

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT			1. CONTRACT ID CODE	PAGE OF PAGES
2. AMENDMENT/MODIFICATION NO. 00026			3. EFFECTIVE DATE See Block 16C	4. REQUISITION/PURCHASE REQ. NO. 4200377521
6. ISSUED BY NASA Goddard Space Flight Center Procurement Operations Division			7. ADMINISTERED BY (if other than item 6) NASA/Goddard Space Flight Center Space Sciences Procurement Office	5. PROJECT NO. (if applicable) 210.S
8. NAME AND ADDRESS OF CONTRACTOR (No. Street, county, State and ZIP Code) LOCKHEED MARTIN CORP. 12257 STATE HWY LITTLETON CO 80127-0000			(4)	9A. AMENDMENT OF SOLICITATION NO.
CODE 04235 FACILITY CODE				9B. DATED (SEE ITEM 11)
			X	10A. MODIFICATION OF CONTRACT/ORDER NO. NNG09EK34C
				10B. DATED (SEE ITEM 13) 04/02/09

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

The above numbered solicitation is amended as set forth in item 14. The hour and date specified for receipt of Offers is extended, is not extended. Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods:

(a) By completing items 8 and 15, and returning one (1) copy of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATA SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and data specified.

12. ACCOUNTING AND APPROPRIATION DATA (if required)

BNC: GJE PR: 4200377521 AMT: \$2,500,000.00

13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS, IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.

(4)	A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.
	B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation date, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(b).
	C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:
X	D. OTHER Specify type of modification and authority NFS 1852.232-81 CONTRACT FUNDING (JUN 1990)

E. IMPORTANT: Contractor is not, is required to sign this document and return ___ copies to the issuing office.

14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)

The purpose of this modification is to revise Clause B.3 and provide additional funding for continued contract performance.

POC: Amy Aqueche. Email: amy.a.aqueche@nasa.gov

Continued....

Except as provided herein, all terms and conditions of the document referenced in item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER (Type or print)		16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print)	
		Amy A. Aqueche	
15B. CONTRACTOR/OFFEROR	15C. DATE SIGNED	16B. UNITED STATES OF AMERICA	16C. DATE SIGNED
(Signature of person authorized to sign)		BY <i>Amy A. Aqueche</i> (Signature of Contracting Officer)	<i>03/01/2011</i>

1. Revise Clause B.3 – CONTRACT FUNDING (1852.232-81) (JUN 1990) is revised to increase funds as set forth below:

	FROM	BY	TO
Estimated Cost	[REDACTED]	[REDACTED]	[REDACTED]
Base Fee	[REDACTED]	[REDACTED]	[REDACTED]
Award Fee	[REDACTED]	[REDACTED]	[REDACTED]
CPAF	\$70,520,075	\$2,500,000	\$73,020,075

*The allotment date is through April 1, 2011.

2. All other terms and conditions remain unchanged and in full force and effect.

END MODIFICATION

OMB Approval 3700-0042

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT				1. CONTRACT ID CODE	PAGE OF PAGES 1 2
2. AMENDMENT/MODIFICATION NO. 00027	3. EFFECTIVE DATE See Block 16C	4. REQUISITION/PURCHASE REG. NO. N/A	5. PROJECT NO. (If applicable)		
6. ISSUED BY NASA Goddard Space Flight Center Procurement Operations Division	CODE 210.S	7. ADMINISTERED BY (If other than Item 6) NASA/Goddard Space Flight Center Space Sciences Procurement Office	CODE 210.S		
8. NAME AND ADDRESS OF CONTRACTOR (No. Street, county, State and ZIP Code) LOCKHEED MARTIN CORP. 12257 STATE HWY LITTLETON CO 80127-0000				(4)	9A. AMENDMENT OF SOLICITATION NO.
					9B. DATED (SEE ITEM 11)
				X	10A. MODIFICATION OF CONTRACT/ORDER NO. NNG09EK34C
					10B. DATED (SEE ITEM 13) 04/02/09
CODE 04235	FACILITY CODE				

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers is extended, is not extended.

Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods:

(a) By completing items 8 and 15, and returning one (1) copy of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATA SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and data specified.

12. ACCOUNTING AND APPROPRIATION DATA (If required)

BNC: GJE PR: NA AMT: *Funding Exists on Contract to Cover Action*

13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS, IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.

(4)	A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.
	B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation data, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(b).
X	C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF: FAR 52.243-2 CHANGES - COST REIMBURSEMENT (AUG 1987)
	D. OTHER Specify type of modification and authority)

E. IMPORTANT: Contractor is not, is required to sign this document and return 1 copies to the issuing office.

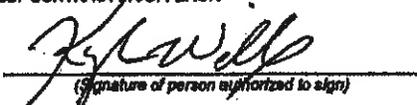
14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)

This modification definitizes Contractor's proposal dated December 7, 2010 for MAVEN Phase CDE 1/2" Latch Valve, U-String Solar Array Layout for MAG Cleanliness, SEU Susceptibility Requirements, GIF Re-spin, and Spare 3/8" Latch Valve and hereby completes CCB action item MAVEN-CCR-0270.

POC: Amy Aqueche. Email: amy.a.aqueche@nasa.gov

Continued...

Except as provided herein, all terms and conditions of the document referenced in item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER (Type or print) Kyle Wille, Contracts Negotiator	15A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print) Amy A. Aqueche
15B. CONTRACTOR/OFFEROR  (Signature of person authorized to sign)	15C. DATE SIGNED 3/24/2011
15B. UNITED STATES OF AMERICA BY  (Signature of Contracting Officer)	15C. DATE SIGNED 3/25/2011

1. Revise Clause B.1 – ESTIMATED COST AND AWARD FEE (1852.216-85) (SEPT 1993) as indicated below:

	Phase B	Phase C	Phase D
Estimated Cost	[REDACTED]	[REDACTED]	[REDACTED]
Maximum/Final Award Fee (Phase B)	[REDACTED]	[REDACTED]	[REDACTED]
Base Fee (Phase CDE)	[REDACTED]	[REDACTED]	[REDACTED]
Maximum Available Award Fee (Phase CDE)	[REDACTED]	[REDACTED]	[REDACTED]
Maximum Positive Performance Incentive (Phase CDE)	[REDACTED]	[REDACTED]	[REDACTED]
TOTAL CPAF (BCDE)	\$236,793,830	\$1,129,595	\$237,923,425

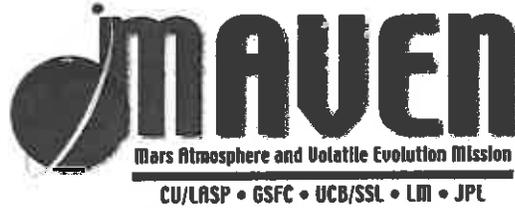
2. Revise Clause J.1, LIST OF ATTACHMENTS, as indicated below:

Attachment	Description	Date
A-2	SOW – Phase CDE Revision C	March 7, 2011

3. All other terms and conditions remain unchanged and in full force and effect.

(END MODIFICATION)

MAVEN-PROC-SOW-0002
Contract Number: NNG09EK34C
Revision C



Statement of Work (SOW)
for the
Mars Atmospheric and Volatile Evolution
(MAVEN)
Phase C/D/E Effort

MAVEN-PROC-SOW-0002
Revision C

Contract # NNG09EK34C

Effective Date: March 7, 2011



**National Aeronautics and
Space Administration**

**Goddard Space Flight Center
Greenbelt, Maryland**

In Review, TBD
CHECK <https://MAVENmis.gsfc.nasa.gov>
TO VERIFY THAT THIS IS THE CORRECT VERSION PRIOR TO USE.

CONFIGURATION MANAGEMENT (CM) FOREWORD

This document is a Mars Atmosphere and Volatile Evolution Mission (MAVEN) Project CM-controlled document. Changes to this document require prior approval of the applicable Configuration Control Board (CCB) chairperson or designee. Proposed changes shall be submitted to the MAVEN Configuration Management Office, along with supportive material justifying the proposed change. Changes to this document will be made by complete revision.

Questions or comments concerning this document should be addressed to:

MAVEN Configuration Management Office
Mail Stop 432
Goddard Space Flight Center
Greenbelt, Maryland 20771

REVIEW/APPROVAL PAGE

All project reviews and approvals are electronic via the MAVEN MIS at:

<https://mavenmis.gsfc.nasa.gov>

Statement of Work (SOW) for Phase C/D/E (Lockheed Martin)

DOCUMENT CHANGE RECORD

REVISION LEVEL	DESCRIPTION OF CHANGE	APPROVED BY	DATE APPROVED
Revision (-)	Baseline Release per CCR-0077	D. Mitchell	12/16/2009
Revision A	Changes to Section 6.2 per CCR-0089	D. Mitchell	12/22/2009
Revision B	Updates per MAVEN-CCR-0242.	D. Mitchell	11/16/2010
Revision C	Updates per CCR's 209, 213, 229, 240, 247 and direction for procuring 3/8" spare latch valve.	TBD	TBD

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1 INTRODUCTION

The Mars Atmospheric and Volatile Evolution (MAVEN) mission's primary goal is to provide a comprehensive picture of the Mars upper atmosphere, ionosphere, solar energetic drivers, and atmospheric losses. It will deliver definitive answers to long-standing questions about the climate history and habitability of Mars.

The MAVEN mission will gather this science through a single planetary orbiter at Mars. The orbiter delivers its science using three instrument packages: a stand-alone neutral gas and ion mass spectrometer (NGIMS), capable of measuring thermal neutrals and ions; a stand-alone imaging ultraviolet spectrometer (IUVS); and the Particles and Fields (P&F) package, consisting of six instruments (STATIC, SEP, SWEA, SWIA, LPW/EUV, MAG) measuring ionospheric properties, energetic ions, solar wind and solar energetic particles, magnetic fields, and solar EUV irradiance. In addition to these instrument packages, MAVEN will carry an Electra relay payload for the purposes of providing telecommunications relay services to other Mars missions including surface landers and rovers, spacecraft during Entry, Descent, and Landing (EDL) operations, and potential aerobot missions such as balloons and airplanes. Each instrument has significant relevant heritage. The instrument packages and the Electra relay payload will be delivered to LM as Government Furnished Equipment (GFE).

The NASA Goddard Space Flight Center (GSFC) manages the MAVEN project for the MAVEN Principal Investigator, Dr. Bruce Jakosky, University of Colorado at Boulder, Laboratory for Atmospheric and Space Physics (LASP) in Boulder, CO.

This Statement of Work (SOW) defines the work to be performed by Lockheed Martin Space Systems Company located in Denver, CO (herein referred to as LM) to design, develop and deliver a fully qualified flight spacecraft, integrate the instrument packages, qualify the orbiter (instruments/spacecraft), integrate the orbiter to the launch vehicle and launch the MAVEN orbiter, on a NASA provided launch vehicle, into a direct insertion orbit to Mars. This SOW also defines the work necessary for LM to design, develop and operate a Mission Support Area (MSA) that shall support the on-orbit mission operations of the MAVEN mission and support Science Operations Center at the LASP during Phase E. This SOW covers work done by LM during Phases C, D and E.

