 Spares Support
37-040101	00	**Monthly Activity Report**



ESTS Contract Task Order Request Performance Plan

Task Order Title: Electrical Power Branch

Task Order Number: 37-040101 Revision: 08

Category	Weighting Technical %	End of Period Technical Score
Technical Objectives	65%	X 65% = 0.00
		Justification
1) Design, analyses, assessments, and reviews are accurate and comprehensive (i.e. cover all relevant requirements and technical issues), and adhere to established program specifications. 2) Perform comprehensive hardware design, analysis, fabrication, and testing based on established engineering practices. 3) Ensure programmatic and technical traceability of requirements, analysis, test, and verification activities.		
	Weighting Schedule %	**Schedule Score**
Schedule Objectives (Milestones)	10% *(min 10%)*	X 10% = 0.00
		Justification
Deliver any products and documentation identified per the agreed-to schedule.		
	Weighting Cost%	**Cost Score**
Cost (actual vs. negotiated)	25% *(min.25%)*	X 25% = 0.00
		Justification
	Weighting Total %	**Total Score**
	100.00%	**0.00**

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

Task Order Number: Electrical Power Branch

Task Order Number: 37-040101 Revision: 08

Comments:

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Risk Assessment

Contract Number: *NNM05AB50C*
TO Title: *Electrical Power Branch*
TO Number: *37-040101* **Revision:** *08*

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

MSFC Initiator: *Jeffrey Brewer*

(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.

Risk	Risk Type	Probability (1-4)	Impact (1-4)	Risk Description
Risk C1	Cost			No cost risks have been identified for this Task Order.
Risk C2	Cost			
Risk T1	Technical			No technical risks have been identified for this Task Order.
Risk T2	Technical			
Risk S1	Schedule			No schedule risks have been identified for this Task Order.
Risk S2	Schedule			

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

Task Order Risk Matrix

		1 Minimal Impact	2 Minor Impact	3 Medium Impact	4 Major Impact
Inevitable Occurrence (>95% Probability)	4	Y	Y	R	R
High Probability of Occurrence (>60% but <95% Probability)	3	G	Y	Y	R
Medium Probability of Occurrence (>25% but <60% Probability)	2	G	Y	Y	Y
Low Probability of Occurrence (<25% Probability)	1	G	G	Y	Y

Legend

- R — **Primary Risk Driver:** Requires Risk Mitigation Plan
- Y — **Caution:** Requires status updates and general plan for risk reduction as determined necessary by Team Lead and Initiator
- G — **Watch:** No Action required

Impact Level	Cost Impact Definition	Technical Impact Definition	Schedule Impact Definition
(1) Minimal Impact	No significant cost impact	No significant technical impact	No significant schedule impact
(2) Minor Impact	Potential to recover cost	Potential to gain required technology without impact	Minor delay in deliverables but no impact to customer
(3) Medium Impact	>0 but <10% subtask cost overrun	Some technical impact but potential to recover	Delay in subtask deliverables but work arounds available and acceptable to customer
(4) Major Impact	>10% subtask cost overrun	Unable to meet technical requirements to perform subtask	Delay in subtask deliverables with impact to customer

Risk Mitigation Plan

Complete the following chart for those risks identified on page 1 as “Primary Risk Drivers”. The following chart will serve as the Risk Mitigation Plan.

Risk No.: Risk Description:		
Mitigation Step No.	Planned Completion Date	Mitigation Step Description