

Task Order Plan (TOP)

Contract Number: NNM05AB50C
TO Title: ET & SRB Dynamics Support
TO Number: 32-030103 **Revision:** 11

Period of Performance: 10/2/2010 to 2/28/2011

MSFC Initiator: Phil Harrison

(b)(4)

Emergency: No

Revision 11

The purpose of this revision is to extend this task into Contract Year 6 of the NNM05AB50C ESTS contract. Subelements 00 and 01 have been renamed to SA and SB, respectively, to comply with the new Shuttle subelement naming convention. This revision defines and estimates work for the period October 2, 2010 through February 28, 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 task order supports the Shuttle Project.

Revision 10

The purpose of this revision is to increase the scope of this task order at the request of the customer. The added scope includes stress support for the External Tank on Subelement 00 as well as an increased effort supporting the current objectives of both Subelements 00 and 01. To accomplish these changes, Sections 1.0, 2.0, 3.0, 6.0 and the performance plan were revised. Changes to the cost estimate are described below.

Subelement 00 was changed to increase Labor by (b)(4) in FY 2010.

Subelement 01 was changed to increase Labor by (b)(4) in FY 2010.

Revision 09

The purpose of this revision is to add scope in order to archive vibroacoustic flight and ground test data, to generate and/or update vibroacoustic tools used to automate vibroacoustic analysis processes and to automate vibroacoustic data reduction processes using Excel Macros, Matlab or other software. The Task Order Description and Objectives, Technical Approach and Schedule sections of the TO have been revised to reflect these changes.

Subelement 00 was changed to increase Labor by (b)(4) in FY 2010. This resulted in an estimated cost increase of (b)(4). Subelement 00 was changed to increase Labor by (b)(4) in FY 2011. This resulted in an estimated cost increase of (b)(4).

Subelement 01 was changed to increase Labor by (b)(4) in FY 2010. This resulted in an estimated cost increase of (b)(4). Subelement 01 was changed to increase Labor by (b)(4) in FY 2011. This resulted in an estimated cost increase of (b)(4).

Revision 08

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.

Revision 07

The purpose of this revision is to update the staffing profile and decrease Labor hours based on current task support requirements and add estimated costs for Other Direct Costs for relocation for subelements 00 and 01.

The following specific changes were made for subelement 00:

- Decreased Labor by (b)(4)
- Added Other Direct Costs of (b)(4)

This resulted in an estimated cost decrease in subelement 00 of (b)(4)

The following specific changes were made for subelement 01:

- Decreased Labor by (b)(4)
- Added Other Direct Costs of (b)(4)

This resulted in an estimated cost decrease in subelement 01 of (b)(4)

Revision 06

The purpose of this revision 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. 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 following Project Office elements: the Space Transportation System External Tank (ET) Project (Subelement 00) and the Space Transportation System Solid Rocket Booster (SRB) Project (Subelement 01).

Revision 05

The purpose of this revision is to update the staffing profile to account for change in personnel due to a staff vacancy, travel, recruiting and relocation estimates. These changes resulted in the following revisions to the cost estimate.

Subelement 00:

Increased the Labor estimate by (b)(4)
Added the Other estimate of (b)(4) for recruiting and relocation.
Decreased the Travel estimate by (b)(4)
These changes resulted in a net decrease of (b)(4)

Subelement 01:

Reduced the Labor estimate by (b)(4)
Added the Other estimate of (b)(4) for recruiting and relocation.
These changes resulted in a net decrease of (b)(4)

Revision 04

The purpose of this revision 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. Additionally, the Schedule, Performance Plan and Risk Assessment have been revised to reflect changes in task activities for the new period of performance. Finally, the subelement -02 was performed by a subcontractor. The work is complete and has been closed for CY03.

Revision 03

The purpose of this revision is to reduce contractor cost estimates and to accommodate a change in the ESTSG staffing profile. Editorial changes were made to sections 5 and 7.

Revision 02

The purpose of this revision 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.

PR #: 4200164794

Revision 01

The purpose of this revision is to adjust the estimates due to taking longer than anticipated to fill new positions. Labor has been reduced by (b)(4) and other direct costs has been reduced by (b)(4)

1.0 Task Order Description & Objectives

This task supports the Space Shuttle External Tank (ET) and Solid Rocket Boosters (SRB) projects. The objective of this Task Order Plan (TOP) is to provide sustaining engineering support to the ET and SRB projects in vibroacoustics, structural dynamics, and loads.