The Goddard Space Flight Center (GSFC) manages the MAVEN mission for NASA.

2 SCOPE OF WORK

LM shall provide the necessary personnel, facilities, services, and materials to design, fabricate, assemble, integrate (including integration of the NASA-supplied MAVEN scientific instruments) and test the MAVEN orbiter along with the necessary software, communications and ground support equipment to accomplish the MAVEN Mission scientific goals. This shall include the launch site processing, integration, and testing with an Atlas V launch vehicle in preparation for launch. LM shall deliver the orbiter to NASA in preparation for launching the MAVEN orbiter in a launch window opening on November 18, 2013 and closing on December 7, 2013. After launch, LM shall provide facilities and mission operations in support of the mission and science operations. The scope covers Phase C/D/E of the MAVEN Life Cycle. This work shall be performed in accordance with the requirements of this document and all attachments to the contract.

LM's scope of work shall include, but not be limited, to the following:

1. Manage the LM team through Phases C through E of the MAVEN mission.
2. Design, develop, fabricate, integrate, test, launch, and deliver a flight-qualified orbiter to meet the MAVEN science goals and objectives, and requirements flowed from the Mission Requirements Document (MRD).
3. Flow-down and implementation of the top-level mission requirements to the appropriate elements of the spacecraft and subsystems.
4. Design, development, fabrication, integration, testing and delivery of a flight qualified orbiter.
5. Receive the GFE instruments and related ground support equipment (GSE), then integrate them with the spacecraft bus and perform spacecraft level testing.
6. Provide all required spacecraft mechanical and electrical GSE.
7. Deliver and support integration, verification, and maintenance of ground system hardware and software.
8. Support combined spacecraft and ground system testing, and MAVEN end-to-end testing before launch.
9. Provide all services associated with the spacecraft/launch vehicle integration, launch site processing, launch site safety, launch site checkout and verification, and launch.
10. Provide all services associated with flight operations from the launch vehicle/spacecraft separation; cruise to Mars, Mars Orbit Insertion (MOI), on-orbit checkout, and Mars operations.
11. Support all services associated with the on-orbit spacecraft checkout and support associated with instrument checkout.

12. Provide spacecraft operator and engineering training for on-orbit operation.
13. Design, development, integration and testing of the Mission Support Area (MSA) as well as support the backup MSA at GSFC.
14. Operate and maintain the Mission Support Area (MSA) for the conduct of MAVEN flight operations post-launch.
15. Provide on-orbit engineering support for the MSA and spacecraft.
16. Implement an organized System Safety and Mission Assurance Program in accordance with the MAVEN Mission Assurance Requirements (MAR), MAVEN-PM-RQMT-0006, per the LM Mission Assurance Implementation Plan (MAIP), MAVEN-SC-PLAN-0029.
17. Provide engineering and I&T support to the instrument package providers.
18. Conduct on-orbit operations, providing for the health and safety of the orbiter.
19. Establish and maintain the required International Traffic in Arms Regulations (ITAR) and Export Control documentation necessary for working with any international team members
20. Provide support of a MAVEN Education and Public Outreach (EPO) program that is being led by LASP and the NASA MAVEN Project Office.
21. Develop and deliver the Contract Data requirements identified in the MAVEN Contract Data Requirements List (CDRL) , MAVEN-PROC-LIST-0002

LM delivered spacecraft and associated efforts shall meet all the spacecraft requirements as flowed down from the Mission Requirements Document (MRD). These requirements are defined in the Spacecraft Specification, MAVEN-SC-SPEC-0002.

Level-of Effort Special Studies and Support

- Provide on a level-of-effort basis approx. 100 hours of engineering direct labor to support various flight system or mission operations special studies as directed in writing by the cognizant GSFC Contracting Officer during Phase C/D/E.

3 APPLICABLE DOCUMENTS

The documents listed in this section apply directly to the performance of the MAVEN contract. These documents establish detailed specifications, requirements, and interface information necessary for the performance of the contract. These documents are under configuration control at GSFC. The most recent version of the document takes precedence over the version listed. LM will be under contract to the configuration controlled version at the time the contract is negotiated. All CM controlled documentation for MAVEN is controlled in the Management Information System (MIS) <https://mavenmis.gsfc.nasa.gov> and all items marked with an (*) are controlled in the DOORS database hosted at LM. This document will be reviewed, approved and updated via procedures defined in the MAVEN Configuration Management Plan, MAVEN-PM-PLAN-0007. In the event of conflicting requirements, the requirements as specified in this SOW shall supersede requirements from the documents listed. LM shall immediately notify the GSFC Contracting Officer Technical Representative (COTR) of any conflicts among the applicable documents and this statement of work in order to resolve the conflict and revise the documents accordingly. Requirements of this document apply to all MAVEN hardware, at the component, subsystem and orbiter levels of integration, either supplied directly by GSFC, contractors or subcontractors. Requirements herein apply to engineering models (when used for qualification purposes or a potential flight spare), qualification models, flight, flight spare hardware, ground systems, and software.

<u>DOCUMENT</u>	<u>DOCUMENT TITLE</u>
MAVEN-SC-SPEC-0002*	MAVEN Spacecraft Specification (MRD Requirement subset)
MAVEN-PROC-LIST-0002	MAVEN Contract Data Requirements List (CDRL)
MAVEN-PM-RQMT-0005*	MAVEN Mission Requirements Document (MRD)
MAVEN-SYS-RQMT-0010*	MAVEN Environmental Requirements Document (ERD)
MAVEN-PM-RQMT-0006*	MAVEN Mission Assurance Requirements (MAR)
MAVEN-SYS-PLAN-0007	MAVEN Magnetic Cleanliness Controls
MAVEN-SYS-PLAN-0024	MAVEN Contamination Control Plan
MAVEN-SYS-PLAN-0020	MAVEN Software Management Plan (SMP)
MAVEN-PM-PLAN-0021	MAVEN Systems Review Plan (SRP)
MAVEN-ELECTRA-RQMT-0014	Mars Exploration Program Requirements for MAVEN Electra Relay Services
MAVEN-MOPS-RQMT-0002	Mission Operations System (MOS)/Ground Data System (GDS) Functional Requirements Document (FRD)

Attachment IV Phase B RFP	Mission Operations Requirements
MAVEN-LV-RQMT-0032	Launch Services Interface Requirements Document (LSIRD)
MAVEN-MDES-RQMT-0036	Technical Resource Allocation Specification (TRAS)

3.1 REFERENCE DOCUMENTS

The following are reference documents that contain detailed requirements that may be called out in the applicable documents identified in Sec. 3 or contain general requirements levied on the MAVEN project by NASA. They are to be considered as requirements to the overall contract, as applicable.

<u>DOCUMENT</u>	<u>DOCUMENT TITLE</u>
AFSCM 91-710	Range Safety User Requirements
ANSI/ESD S20.20	ESD Association Standard for the Development of an Electrostatic Discharge Control Program for Protection of Electrical and Electronic Parts, Assemblies, and Equipment (Excluding Electrically Initiated Explosive Devices)
CR 5320.9	Payload and Experiment Failure Mode Effects Analysis and Critical Items List Ground Rules
FAP P-302-720	Performing a Failure Mode Effects Analysis
GIDEP S0300-BT-PRO-010	GIDEP Operations Manual
GP-1098	KSC Ground Operations Safety Plan, Volume 1
GSFC EEE-INST-002	Instructions for EEE Parts Selection, Screening, and Qualification and Derating
GSFC S-302-89-01	Failure Modes and Effects Analysis Procedures for Unmanned Spacecraft and Instruments
GFSC-STD-1000	Rules for Design, Development, Verification, and Operation of Flight Systems (aka Gold Rules)
GSFC-STD-7000	General Environmental Verification Standards (GEVS) for Flight Programs and Projects
GPR 1060.2	Management Review and Reporting for Programs and Projects

GPR 7120.4	Risk Management
GPR 8621.3	Mishap, Incident, Hazard, and Close Call Investigation
GPR 8700.4	Integrated Independent Reviews
GPR 8700.6B	Engineering Peer Reviews
IEEE 1413.1	Guide for Selecting and Using Reliability Predictions Based on IEEE 1413
IPC A-600	Acceptability of Printed Boards
IPC-A-610	Acceptability of Electronic Assemblies
IPC/EIA J-STD-001	Requirements for Soldered Electrical and Electronic Assemblies
IPC-2221	Generic Standard on Printed Board Design
IPC-2222	Sectional Design Standard for Rigid Organic Printed Boards
IPC-2223	Sectional Design Standard for Flexible Printed Boards
IPC-6011	Generic Performance Specifications for Printed Boards
IPC-6012	Qualification and Performance Specification for Rigid Printed Boards
IPC-6013	Qualification and Performance Specification for Flexible Printed Boards
IPC-6018	Microwave End Product Board Inspection and Test
K-ELV-11.2	Guide for Expendable Launch Vehicle Payload Processing at Kennedy Space Center and Cape Canaveral Air Force Station
KHB 1860.1	KSC Ionizing Radiation Protection Program
KHB 1860.2	KSC Non-Ionizing Radiation Protection Program
MAVEN-PM-PLAN-0008	MAVEN Project Management Plan
MAVEN-PM-PLAN-0007	MAVEN Configuration Management Plan
MAVEN-SYS-PLAN-0006	MAVEN Systems Engineering Management Plan (SEMP)
MAVEN-PM-PLAN-0004	MAVEN Risk Management Plan
MIL-STD 461C	Electromagnetic Emission and Susceptibility Requirements for the Control of Electromagnetic Interference

MIL-STD-461F	Requirements for the Control of Electromagnetic Interference Characteristics of Subsystems and Equipment
MIL-STD-462	Electromagnetic Interference Characteristics, Measurement of Radiated and Conducted EMI
NASA-HDBK-4001	Electrical Grounding Architecture for Unmanned Spacecraft
NASA-TP-2361	Surface Charging Avoidance
NASA-HDBK-4002	Avoiding Problems Caused by Spacecraft On-Orbit Internal Charging Effects
NASA-HDBK-7004B	Force Limited Vibration Testing Handbook
NASA-STD-7001	Payload Vibroacoustic Test Criteria
NASA-STD-7003	Pyroshock Test Criteria
NASA-STD-8719.13B	NASA Software Safety Technical Standard
NPD 7120.4	Program and Project Management
NPD8020.7G	Biological Contamination Control for Outbound and Inbound Planetary Spacecraft
NPD 8700.1	NASA Policy for Safety & Mission Success
NPD 8710.3	NASA Policy for Limiting Orbital Debris Generation
NPD 8720.1	NASA Reliability and Maintainability (R&M) Program Policy
NPD 8730.2	NASA Parts Policy
NPR 6000.1G	Requirements for Packaging, Handling, and Transportation for Aeronautical and Space Systems, Equipment and Associated Components
NPR 7120.5D	NASA Space Flight Program and Project Management Processes and Requirements
NPR 7123.1	Systems Engineering Processes and Requirements
NPR 7150.2	NASA Software Engineering Requirements
NPR 8000.4	Risk Management Procedural Requirements
NPR8020.12C	Planetary Protection Provisions for Robotic Extraterrestrial Missions

NPR 8621.1	NASA Procedures and Guidelines for Mishap Reporting, Investigating, and Record Keeping
NPR 8705.4	Risk Classification for NASA Payloads
NPR 8705.5	Probabilistic Risk Assessment (PRA) Procedures for NASA Programs and Projects
NPR 8715.3	NASA General Safety Program Requirements
NPR 8715.6A	NASA Procedural Requirements for Limiting Orbital Debris
NPR 8735.1	Procedures for Exchanging Parts, Materials, and Safety Problem Data Utilizing the Government-Industry Data Exchange Program and NASA Advisories
NPR 9501.2D	NASA Contractor Financial Management Reporting
NSS 1740.12	Safety Standard for Explosives, Propellants, and Pyrotechnics
NSS 1740.14	Guidelines and Assessment Procedures for Limiting Orbital Debris
RADC-TR-85-229	Reliability Prediction for Spacecraft
SAE AS9100	Quality Management System, Aerospace Requirements
541-PG-8072.1.2	GSFC Fastener Integrity Requirements

4 PERIOD OF PERFORMANCE

The period of performance for the work specified in this SOW will be for phases C, D and E.

The following table contains the current projected start dates for each phase of the mission:

Table 4-1 – MAVEN Mission Phases Dates

Phase	Date
Phase C - START	Nov. 1, 2010
Phase D - START	August 2012
LAUNCH Readiness Date	November 18, 2013
Phase E - START	[L+30 days]
Phase E - END	Mapping Phase Start + 365 days + 6 months of final data analysis/archiving

Phase F – “Decommissioning Phase” – Contract closeout and property disposition will be handled either in Phase F or as a contract change to Phase E when the requirements and costs are better understood.

5 PROGRAMMATIC REQUIREMENTS

5.1 PROJECT MANAGEMENT

LM shall designate, by name, a LM MAVEN Project Manager (PM). The PM shall be responsible for leading the LM team through these phases of the project and manage the contract to ensure that all performance, schedule, costs and quality objectives are met. The PM will be the primary point of contact and shall provide full visibility to NASA/GSFC on all aspects of performance covered by this SOW and immediately disclose existing or potential problems and planned resolutions. The PM shall maintain a liaison with the GSFC/MAVEN COTR and GSFC MAVEN Project Office to ensure adherence to all requirements. The PM will be the technical focal point and direct and administer the MAVEN orbiter development, mission integration and mission operations. The PM shall coordinate LM efforts with that of its subcontractors, the MAVEN Instrument Investigators, and NASA.

LM shall establish, implement and maintain a management system that integrates management disciplines, functions, and systems into an overall activity to achieve cost-effective planning, organizing, controlling, and reporting of the contract objectives. The day-to-day management and administration of the specified work are the prime objectives of this SOW element. As part of this effort, LM shall provide traceability of cost, schedule and technical progress data for work being performed by LM and all of its suppliers and subcontractors in support of this contract, as well as provide the necessary leadership and technical coordination of the activities to ensure schedules and technical progress are consistent with the contract objectives.

5.2 CONTRACTUAL/TECHNICAL DIRECTION

LM performance to the requirements of this contract is under the administrative direction of the NASA GSFC Contracting Officer (CO). Administrative direction includes guidance and approvals that establish all understandings and agreements between LM and NASA. Sole authority to make changes, revisions, or amendments, to the contract, on behalf of NASA and to effect deviations (by way of additions or deletions) from the work described herein rests with the authorized CO.

The CO designates the COTR as the principal technical interface to LM who will monitor LM's technical performance and progress. All technical changes to the contract, addition of tasks must be previously coordinated with the COTR as the MAVEN project representative. The COTR will coordinate with the CO any official changes to the contract. Any deletions, additions, changes or amendments to this SOW, or other exhibits or documents referenced herein, are not considered technical guidance and shall be implemented by LM only if expressly authorized in writing by the CO.

Acceptance of direction from anyone other than the COTR and/or CO will not be considered as a basis for claim against the government.

5.3 COMMUNICATIONS

LM shall provide regular communications and meetings with NASA/GSFC either via teleconferences or face-to-face to discuss programmatic, financial data, contracts, and technical status and issues. Periodic meetings (weekly, monthly, and quarterly) shall be established. In addition to the periodic meetings, special meetings such as Technical Interchange Meetings (TIMs) shall be set up for detailed technical or programmatic interchange as needed.

5.3.1 WEEKLY MEETINGS

LM shall report technical and programmatic progress in weekly informal teleconferences with the MAVEN Project Office.

LM shall conduct status meetings with the COTR on a weekly basis and generate a brief email status to be sent to the COTR.

5.3.2 MONTHLY/QUARTERLY MEETINGS

LM shall conduct a Monthly Management Review (MMR) at the LM Denver facility. LM shall prepare a MAVEN Spacecraft Monthly Technical Progress Review data package (see Section 5.3.8.1) and present this data package to NASA –on an agreed upon date around the 15th of each month held at LM's facility except when combined as a quarterly project review. The quarterlies will rotate between Lockheed Martin (LM), the Laboratory for Atmospheric and Space Physics (LASP), the Goddard Space Flight Center (GSFC), the Jet Propulsion Laboratory (JPL), and the University of California, Berkeley, Space Sciences Lab (SSL). LM is to prepare the same review package for the project, but will likely present a reduced package at the quarterly. A separate LM Quarterly with GSFC management may be required. The monthly Technical Progress Reviews shall be held unless the NASA COTR and LM PM agree to an alternate briefing. A separate financial splinter meeting will be held to address financial and contract data.

5.3.3 TECHNICAL INTERCHANGE MEETINGS

LM shall support/conduct miscellaneous Technical Interchange Meetings (TIMs) as needed to resolve and work out detailed technical issues (e.g. interfaces). These will be held via teleconferences or via face-to-face meetings. The location of these TIMs will likely vary between GSFC, LASP, University of California at Berkeley, JPL, LM, and the launch vehicle provider. Attendance to these TIMs will depend on the topic to be discussed and should be limited to the appropriate personnel. Some examples of specific TIMs that are required are:

- Technical and Project team telecoms and working meetings, such as mission assurance, software, integration and test, fault protection, subsystems, mission sequence and operations.
- Telecons and working meetings for interfaces and integration with the payloads, telecom equipment, launch vehicle and the ground system.
- Flight System Design Team meetings with GSFC participation via telecon.
- Engineering Change Boards

- Mission Assurance Working Groups
- Spacecraft
- EMI Working Group
- ICD Working Groups
- Payload Working Group

5.3.4 OFFSITE TEAM BUILDING

LM shall support a series of offsite management and leadership team building exercises at key points in the MAVEN project cycle. These will most likely be at the start of Phase C, the start of ATLO, start of System Level Environmental Testing, and start of Launch Site Operations. These will nominally be a 1-day event, likely tied in with the Quarterly Management Reviews. They will focus on establishing a quality and open working relationship between key members of the MAVEN team.

5.3.5 REVIEWS

LM shall conduct and/or support various subsystem, spacecraft, and mission level reviews during Phases C through E. The MAVEN Life Cycle reviews are shown in Figure 5-1. The current planned MAVEN reviews are defined in Appendix A of the System Review Plan, MAVEN-PM-PLAN-021 and are summarized in Figure 5-2. The MAVEN Review Schedule is reflected in the MAVEN Integrated Master Schedule. Finalization of the review dates shall be coordinated during regular/monthly schedule meetings with the MAVEN Project Office at GSFC. (CDRL PM-13)

5.3.5.1 INDEPENDENT REVIEWS

LM shall provide support for a formal review program chaired by GSFC and/or an independent representative identified by NASA Headquarters that meets the requirements of the MAVEN Mission Assurance review program. The reviews shall:

- Assure that the spacecraft, instrument(s) and supporting designs are consistent with the MAVEN Mission Requirements Document;
- Assure that the characteristics of the systems are carefully examined to develop the best approach consistent with existing constraints and available resources;
- Provide a means of periodic evaluation of the hardware, software, and ground support development;
- Assure that end-item deliverables (systems and subsystems) meet the MAVEN requirements for performance, schedule and cost.

Independent life-cycle reviews are formal reviews that will be conducted by the Standing Review Board (SRB) team as defined in NPR 7120.5D (NASA Space Flight Program and Project Management Requirements) and in the Terms of Reference for Independent Life Cycle Reviews of the MAVEN Project dated March 15, 2010. The SRB will chair the following reviews during Phases C/D/E:

- **Mission Critical Design Review (CDR)**
- **System Integration Review (SIR)/ATLO Readiness Review (ARR)**
- **Operations Readiness Review (ORR)**
- **Observatory Pre-Ship Review (PSR)**
- **Post Launch Assessment Review (PLAR)**

- **Critical Events Readiness Reviews (CERR)**

- **Decommissioning Review (DR)**
 - LM shall prepare and submit a MAVEN **Mission Critical Design Review (CDR) Data Package**. This review typically occurs after the design has been completed but prior to the start of manufacturing flight components or the coding of software. Scheduling of the review will be coordinated with the MAVEN Project Office, *Flight component procurement, if required prior to the MAVEN Confirmation Review with NASA HQ, shall require approval by the MAVEN Project Office*, LM shall emphasize implementations of design approaches as well as test plans for flight systems including the results of engineering model testing. LM shall present the MAVEN Mission CDR Data Package to the Systems Review team at the Critical Design Review.

 - LM shall prepare and submit a MAVEN **Systems Integration Review/ATLO Readiness Review (SIR/ARR) data package**. LM shall conduct the ARR and present the **ATLO Readiness Review (ARR) data package** to the Systems Review team at LM's facility.

LM shall prepare and submit a MAVEN **Operational Readiness Review (ORR) Data Package**. The ORR examines the actual system characteristics and the procedures used in the system's or product's operation and ensures that all system and support (flight and ground) hardware, software, personnel, and procedures are ready for operations and that user documentation accurately reflects the deployed state of the system. This review will be conducted at the LM facility, roughly 4 months prior to launch, to verify overall readiness of the Mission Operations Center and Science Operations Center resources to achieve the mission flight objectives.