Subelement – SA ET Sustaining Engineering

This subelement provides structural dynamics and vibroacoustic support to the Space Transportation System External Tank Project. In addition, it provides technical support to the Shuttle Loads Panel on dynamics and vibroacoustics issues related to External Tank. The major tasks include but are not limited to:

- Attending and supporting Engineering Meetings/Reviews and track issues related to structural dynamics and vibroacoustics
- Reviewing/assessing change requests and making recommendations to either approve or disapprove changes, performing and/or evaluating dynamic analyses on program issues related to In-Flight Anomalies or Return-to-Flight.
- Documenting and/or presenting results.
- Supporting vibroacoustic Statistical Energy Analysis (SEA) and hybrid analysis methodology/tool development and implementation. Supporting empirical-based vibroacoustic analysis development and implementation.
- Participating in shuttle loads panel meetings when issues involving dynamics or vibroacoustics are discussed and subsequently responding to loads panel action items.
- Archiving vibroacoustic flight and ground test data, generating and/or updating vibroacoustic tools used to automate vibroacoustic analysis processes and automate vibroacoustic data reduction processes using Excel Macros, Matlab or other software.

Subelement – SB SRB Sustaining Engineering

This subelement provides structural dynamics and vibroacoustic support to the Space Transportation System Solid Rocket Booster Project. In addition, it provides technical support to the Shuttle Loads Panel on dynamics and vibroacoustics issues related to Solid Rocket Booster. The major tasks include but are not limited to:

- Attending and supporting Engineering Meetings/Reviews and track issues related to structural dynamics and vibroacoustics,

- Reviewing/assessing change requests and making recommendations to either approve or disapprove changes, performing and/or evaluating dynamic analyses on program concerns related to change packages, non-conformance issues, and In-Flight Anomalies.
- Documenting and/or presenting results.
- Supporting vibroacoustic Statistical Energy Analysis (SEA) and hybrid analysis methodology/tool development and implementation. Supporting empirical-based vibroacoustic analysis development and implementation.
- Participating in shuttle loads panel meetings when issues involving dynamics or vibroacoustics are discussed and subsequently responding to loads panel action items.
- Archiving vibroacoustic flight and ground test data, generating and/or updating vibroacoustic tools used to automate vibroacoustic analysis processes and automate vibroacoustic data reduction processes using Excel Macros, Matlab or other software.

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

Subelement – SA ET Sustaining Engineering

The ESTS Group will perform analyses and assessments to support structural dynamic, vibroacoustic, and loads sustaining engineering activities associated with the ET. The major areas of task work include, but are not limited to:

- Attend ET meetings/reviews and track issues relative to structural dynamics, vibroacoustics, and loads.
- Review/assess ET change requests and provide approval or disapproval recommendations.
- Perform and/or evaluate ET structural dynamic, vibroacoustic, and loads analyses associated with change packages, non-conformances issues, and flight anomalies.
- Support vibroacoustic Statistical Energy Analysis (SEA) and hybrid analysis methodology/tool development and implementation. Support empirical-based vibroacoustic analysis development and implementation.
- Participate in Shuttle loads panel meetings when they are expected to include ET structural dynamic, vibroacoustic, and/or loads items.
- Archiving vibroacoustic flight and ground test data, generating and/or updating vibroacoustic tools used to automate vibroacoustic analysis processes and automate vibroacoustic data reduction processes using Excel Macros, Matlab or other software.

The ESTS Group will provide review and assessment of existing analyses, as well as develop independent analyses as indicated to support EV31 responsibilities.

Subelement – SB SRB Sustaining Engineering

The ESTS Group will perform analyses and assessments to support structural dynamic, vibroacoustic and loads sustaining engineering activities associated with the SRB. The major areas of task work include, but are not limited to:

- Attend SRB meetings/reviews and track issues relative to structural dynamics, vibroacoustics, and loads.
- Review/assess SRB change requests and provide approval or disapproval recommendations.
- Perform and/or evaluate SRB structural dynamic, vibroacoustic, and loads analyses associated with return to flight efforts and flight anomalies.
- Support vibroacoustic Statistical Energy Analysis (SEA) and hybrid analysis methodology/tool development and implementation. Support empirical-based vibroacoustic analysis development and implementation.

- Participate in Shuttle loads panel meetings when they are expected to include SRB structural dynamics, vibroacoustics, and/or loads items.
- Archiving vibroacoustic flight and ground test data, generating and/or updating vibroacoustic tools used to automate vibroacoustic analysis processes and automate vibroacoustic data reduction processes using Excel Macros, Matlab or other software.

The ESTS Group will provide review and assessment of existing analyses, as well as develop independent analyses as indicated to support EV31 responsibilities.

3.0 Discussion of Skills Required

Subelement – SA ET Sustaining Engineering

This subelement requires broad experience in structural dynamics, loads, and environments modeling and analysis and finite element analyses. The subelement also requires, as a minimum, skill in NA-STRAN for the dynamics analysis work (including transient analyses) and use of Patran pre-/post-processing software (when utilizing on-site computers). In addition, this subelement may require experience with VA One, LS-DYNA, Excel or Matlab software.