 - LM shall prepare and submit a MAVEN **Observatory Pre-Ship Review (PSR) Data Package**. This review shall take place prior to shipment of the orbiter to the launch site. LM shall present evidence to show that testing has been completed with no unacceptable open issues and will evaluate the readiness of the hardware and software

for flight. LM shall address the testing on flight hardware and software, verification and documentation of the hardware and software configuration, identification of outstanding safety risks, disposition of waivers/deviations/open issues, compatibility of spacecraft and ground support equipment, and orbital operations plans. LM shall present a MAVEN Orbiter Pre-Ship Review Data Packages to the Systems Review team at the Pre-Ship Review.

- LM shall prepare and submit a MAVEN **Post Launch Assessment Review (PLAR)** Data Package. This review will be conducted at LM's facility and will address post launch events, anomalies, trend data, and overall MAVEN health and status.
- LM shall prepare and submit a MAVEN **Critical Events Readiness Review (CERR)** Data Package. This review will be conducted at LM's facility and will address critical events such as Mars Orbit Insertion (MOI) and Apoapsis Lowering.
- LM shall prepare and submit a MAVEN **Decommissioning Review (DR)** Data Package. This review will be conducted at LM's facility to address decommissioning MAVEN after all mission flight objectives have been achieved or directed by NASA HQ.

Two reviews that are chaired by the Kennedy Space Center (KSC) with SRB support are:

- **Flight Readiness Review (FRR)**
- **Launch Readiness Review (LRR)**
 - LM shall prepare and submit a MAVEN **Flight Readiness Review (FRR)** Data Package. This review will be conducted at the launch facility to verify overall readiness of flight hardware and software, and ground and launch support resources to achieve the mission flight objectives. LM shall support the Flight Readiness Review.
 - LM shall prepare and submit a MAVEN **Launch Readiness Review (LRR)** Data Package. This review will be conducted at the launch facility to verify overall readiness of flight hardware and software, and ground and launch support resources to achieve the mission flight objectives. LM shall support the Launch Readiness Review.

There are also independent reviews conducted by the Safety and Mission Assurance organization, NASA HQ, and GSFC Director Office. They include, but are not limited to:

- **Safety and Mission Success Review (SMSR)** at NASA Headquarters. LM shall support the development and presentation for the SMSR.
- **Mission Readiness Review (MRR)**, which is a GSFC management review..

- Other reviews as required.

There are reviews that will be chaired by the Goddard Space Flight Center (GSFC) Integrated Independent Review Team (IRT), an independent GSFC authority. The review requirements are defined in *GPR 8700.4 Integrated Independent Reviews* and in the MAVEN MAR (MAVEN-PM-RQMT-0006) Section 8.0. These reviews shall include:

- **Spacecraft Critical Design Review (CDR)**
- **Spacecraft Pre-Environmental Review (PER)**
- **MOS/GDS PDR**
- **MOS/GDS CDR**
- **Mission Operations Review (MOR)**
 - LM shall prepare and submit a MAVEN **Spacecraft Critical Design Review (CDR) Data Package**. This review occurs after the design has been completed but prior to the start of manufacturing flight components or the coding of software. LM shall emphasize implementations of design approaches as well as test plans for flight systems including the results of engineering model testing. LM shall present the MAVEN Spacecraft CDR Data Package to the Systems Review team at the Critical Design Review.
 - LM shall prepare and submit a MAVEN **Orbiter Pre-Environmental Review (PER) Data Package**. This review occurs prior to the start of environmental testing of the flight instrument. LM shall emphasize the readiness of the flight hardware and software, and facilities for system level test and evaluate the environmental test plans. LM shall present the MAVEN Orbiter PER Data Package to the Systems Review team Pre-Environmental Review.
 - LM shall prepare and submit a MAVEN **Mission Operations/Ground Data System (MOS/GDS) Preliminary Design Review (PDR) Data Package**. This review will be conducted at LM's facility and will address Phase E Operations. It will occur roughly 6 months after Mission PDR and cover the end-to-end GDS and interfaces for MAVEN, and the interactions between GDS facilities and how operations will be performed.
 - LM shall prepare and submit a MAVEN **Mission Operations/Ground Data System (MOS/GDS) Critical Design Review (CDR) Data Package**. This review will be conducted at LM's facility and will address Phase E Operations. It will occur roughly 2 years before launch and covers in greater detail the mature design of the end-to-end GDS and interfaces for MAVEN, and the interactions between GDS facilities and how operations will be performed.

- LM shall prepare and submit a MAVEN **Mission Operations Review (MOR) Data Package**. This Mission-oriented review occurs roughly 12 months before launch. The MOR would build on the operations portion of the MOS-GDS PDR and CDR (more focus on operations plans and procedures and less on GDS). LM shall present the status of the system components, including the ground system, network-operations, the operational interfaces with the flight system, and orbital operations plans.

Finally there are lower-level informal engineering peer reviews, tabletops, and subsystem Critical Design reviews (CDRs). Engineering peer reviews of subsystem hardware/software chaired by LM shall occur during the project life cycle. These reviews are expected to cover the most detailed designs of the MAVEN reviews. It is the intent of the peer reviews that participants generate a detailed understanding of the component and subsystem designs' ability to meet higher-level system and mission requirements. Effective peer reviews will enable significant streamlining of the content of higher-level formal reviews. To promote continuity of the whole review program, LM shall notify the COTR of the lower-level review schedule to allow participation by the GSFC independent review team members and the GSFC MAVEN Project technical engineering support staff.

LM shall provide the necessary resources to prepare technical and programmatic handouts and drawings/schematics/schedules for distribution at the reviews, as well as present the data when required.

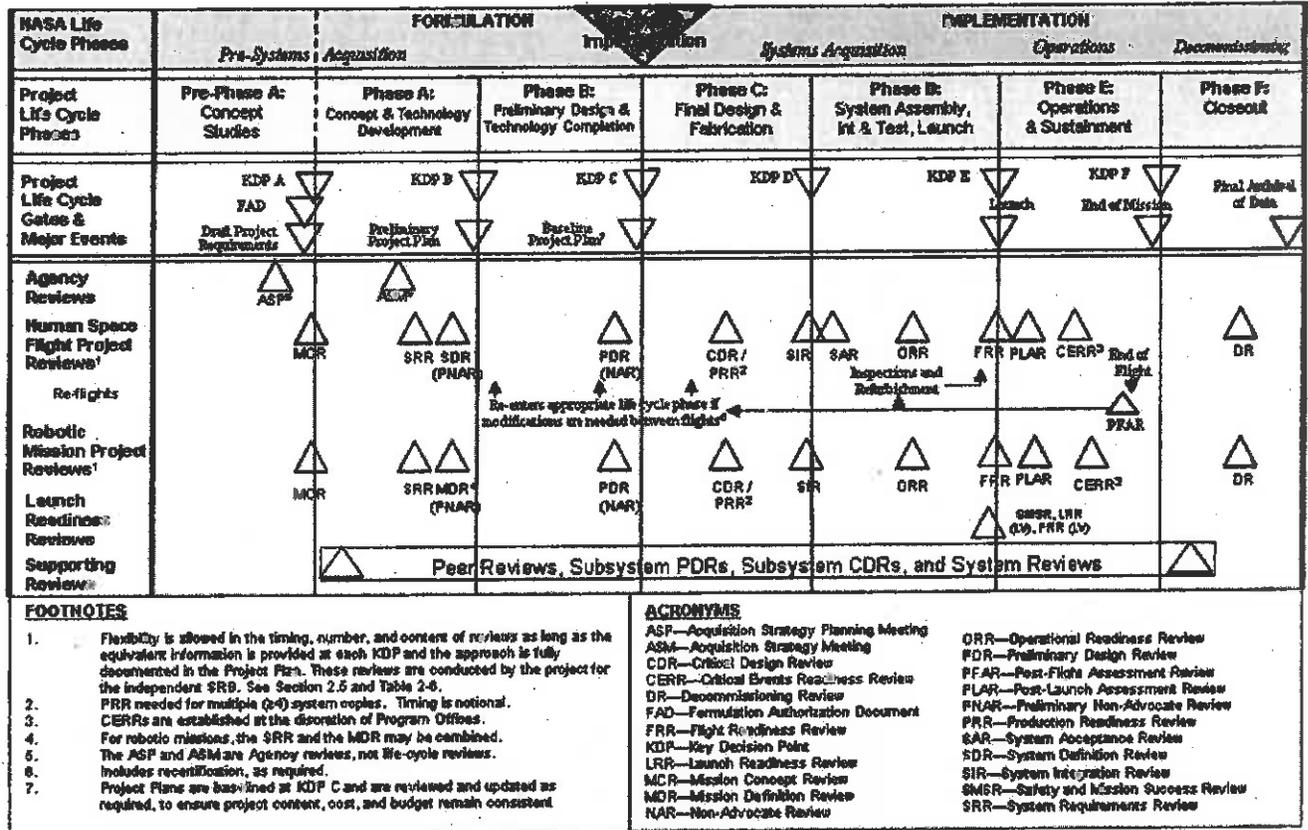
LM shall have available for NASA access and review, the minutes of the peer reviews (including action items if any) within ten (10) working days after a review has been conducted.

LM shall implement a system for tracking the status and resolution of Action Items initiated during peer and formal reviews whose status shall be reported at the formal reviews.

Wherever possible, these peer reviews should be conducted in accordance with *GPR 8700.6B, Engineering Peer Reviews*.

Some of the Peer Reviews and Subsystem Reviews required are:

- Lower Level Peer Reviews of hardware and software designs, analyses, and procedures where deemed necessary prior to higher-level reviews.
- Informal Test Readiness Reviews (TRRs) at the assembly/ subsystem level prior to the start of environmental testing.
- Pre-delivery reviews for subsystems, individually delivered assemblies, software and support equipment.
- Subsystem Critical Design Reviews (CDRs).
- Flight Parameter Reviews (FPR) at the LM's facility.



MAVEN Life Cycle Reviews
 Figure 5-1

Reviews	Date	Days	Chairing Authority	Location/Comments
Mission-level Reviews				
Systems Requirements Assessment	Complete		SRB	GSFC
PDR	Complete		SRB	GSFC
CDR	*	*	SRB	GSFC
SIR	*	*	SRB	LM-Denver
PER	*	*	IIRT	LM-Denver
PSR	*	*	SRB	LM-Denver
FRR	*	*	KSC	KSC
LRR/LVFRR	*	*	KSC	KSC
PLAR	*	*	SRB	LM-Denver

CERR	*	*	SRB	LM-Denver
DR	*	*	SRB	LM-Denver
MRR	*	*	GSFC CD	GSFC
SMSR	*	*	HQ/OSMA & Chief Eng	NASA HQ
MRB	*	*	SMD AA	NASA HQ
S/C & Ground Segment Reviews				
S/C PDR	*	*	IIRT	LM-Denver
MOS/GDS PDR	*	*	IIRT	LM-Denver
S/C CDR	*	*	IIRT	LM-Denver
MOS/GDS CDR	*	*	IIRT	LM-Denver
MOR	*	*	IIRT	LM-Denver
ORR	*	*	IIRT	LM-Denver
P&F Package Reviews				
PDR	*	*	IIRT	UCB
CDR	*	*	IIRT	UCB
PER	*	*	IIRT	UCB
PSR	*	*	IIRT	UCB
RS Package Reviews				
PDR	*	*	IIRT	LASP
CDR	*	*	IIRT	LASP
PER	*	*	IIRT	LASP
PSR	*	*	IIRT	LASP
NGIMS Instrument Reviews				
PDR	*	*	IIRT	GSFC
CDR	*	*	IIRT	GSFC
PER	*	*	IIRT	GSFC
PSR	*	*	IIRT	GSFC

*See MAVEN-PM-PLAN-0021 MAVEN Systems Review Plan App. A for dates and durations.

MAVEN Review Summary Figure 5-2

5.3.5.2 SAFETY REVIEWS

LM shall support and develop data packages as required to support GSFC PDRs, CDRs and PSRs Reviews. LM shall support the KSC Safety Reviews, Delta Safety Reviews, and Safety TIMs, as required.

5.3.5.3 PLANETARY PROTECTION REVIEWS

MAVEN has been given a classification as a Category III (orbiter, flyby) mission. LM shall support and develop data packages as required for the following required (per NPR 8020.12C) planetary protection reviews:

- Pre-Launch Planetary Protection Review (120 to 90 days prior to November 18, 2013)
- Launch Readiness Review (as an agenda item on the project LRR)

5.3.6 RESOURCE MANAGEMENT

LM shall establish, implement, and maintain a comprehensive resource management system for planning, authorizing, and controlling the total resources effort for each task and for providing timely and adequate visibility into manpower and schedule performance. The system shall be consistent with the spacecraft contractor's standards.

LM shall provide facilities required for component, subsystem, and spacecraft development and testing, such as: clean rooms, thermal vacuum chambers, thermal cycle chambers, vibration facilities, and spacecraft storage facilities.

LM shall establish, implement, and maintain an integrated scheduling system consistent with their corporate procedures. The spacecraft contractor shall provide a master program phasing schedule, spacecraft schedules, and detailed subsystem schedules in accordance with (CDRL PM-11).

LM shall provide the necessary resources for monitoring, controlling, executing, and administering the MAVEN contract and subcontracts to ensure compliance with all contractual requirements.

5.3.7 SITE ACCESS

NASA shall be granted access to the LM and subcontractor facilities. Procedures for visit requests; contacts and authorizations will be coordinated with the LM MAVEN PM.

LM shall provide office space, telephones, and high-speed internet access, with provisions to get through Contractor firewalls to GSFC, for use by four (4) GSFC representatives during the performance of this Contract. The facility and network shall meet GSFC flight operations security requirements and NASA IT security requirements.

5.3.8 REPORTS

LM shall provide various programmatic reports during the Phase C through Phase E period. This section will outline the various periodic reports that will be needed. LM shall develop and deliver all documentation in according with the Contract Deliverables Requirements List (CDRL). LM shall make available to the MAVEN project in a timely manner when requested, any spacecraft/orbiter related plans, reports, technical memoranda, procedures, and analyses that are contractor or subcontractor generated under this contract for the MAVEN mission, but not listed in the CDRL.

LM shall prepare and submit a final summary letter/report, upon completion of Phase D and Phase E, stating which deliverables were met per the contract and whether or not all electronic deliverables and data were captured in the MIS system database. The summary shall identify specific idiosyncrasies or "features" of the MAVEN orbiter.

5.3.8.1 MONTHLY TECHNICAL PROGRESS REPORT

LM will generate a written monthly report/presentation regardless of whether the review takes place or not. These reports shall then be submitted in electronic format. General guidance for content is identified, but not limited to what is addressed in CDRL PM-02.

5.3.8.2 SCHEDULE REPORTS

LM shall develop and maintain a project schedule by logically networking detailed program activities from contract award to the completion of the contract. Reports are as identified in CDRL PM-11.

5.3.8.3 MONTHLY and QUARTERLY FINANCIAL REPORTS

The Contractor shall integrate projected and actual cost data from all cost centers and shall submit monthly and quarterly financial management reports per CDRL PM-03 and CDRL PM-04.

5.3.8.4 EARNED VALUE REPORTING

LM shall use and maintain in performance of this contract an Earned Value Management System (EVMS). Reports shall be delivered per CDRL's PM-07, PM-08, PM-11.

5.3.8.4.1 EARNED VALUE MANAGEMENT SYSTEM REVIEWS

The MAVEN Project Office will assess the compliance of LM's EVMS and Performance Management Baseline by conducting Integrated Baseline Reviews (IBRs) and EVMS Assurance Reviews CDRL PM-10.

5.3.9 RISK MANAGEMENT

LM shall implement a risk management program in compliance with NPR 8000.4, *NASA Risk Management Procedural Requirements*. As part of their risk management program, LM shall prepare and submit a Risk Management Plan per CDRL PM-28.

5.3.10 CONFIGURATION MANAGEMENT

Configuration Management (CM) shall be performed in support of the MAVEN Project. The configuration of deliverable items shall be maintained throughout all phases of assembly and test. Configuration verification shall be performed and documented as assemblies are incorporated into higher-level assemblies and at major project milestones (i.e. pre-environmental test, pre-ship, pre-launch, etc). LM shall deliver a Configuration Management Plan per CDRL PM-12 that documents the CM process for MAVEN.

LM shall provide documentary Electronic Images of the MAVEN Orbiter during all phases of fabrication and ATLO. This imagery will be used to document the construction of the MAVEN Observatory. It shall include receiving and inspection photos of the instruments and subsystem deliveries. The electronic images shall be delivered per CDRL PM-02.

5.3.11 SUBCONTRACT MANAGEMENT

LM shall negotiate and award all subcontracts that are necessary for the development of the spacecraft, the Mission Support Area (MSA), instrument support, and support of the SOC. LM shall flow-down mission assurance requirements contained in the MAVEN MAR, MAVEN-PM-RQMT-0006, document to all subcontracts as defined in the MAVEN Mission Assurance Implementation Plan (MAIP), MAVEN-SC-PLAN-0029. LM shall provide technical and programmatic oversight of the subcontract and report their progress and performance in the monthly reports. For all subcontracts already in place, LM shall update and negotiate these subcontracts to cover phases C through E of the mission if required. Also, all subcontracts with a non-United States participant must meet all approved NASA procurement policies. The NASA FAR Supplement (NFS) subpart 1825 addresses foreign acquisitions.

5.3.12 EXPORT CONTROL

LM shall prepare, submit, and update as necessary any International Traffic in Arms Regulations (ITAR) and Export Control documentation required. LM shall comply with the provisions of 22 CFR 120-130, International Traffic in Arms Regulations (ITAR); 15 CFR 730-774, Export Administration Regulations; and NASA FAR Supplement 1852.225-70, Export Licenses.

6 TECHNICAL REQUIREMENTS

6.1 SYSTEMS ENGINEERING

LM shall provide systems engineering for the spacecraft, orbiter, and mission level. The systems engineers shall be responsible for the overall technical coordination of the technical team in order to produce a design and a system that meets all of its requirements.

Included in the systems engineer's responsibility is the proper flow-down of top-level requirements to the spacecraft, spacecraft subsystems, and component levels and the tracking and verification of all these requirements. The spacecraft team shall use the DOORS[®] requirement management tool to help manage the requirements effort. The Mission Requirements Document, the Spacecraft Specification, and all spacecraft specific Interface Control Drawings (ICDs) shall be entered in the DOORS[®] database. Requirements links shall be established between the spacecraft level documents and also higher level mission documents. As the design matures, the documents in DOORS[®] (and the DOORS[®] database) shall be updated and maintained as necessary. The systems engineers shall be responsible for ensuring that all requirements are verified and should use the DOORS[®] tool to document the results, create and update the verification matrices for each subsystem and the overall spacecraft/orbiter, and produce verification reports as necessary.

The systems engineers shall also lead the effort to identify and document all technical interface information within the spacecraft via ICDs. They shall also be intimately involved with the top-level ICDs (e.g.: Spacecraft to Instrument Suite ICDs) generated by other MAVEN mission elements that involve the instrument packages.

Another important function of the systems engineer shall be to budget and allocate the important technical resources (e.g.: mass, power, data rates, etc.) of the spacecraft. During the design, development and test effort, the systems engineer shall track these resources and report them on a monthly basis.

The systems engineering team shall use as a guide the following documents: 1) NASA Systems Engineering Processes and Requirements (NPR 7123.1A); 2) NASA Systems Engineering Handbook (SP-2007-6105) and, 3) the Goddard Procedural Requirement on Systems Engineering (GPR 7120.5A).

The following sections contain some systems engineering activities that shall be performed in Phases C through E.

6.1.1 PHASE C and D SYSTEMS ENGINEERING ACTIVITIES

During Phases C and D, the systems engineering activities shall include, but not be limited, to the following tasks:

- Perform Requirements traceability, update verification matrices. Establish flight system verification plan.
- Develop Spacecraft Specification document
- Generate Baseline Drawing trees and Indentured Parts Lists, or equivalents

- Generate Baseline Block Diagrams
- Maintain Interface Control Documents (ICDs)
- Manage and trend technical resources (power, mass, etc.)
- Provide Baseline inputs to other mission element ICDs
- Support the MAVEN mission systems engineering activities
- LM shall generate a Gold Rules Compliance Matrix.
- LM shall generate a list of exceptions to test-as-you-fly.
- LM shall input to the list of incompressible tests.
- Engineering Layout Drawings of the MAVEN Orbiter, Electrical Schematic Drawings of the MAVEN Orbiter and any design documentation related to the MAVEN Orbiter shall be available for NASA access and review including hard copies at the request of the COTR.
- LM shall develop a MAVEN Thermal Analytical Model of the MAVEN Orbiter.
- LM shall develop a MAVEN Structural Analytical Model of the MAVEN Orbiter.
- LM shall provide input to the MAVEN Contamination Analytical Model of the MAVEN Orbiter. LM shall document the results of these models covering techniques used, assumptions made and results.
- LM shall develop MAVEN Radiation Exposure Analytical Models of the MAVEN Orbiter. LM shall document the results of these models covering techniques used, assumptions made and results.
- LM shall formulate inputs to NASA and support the development of the MAVEN Environmental Requirements Document (ERD) and Orbiter, Component, and Instrument Test Requirements Documents. These requirements specification will define the environment that the MAVEN Orbiter and the individual instruments will encounter in terms of EMC, thermal, thermal vacuum, vibration, static load, shock etc.
- LM shall prepare and submit to NASA, as requested, MAVEN Spacecraft Subsystem Block Diagrams for each spacecraft subsystem.
- The activities at LM and spacecraft design shall meet the contamination control requirements as defined in the MAVEN Contamination Control Plan, MAVEN-SC-PLAN-0024 (LM document MAV-PN-09-002). (Phase B CDRL MA 13-1)
- LM shall support and participate in the MAVEN Science Working Group (SWG). The SWG meets once every three-months. LM shall attend and provide information such as status of the spacecraft to the SWG.