Subelement – SB SRB Sustaining Engineering

The subelement requires broad experience in structural dynamics, loads and environments modeling and analysis and finite element analyses. The subelement also requires, as a minimum, skill in NA-STRAN for the dynamics analysis work (including transient analyses) and use of Patran pre-/post-processing software (when utilizing on-site computers). In addition, this subelement may require experience with VA One, LS-DYNA, Excel or Matlab software.

4.0 Special Tools Required

None.

5.0 Participating Subcontractors

None.

6.0 Milestones & Deliverables

Keep EV31/Dynamics, Loads, and Strengths Branch informed on significant issues in bi-weekly meetings or as requested. Generate status charts on dynamics and vibroacoustics issues as requested. Retain a data base of all documents/issues worked and publish results. Generate monthly activity reports.

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

Subelement – SA ET Sustaining Engineering

None.

Subelement – SB SRB Sustaining Engineering

None.

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
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9.0 Schedule

Task Order #	SubE	Task Work Element	2011											
			Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
32-030103	SA	<input type="checkbox"/> Subelement – SA ET Sustaining Engineering	▼											
32-030103	SA	Review/Assess Change Requests	▬											
32-030103	SA	Conduct Engineering Analyses	▬											
32-030103	SA	Support Technical Meetings	▬											
32-030103	SA	Provide Shuttle Loads Panel Support	▬											
32-030103	SA	Prepare Reports	▬											
32-030103	SA	Perform Archiving and Tool Development	▬											
32-030103	SA	Provide MARs	▬											
32-030103	SB	<input type="checkbox"/> Subelement – SB SRB Sustaining Engineering	▼											
32-030103	SB	Review/Assess Change Requests	▬											
32-030103	SB	Conduct Engineering Analyses	▬											
32-030103	SB	Support Technical Meetings	▬											
32-030103	SB	Provide Shuttle Loads Panel Support	▬											
32-030103	SB	Prepare Reports	▬											
32-030103	SB	Perform Archiving and Tool Development	▬											
32-030103	SB	Provide MARs	▬											

ESTS Contract Task Order Request Performance Plan

Task Order Title: [ET & SRB Dynamics Support](#)

Task Order Number: [32-030103](#) Revision: 11

Category	Weighting Technical %	End of Period Technical Score
Technical Objectives	65%	X <u>65%</u> = Justification
<ol style="list-style-type: none"> 1. Attend External Tank & Solid Rocket Booster engineering meetings/reviews, tracking issues related to structural dynamics and loads. 2. Participate in the Shuttle Loads Panel telecom's and meetings when presentations are made related to the External Tank and Solid Rocket Booster programs. Respond to actions given by the Loads Panel Co-Chair during these meetings. 3. Review External Tank and Solid Rocket Booster change requests. Make recommendations to either approve or disapprove. 4. Make technical presentations related to the External Tank and Solid Rocket Booster programs, on issues that arise with respect to return to flight activities, and sustaining engineering. Perform and/or coordinate structural analyses in order to close out issues. 5. Perform structural dynamic analyses of the ET and SRB structures and their components, review finite element models, analyses and test reports, perform sensitivity studies, provide test planning, and test support, and participate in TIM's and design reviews. Review, evaluate, and analyze In-Flight Anomalies and related flight instrumentation. 6. Archiving vibroacoustic flight and ground test data, generating and/or updating vibroacoustic tools used to automate vibroacoustic analysis processes and automate vibroacoustic data reduction processes using Excel Macros, Matlab or other software. 		
Schedule Objectives (Milestones)	Weighting Schedule % <u>10%</u> (min 10%)	Schedule Score X <u>10%</u> = Justification

ESTS Contract Task Order Request Performance Plan

Task Order Title: [ET & SRB Dynamics Support](#)

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<ol style="list-style-type: none"> 1. Generate Project Review charts as requested. 2. Retain in a database, all documents/issues worked, and issue status/resolution. 3. Keep the EV31, Structural Loads Team Lead informed on significant issues in bi-weekly meetings or as requested. 4. Provide timely review and assessment of test plans and procedures, test reports, test data, and flight data. 		
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	Weighting		Cost Score	
<u>Cost (actual vs. negotiated)</u>	Cost%	25%		X 25% =
	<i>(min.25%)</i>			Justification
	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

Task Order Number: [ET & SRB Dynamics Support](#)

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Comments:

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.

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	1	2	If required input data is not available on schedule, it may cause delays in associated deliverables.
Risk S2	Schedule			

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