- LM shall provide Flight Segment inputs to the project level orbit determination performance analysis and orbit determination documentation.
- LM shall provide inputs to the Trajectory and Maneuvering Planning documentation and analysis.
- LM shall support the Planetary Protection Working Group and provide the necessary analysis/help develop any Planetary Protection documentation. LM shall support planetary protection, reviews as required. Mission and spacecraft design shall meet the requirements of a Category III (orbiter, flyby) spacecraft per NPR 8020.12C.
- Breakup and Burnup analysis will be provided at CDR identifying items that are likely to not need planetary protection cleaning. Additional analysis will be requested via RFP.
- Planetary Protection Assaying requirements will be defined by the Planetary Protection Working Group. LM shall implement an assaying effort that meets these requirements. Support for this effort will be requested in an additional RFP.

Mission Assurance/Systems Related Requirements:

- The FMEA shall be performed in accordance with GSFC S-302-89-01 "Failure Modes and Effects Analysis Procedures for Unmanned Spacecraft and Instruments" or a developer(s) procedure that has been approved by the GSFC MAVEN COTR.
- All part applications that do not meet the derating criteria shall be documented in a formal LM memorandum and approved by the MAVEN Parts Control Board (PCB) for flight. The analyses and updates shall be made available for NASA access and review.
- LM shall perform trend analyses to the component level to track measurable parameters that relate to performance stability. Selected parameters shall be monitored for trends starting at component acceptance testing and continuing during the system integration and test phases. The monitoring shall be accomplished within the normal test framework (i.e., during functional tests, environmental tests, etc). LM shall establish a system for recording and analyzing the parameters as well as any changes from the first observed value even if the levels are within specified limits. A list of parameters to be monitored and the trend analysis reports shall be available for NASA access and review. Trend analysis data shall be reviewed with the mission operational personnel prior to launch, and the mission operational personnel shall continue recording trends throughout mission life for early detection of possible mission failure tendencies.

- LM shall meet the Mission Assurance requirements identified in the MAR regarding Printed Wiring Board (PWB) Coupons. The exception noted here is that while GSFC will return coupon analysis results within 2 weeks, LM may proceed prior to receiving GSFC results if LM coupon analysis is acceptable. The project will assume the cost/schedule risk in this specific instance. Upon first indication that GSFC results indicate coupon deficiencies, LM will convene with the GSFC CSO and COTR and establish a resolution plan before proceeding further with that PWB vendor.

In general, Mission Assurance requirements are identified in Section 7.

6.2 FLIGHT SYSTEM

LM shall design, fabricate, calibrate, integrate, test and deliver a fully qualified flight system integrated, tested, and qualified with the instrument packages. The flight system shall be designed and tested to fulfill the mission science requirements for measurement accuracy and precision. As part of the development of the flight hardware, the spacecraft team should use a combination of Prototype Units (PUs), Engineering Models (EMs), and Qualification Models (QMs) as applicable, depending on the heritage and maturity of each of the subsystem designs. This shall lead into the development of the flight units for each subsystem. Each flight subsystem or component shall be fully qualified prior to its delivery to spacecraft ATLO. LM shall provide the necessary spacecraft spares, and necessary ground software/support equipment and special tooling.

6.2.1 DESIGN AND DEVELOPMENT

Complete the design efforts initiated under Phase B and finalize the Flight System design, requirements definition, payload accommodations and interfaces, and to finalize the manufacturing, integration, test, verification, and launch operations plans.

Develop, verify, certify, operate and maintain testbeds, in accordance with GSFC approved Testbed Plans, to verify flight software functions, subsystem and payload interface functions, timing interactions, flight/ground interface testing, command sequence testing, integrated flight/ground development, and fault identification and response routines.

Support the development, verification and validation of critical mission sequences, significant mission sequences, and mission scenarios during the ATLO phase.

6.2.2 MANUFACTURING, ASSEMBLY, INTEGRATION, AND TEST

LM shall provide the appropriate manufacturing, assembly, integration, and test resources necessary to deliver a qualified Flight System, which consists of the integrated spacecraft and science payloads that will support the launch and mission operations.

LM shall manufacture, assemble, integrate and test the MAVEN spacecraft, in accordance with Contractor-developed fabrication, assembly, integration, test, verification and calibration documentation including GSFC-approved plans, specifications, procedures, drawings and analyses.

LM shall integrate and test the Science and Relay Payloads with the spacecraft in accordance with LM-developed integration and test plans, procedures, drawings and specifications.

LM shall provide ground support equipment (including test and control instrumentation, software, ground handling and lift fixtures, special tooling, special test equipment and shipping containers) required to manufacture, integrate, test, calibrate ship and prepare the Flight System for launch.

LM shall demonstrate compatibility of the Flight System Telemetry and Command (T&C) systems, Planning and Scheduling systems, and command sequencing systems in the Mission Support Area (MSA) located at LM

LM shall demonstrate compatibility of the Flight System with data products of the Science Operations Center (SOC).

LM shall demonstrate compatibility of the Flight System with data products of the Instrument Team institutions (SSL, LASP, GSFC).

LM shall demonstrate compatibility of the Flight System with data products of the Navigation element located at JPL.

LM shall demonstrate commanding and data flow including end-to-end sequence testing.

6.2.2.1 SUBSYSTEMS

During Phase C and D, the subsystem hardware development activities shall include, but not be limited, to the following tasks:

- a. Generate Specification documents
- b. Complete design, schematics, drawings
- c. Update As-Designed Parts Lists
- d. Order remaining non-flight and flight long-lead parts
- e. Fabricate and test EM units where applicable
- f. Perform Baseline Mechanical Structural Models/Analyses
- g. Perform Baseline Thermal Models/Analyses
- h. Generate Baseline Manufacturing Plan
- i. Generate Baseline Spacecraft Grounding Diagram
- j. Conduct Peer Reviews of the Subsystem Designs
- k. Present design at mission-level CDRs
- l. Conduct ATLO Readiness Reviews for each of the subsystem flight hardware.

- m. Present Environmental and Integration and Test Plans
- n. LM shall perform, as agreed upon, Orbiter level Deployment tests to confirm that the final spacecraft, as built, has sufficient margin and clearance to deploy the appendages. These tests shall encompass the Solar Arrays and Spacecraft-Provided Instrument Booms and be performed post Environmental Testing.

6.2.2.1.1 PROPULSION

LM shall supply all labor, materials (excluding GFE), and ground support equipment (excluding GFE) necessary for all referee fluid loading and off-loading and drying of the MAVEN spacecraft during environmental testing and all fueling and off-fueling, if necessary, of the MAVEN spacecraft in preparation for flight. All work shall be in compliance with LM, GSFC, Kennedy Space Center and Cape Canaveral Air Station safety requirements.

6.2.2.1.2 THERMAL

LM shall supply the material and labor for the fabrication of the instrument thermal blankets for all instrument Flight Models as defined in the payload receivables/deliverables (REC/DEL) list.

LM shall perform the design, analysis, and fabrication of the instrument thermal blankets (as defined by the payload REC/DEL list), all spacecraft to instrument passive mounting interfaces and all spacecraft to instrument power/telemetry harnessing. The instrument institutions will provide a simplified thermal model (using Thermal Desktop Version 5.3 with no more than 50 nodes) for LM to incorporate into an integrated system thermal model. LM will use these simplified thermal models to calculate the bounding thermal environments for the instruments.

LM shall supply the material and labor for the fabrication of the instrument thermal blankets for all engineering models (EM) as defined in the payload REC/DEL list. Models for thermal blanket fabrication, and mock-ups of the instruments will be provided by the instrument package teams.

LM shall have available for NASA access and review, a MAVEN Orbiter Thermal Analysis.

6.2.2.1.3 SOFTWARE

During all phases of the project the contractor shall comply with all software management requirements documented in the MAVEN Software Management Plan (SMP), MAVEN-SYS-PLAN-0020.

- LM shall design the MAVEN flight software so that it can be modified on orbit per ground commands as defined in the MRD.

- LM shall design the MAVEN workstation based, spacecraft Software Simulator (Soft-Sim) in place at the Subcontractor's facility. LM shall maintain the simulator software with the current flight software and simulation models build.
- Support flight software Independent Verification and Validation (IV&V) at GSFC and at the NASA IV&V facility to assess adequacy of specifications and software design compliance and verification approach.
- LM shall comply with the Software Safety requirements for the spacecraft and verify all safety-critical software on flight or flight-like hardware as defined in the NASA-STD-8719.13B; NASA Software Safety Technical Standard

6.2.2.2 SPARES

LM shall work with the GSFC project office in the development of a flight and ground systems spares program. GSFC will coordinate the spares risk posture with LM. Disposition of spares will approved by the GSFC MAVEN project office.

6.2.3 ATLO

LM shall execute a robust ATLO program as documented in the Integration, Assembly and Test Plan. (CDRL IT-02) This plan shall provide details on the Integration, Assembly and Test flow starting with spacecraft subsystem level integration and ending with shipment to the launch facility. The plan shall also describe aliveness, functional and performance testing throughout the test flow.

LM shall conduct an environmental test program in accordance with the requirements for an ATLAS-V launch vehicle as identified in the *GEVS for STS and ELV Payloads, Subsystems, and Components, GSFC-STD-7000*, for flight hardware sufficient to demonstrate design qualification, acceptance, and to test for workmanship. The test program tailored for MAVEN is documented in the MAVEN Environmental Requirements Document (ERD), MAVEN-SYS-RQMT-0010.

Functional testing shall be performed before, during, and after environmental tests, as appropriate. LM's environmental test plans shall define the specific parameters associated with the planned environmental tests.

The following environmental exposures are required as a baseline for the MAVEN orbiter: Modal Survey, Sine Vibration, Acoustics, Mechanical Shock, EMI/EMC, Thermal Vacuum/Thermal Balance, Mass Properties, and Deployments shall be performed.

Repeated functional tests should be used to demonstrate the growing maturity of spacecraft subsystems, perform trending analysis, and to baseline performance status before each environmental test. Comprehensive Tests shall be performed to verify full mission hardware compliance, compatibility, and operability; and to perform trending analysis. The comprehensive test program shall establish a baseline pre and post environmental testing to identify anomalies and/or potential trends. LM shall develop the orbiter test procedures and integrating the instrument test procedures into the orbiter test program. LM shall convert the instrument functional procedures into the appropriate format(s) for use in system testing.

Prior to the PSR, LM shall perform an end-to-end compatibility test to demonstrate the Mission Support Area (MSA) capability to communicate with the MAVEN orbiter (up-link and downlink) via the DSN. Simulated normal orbital mission scenarios encompassing launch, subsystems and instrument activation, housekeeping, command/control, and stabilization/pointing shall be demonstrated, including the collecting, processing, and archiving of science data. Orbiter immunity to erroneous commands, autonomous safe-hold, and simulated anomaly recovery operations shall also be demonstrated.

LM shall report flight hardware failures to the MAVEN Project at GSFC beginning with acceptance testing of flight hardware. A failure is defined as any departure, or suspected departure, from design, performance, testing, or handling requirements that affects the function of flight equipment shall be immediately documented. Reporting documentation shall include as a minimum the date and time of occurrence, anomaly description, and root cause and corrective action. Developer review/disposition/approval of failure reports shall be described in applicable procedure(s) included or referenced in the MAIP. Failures in ground support equipment that interfaces with flight equipment shall also be immediately documented. LM shall report failures within 24 hours of occurrence. A Problem/Failure Report documenting the failure and investigation shall be supplied to the MAVEN COTR within 5 days of the occurrence beginning with orbiter integration.

Reporting shall continue through successful closure with the Failure Review Board (FRB). The FRB shall be comprised of the following:

1. Systems Engineer (chairperson);
2. Developer quality or reliability representative;
3. Developer project manager or representative;
4. NASA/GSFC MAVEN Systems Engineer or Designee;
5. NASA/GSFC MAVEN CSO or Designee;
6. NASA/GSFC MAVEN COTR or Designee;
7. Developer engineering representative responsible for the failed unit.

GSFC has final approval of all Orbiter PFR dispositions starting with the first instrument integration with the spacecraft. Prior to that the Task Manager will be given access to all failure reports. In addition, GSFC reserves disapproval rights within two working days on PFR dispositions prior to Orbiter I&T. The GSFC CSO, or his delegated representative, shall be kept informed of FRB meeting schedules and agenda with sufficient advance notice to permit GSFC

participation, if desired. LM shall provide GSFC access to their MAVEN failure-reporting database.

The developer shall operate a closed looped nonconformance control system to disposition discrepant hardware. The developer shall identify each nonconformance in an MRB Report (or developer compatible form). LM shall provide GSFC access to their MRB database.

LM shall provide a site, all supervision, labor, equipment, parts and supplies to support the MAVEN Spacecraft Assembly, Integration, and Verification (AIV).

LM shall provide a site, all supervision, labor, equipment, parts and supplies to support the MAVEN Instruments Assembly, Integration, and Verification (AIV) onto the MAVEN spacecraft.

LM shall prepare and submit to NASA an Orbiter Mass Properties Report as part of the Monthly Status Reviews. This will typically be a mass summary at the monthly review. A detailed breakdown of the mass properties shall be maintained and available for review.

LM shall have available for NASA access and review a MAVEN Orbiter Structural Analysis.

LM have available for NASA access and review an Orbiter Modal Correlation Post-Test Results.

All test data from the start of ATLO thru Phase E shall be archived. Access to spacecraft level (including integrated instrument) raw test data shall be provided to government and authorized contractor personnel.

6.2.4 TESTBEDS

Specify, develop, verify and maintain one (1) Flight System single sided testbed and two (2) flight software simulator (Soft-Sim), including all required support equipment, for use with GSFC and LM Mission Operations System.

Maintain and update as necessary Contractor provided hardware and software, including operation and maintenance of the Flight System testbed to reflect actual Flight System performance/capabilities during Phase E.

6.2.5 GROUND SUPPORT EQUIPMENT

LM shall provide Mechanical Ground Support Equipment (MGSE) for the handling of the Spacecraft and Orbiter during instrument build-up and test, shipping, and installation operations at the spacecraft LM. The instruments will provide instrument lifting fixtures if required.

LM shall provide for Electrical Ground Support Equipment (EGSE) for the control and operation of the Spacecraft during instrument build-up and test, performance evaluation, test, simulation and stimulation of the flight Spacecraft. EGSE directly interfacing with the flight hardware shall use flight quality connectors or connector savers to interface with flight hardware to minimize the number of flight connector mate/demates during ground testing, or perform a GSE Failure

Modes and Effects Analysis (FMEA) along with mate/demate logs to ensure flight connector integrity. The instruments will provide instrument-specific EGSE, if required.

LM shall provide a 2nd set of C&DH EGSE to help with parallel testing of the C&DH flight systems and support other system or instrument tests as required.

6.2.6 PAYLOAD ACCOMMODATIONS AND SUPPORT

Incorporate payload-provided mechanical configuration, structural and thermal math models with flight system models and provide relevant integrated model results to payload providers.

Conduct planning and coordination with payload providers and GSFC to establish payload and spacecraft interface design verification, test plans and requirements for ATLO.

Provide suitable facilities, and handling and transportation support for storage, pre-integration checkout, testing, and integration of individual payloads.

Interface details will be defined in the applicable ICDs and payloads receivable/deliverable list.

Provide purge gases and control cart as required.

Integrate Engineering Model (EM) payloads in accordance with spacecraft-payload Interface Control Documents (ICDs), with testbed(s) to verify and evaluate spacecraft-payload electrical interfaces, command and telemetry performance.

6.2.6.1 PAYLOAD PROVIDED DELIVERIES

Agreements for payload deliveries will be captured in the Payload Receivables/Deliverables List and will be attached as part of the Phase C/D/E RFP.

Payload providers will:

- Provide a fit check template for each payload.
- Support preparation of the interface control documentation.
- Identify what type and quantity of external payload connectors are required.
- Provide a payload engineering model (EM) or simulator, which simulates the signal interface behavior of the flight unit. The EM or simulator will provide an interface that is electrically and functionally equivalent to the flight unit. The EM or simulator will reproduce timing, signal levels, polarity, bit ordering, and data format of the flight unit.
- Provide a set of EM or simulator Ground Support Equipment (GSE) as required to operate/assess the EM/simulator in the flight system test bed.
- Provide a payload mass model if the payload cannot be simulated as a rigid body with modes greater than 100 Hz and/or it uses kinematic mounts.
- Deliver Flight Payload and GSE.

- Provide thermal and structural math models, or equivalent.
- Provide payload installation procedures and handling and/or operating constraints.
- Provide payload-mounted alignment cubes, if required, for alignment characterization.
- Provide an end-item data package and Hardware Requirements Certification Review.

6.2.6.2 FACILITIES

Provide suitable Class 100,000 access-limited, clean room facilities, including high-speed Internet connections, for post-delivery processing of payload hardware and GSE by payload provider personnel. The facility shall be operated in line with the MAVEN Contamination Control Plan. Provide “contingency” capability of a Class 10,000 clean bench/tent if required for offline instrument processing/testing.

ATLO facilities shall meet payload contamination requirements.

6.3 GROUND SYSTEM

6.3.1 GROUND SYSTEMS DEVELOPMENT

LM shall:

Derive detailed requirements for MAVEN ground system software and hardware to support MAVEN flight operations in the MSA, based on Level 2/3 Mission Operations System-Ground Data System (MOS-GDS) requirements.

Prepare Flight System inputs to the Operations Plan, define requirements, and coordinate with GSFC Ground System personnel to establish detailed interface specifications and agreements.

Work with elements of the distributed MOS-GDS architecture to produce a Ground System Interface Control Document (ICD) and Operations Interface Agreements (OIA)

Prepare a multi-volume Mission Operations Plan

Submit inputs to and provide review support for development of the Project-level Mission Plan document

Provide a real-time Telemetry and Command (T&C) system for command and control of the MAVEN orbiter.

Provide a Planning and Scheduling / command sequence generation system to support mission planning, command sequence generation, uplink table generation, and flight rule / constraint checking for commands

Provide a long-term trending and plotting system for subsystem performance characterization and analysis

Provide and maintain standalone software tools in the MSA for support of MAVEN operations

Derive detailed requirements for MAVEN ground system software and hardware to support MAVEN telemetry monitoring and emergency orbiter commanding from a backup Mission Support area (bMSA) to be located at GSFC.

Provide software for deployment at GSFC to support development of the back-up Mission Support Area (bMSA)

Provide a “controlled repository” to hold a current image of all operational data to allow the back-up Mission Support Area (bMSA) at GSFC to assume responsibility for operations

Provide a system to support development of the master C&T database resident at LM

Support electronic data interfaces between the MSA and external elements of the distributed MAVEN MOS-GDS architecture including the DSN, SOC, Instrument Teams, GSFC bMSA, and Navigation element at JPL

Provide the capability (via the JPL Incident, Surprise, and Anomaly [ISA] system, or other system) to document and track the status of anomalous events during the MAVEN mission

Provide Personnel to participate with the LASP and GSFC Ground System teams in all operations planning and preparation activities, including:

- Ground System Scenario development and detailed Operations Concepts development.
- Ground System operations procedures and contingency procedures development
- Operations interface specifications and software interface specifications.
- Ground System testing, training and rehearsals.

- Development of operations handbook and training materials.

7 SAFETY AND MISSION ASSURANCE

During all phases of the project the contractor shall comply with all safety and mission assurance requirements documented in the MAVEN Mission Assurance Requirements, MAVEN-PM-RQMT-0006, which is included as an attachment to this contract. The contractor's plan for compliance with the MAR shall be documented in the MAIP, MAVEN-SC-PLAN-0029LM shall allow for support, at GSFC's discretion, Systems, Quality and Reliability Assurance engineers to reside at the Contractor's facility to support Phases C/D and E activities.

7.1 SAFETY

LM shall comply with safety requirements for the spacecraft as documented in the MAVEN Mission Assurance Requirements, MAVEN-PM-RQMT-0006 and AFSCM 91-710, Range Safety User Requirements Manual.

8 LAUNCH OPERATIONS

Conduct launch site operations for the spacecraft and payloads at Kennedy Space Center (KSC) including monitoring Flight System health, and performing required spacecraft fueling/defueling and maintenance operations before encapsulation and stacking. Support pre-launch Flight System operations during encapsulation and stacking, monitoring and reporting Flight System launch readiness/health before liftoff and during launch.

Participate in launch site operations planning activities and prepare Flight System inputs for launch preparation plans, procedures and sequences as well as other required launch vehicle and ATLO documentation.

LM shall develop Launch Site Operating Procedures for the MAVEN Mission.

LM shall develop Orbiter Launch Procedures for the MAVEN Mission.

LM shall provide technical support, maintenance, repair and recalibration of the MAVEN Spacecraft. This shall include support of launch operations at the launch site and on-orbit checkout of the MAVEN Spacecraft for a period of 30 days after launch.

LM shall develop Target Specification and Launch Window Specifications for preliminary Mission Analysis and Detailed Test Objectives.

LM shall support mission operations and anomaly response team activities through the Post-Launch Assessment Review (PLAR).

8.1 LAUNCH VEHICLE INTEGRATION

Support the development of the detailed Launch Services Interface Requirements Document (LSIRD), (MAVEN-LV-RQMT-0032). Provide any analyses and data and support GSFC and the launch vehicle provider to complete all required launch vehicle analyses, studies, reports, procedures, plans sequences and related interface documentation.

8.2 LAUNCH SITE PROCESSING

LM shall work with KSC to prepare a Launch Site Support Plan.

Deliver the Flight System to KSC in accordance with Contractor-prepared shipping plans.

Perform post-shipment Flight System verification testing and support the integration of the Flight System with the launch vehicle at the launch site.

LM shall meet the requirements specified in "Table B-1. Customer Requirements Index for ELV Spacecraft" contained in *Guide for Expendable Launch Vehicle Payload Processing at Kennedy Space Center and Cape Canaveral Air Force*.

9 LOGISTICS

LM shall plan and coordinate all spacecraft move/transportation operations.

LM shall comply with *NASA NPG 6000.1E Requirements for Packaging, Handling and Transportation for Aeronautical and Space Systems, Equipment and Associated Components* and the *International Traffic in Arms Regulations* when handling and transporting hardware, documentation, software and Ground Support Equipment among, test facilities, Goddard Space Flight Center (GSFC), and the Kennedy Space Center (KSC).

LM shall execute all foreign shipments under a Government Bill of Lading provided by NASA.

10 EDUCATION AND PUBLIC OUTREACH

LM shall provide support to an integrated Education and Public Outreach (EPO) effort for the MAVEN mission. The EPO program will combine new initiatives with proven techniques to communicate MAVEN mission results to the public and incorporate MAVEN science in learning activities on various educational levels for phases C through E of the mission. LM shall fully coordinate EPO activities with the overall MAVEN project EPO lead.

Status of LM's E/PO program support shall be included as an integral element of major Mission reviews.

11 GOVERNMENT FURNISHED EQUIPMENT/SERVICES

The Government Furnished Equipment (GFE) list is provided as Attachment K to the Phase CDE contract. GFE listed as non-committal will be negotiated on a case by case basis.

NASA will provide Deep Space Network (DSN) tracking, data recovery, and Compatibility Test Trailer support.

NASA will provide the ATLAS-V launch vehicle and associated launch services such as vehicle production, launch site assembly, Orbiter propellant, purge, temperature and humidity control, contamination control, checkout, launch countdown and range support, as well as Orbiter/launch vehicle integration, analysis, and post-flight mission data evaluation.

NASA will provide the Test Payload Adapter Fitting (TPAF) for the orbiter system level sine vibration test.

NASA/GSFC will provide the MAVEN Instrument (STATIC, SEP, SWEA, SWIA, LPW/EUV, MAG, IUVS, NGIMS, and Electra) management and oversight, flight hardware and software, ground support hardware and software, and Instrument Team participation, such as design reviews, ICDs, Orbiter integration, assembly and test, Orbiter Environmental test, launch support, Instrument commissioning, and mission support. Instrument Delivery Dates are as reflected in the MAVEN Integrated Master Schedule (IMS).

Licensing for Software and Ground Systems as required

12 GSFC SUPPORT

The GSFC MAVEN project will at a minimum:

- Review and approve or disapprove within 20 working days after receipt at GSFC (unless otherwise specified) documents submitted by the Contractor in response to project requirements, other than problem/failure reports.
- Attend and participate, as appropriate, in Contractor and lower-tier Contractor reviews, and critical technical discussions.
- Identify the selected launch services provider and provide launch vehicle environments.
- Perform Quality/Safety Assurance surveys and evaluations at Contractor facilities.
- Provide engineering support, as mutually agreed upon, to the Contractor's design, interface definition and integrated product teams.
- Provide EELV test Payload Attach Fitting for orbiter test program
- Review test results for GFE items on the spacecraft and provide concurrence before breaking major spacecraft configurations.
- Negotiate and provide the support of the JPL/ NASA Compatibility Test Van (CTV) for End to End testing.
- Negotiate with the United States Air Force for the C-17 airlift transportation and delivery to the launch site as required.

13 RECORD KEEPING

13.1 PROGRAM PLANS AND DATA

LM shall prepare and submit the plans and documents as specified in the CDRLs. Those not shown, as deliverables shall be made available if required. LM shall maintain as-built documentation thru the life of this contract.

13.2 INFORMATION, DATA, RECORDS AND STORAGE

Establish a method to provide access by Internet to authorized MAVEN Project personnel for working data products in accordance with CDRL PM-001. A GSFC or Contractor electronic database system or combination of both can be used. If a Contractor database is used, maintain access protection for the system, including an access control list for all authorized MAVEN Project personnel.

All test data from the start of ATLO thru Phase E shall be archived.

14 PHASE E / MISSION OPERATIONS

LM shall provide the resources necessary to support the GSFC mission operations team from the completion of the Post-Launch Assessment Review (PLAR) through Phase E and an option for Phase F decommissioning support to operate the MAVEN Flight System.

14.1 PHASE E ACTIVITIES TO BE DEVELOPED DURING PHASE C/D

LM shall support GSFC MAVEN Project work with the Mission Ground Support Systems MGSS) office point of contact at JPL to prepare Project Service Level Agreements (PSLA).

LM shall support the GSFC MAVEN Project in the development of the DSN Services Agreement (DSA) with the DSN Plans and Commitments Office at JPL

14.2 PHASE E

14.2.1 OPERATIONS

LM shall provide operations and technical support for the MAVEN Spacecraft during the mission operations phase of the project for a period starting at launch, thru Cruise Phase, and for 1 Earth-year after start of the Mars Mapping Phase.

LM shall be responsible for operation and control of the MAVEN Spacecraft and shall process and distribute data to the MAVEN Principal Investigators and the MAVEN Science Operations Center.

Perform engineering monitoring, tracking and analyses of all spacecraft functions and performance

- Summarize results in reports.
- Notify GSFC in response to unexpected off-nominal spacecraft conditions.

Perform analyses and ground tests as necessary to verify in-flight anomalous behavior and performance, and to determine and verify corrective actions. Use an Incident, Surprise, Anomaly (ISA) process to document in-flight anomalies and the evaluation and corrective actions.

Provide support to the LASP Science Operations System team to develop and verify Flight System command sequences.

Support the LASP and GSFC Ground System teams to develop plans, procedures, timelines, rehearsals, sequences and contingencies.

Maintain and update as necessary Contractor provided hardware and software, including operation and maintenance of the Flight System.

Use the Flight System testbeds to test first-time and critical command sequences, for anomaly resolution and recovery and for flight software maintenance and upgrades.

Maintain and modify in-flight, as needed, the flight software, for enhancements, or anomaly resolution.

Complete other activities in support of Mission.

Provide level-of-effort engineering support for various flight system or mission operations special studies as directed in writing by the Cognizant GSFC Contract Officer.

14.2.2 PROGRAM MANAGEMENT AND REPORTING

Establish a management system and organization to support the requirements of this Contract

Assign a Flight System Operations Manager who is responsible for all Contractor effort and shall have authority commensurate with that responsibility

Continue to implement a reporting program as established during Phases B/C/D.

Update and maintain a listing of program risk items including technical, schedule and cost risks, and provide mitigation options and cutoff.

Grant specific GSFC personnel non-escort privileges to all areas of the Contractor's facility where work is being performed under this Contract.

Accept "in-scope" technical direction only from the GSFC COTR. Direction will be in written form, such as a Technical Direction Memorandum (TDM).

Maintain technical liaison between MAVEN Project personnel, and the Contractor's equivalent personnel to permit the timely involvement in relevant technical issues.

14.2.3 MEETINGS AND REVIEWS

Participate in and support GSFC Project and NASA meetings and reviews, in accordance with GSFC approved Review plan, including but not limited to:

- Engineering and Management status and working meetings and telecons.
- Quarterly Reviews at GSFC as requested
- Critical Event Readiness Reviews at GSFC for all mission operations critical events.
- Sequencing and real-time command meetings and reviews
- Other meetings and reviews as requested by GSFC
- Post-Launch Assessment Review (PLAR) at the contractor's facility.

14.2.4 PROGRAM PLANS AND DATA

Generate a Program Plan and maintain as-built documentation.

14.2.5 INFORMATION, DATA, RECORDS AND STORAGE

Transfer all deliverable documentation to a GSFC database system, which is Internet accessible and is configuration-controlled, released documents.

Establish a method to provide access by Internet to authorized MAVEN Project personnel for working data products. A GSFC or Contractor electronic database system or combination of both can be used. If a Contractor database is used, maintain access protection for the system, including an access control list for all authorized MAVEN Project personnel.

15 POST-LAUNCH RESIDUAL HARDWARE DELIVERY

Disposition per GSFC direction, all residual flight spare hardware, including flight electronic parts, and ground support equipment, including test and control instrumentation, software, ground handling and lift fixtures, special tooling, special test equipment and shipping containers. Delivery to include all appropriate documentation to allow for future usage.

Property disposition will be handled either in Phase F or as a contract change to Phase E when the requirements and costs are better understood.

16 INSPECTIONS AND ACCEPTANCE

The Flight System and any deliverable flight spares and/or rapid repair kits fabricated and assembled under this Contract shall be inspected at the Contractor's facility and verified for compliance with the requirements set forth in this Contract, using Contractor-prepared test plans

Flight System final checkout shall be performed at the launch site, using Contractor prepared test plans

Final inspection and acceptance of all ground support equipment shall be at the Contractor's facility.

Final acceptance of any Ground System hardware, software, procedures, and trained personnel needed for performance analysis of the flight system shall be at the Contractor's facility.

Final acceptance of the Flight System shall be at liftoff.

Acceptance of the Flight System will be documented on a Letter of Completion (LOC), as indicated by the GSFC Contractor Manager's signature, or assigned delegate's signature.

16.1 DELIVERY INSTRUCTIONS

Except as otherwise provided in this Contract, the point of inspection, acceptance and delivery of all CDRL items deliverable under this Contract shall be the NASA Goddard Space Flight Center, Greenbelt, Maryland 20771. All such deliverables shall be packaged, packed, boxed or crated in such a manner to ensure safe delivery and shall be shipped prepaid and at the Contractor's expense to the point of delivery.

- The Flight System shall be shipped from LM directly to KSC, Florida for launch site processing and launch vehicle integration. The point of delivery for the Flight System shall be at KSC, Florida.
- LM shall provide the transportation and delivery to the launch site. NASA GSFC will coordinate the airlift transport via C-17 as required.
- Residual flight hardware and ground support equipment, software, ground handling and lift fixtures, special tooling, special test equipment and shipping containers shall be delivered in place at LM Denver, CO.

LM shall provide the CO the annual and final reports of reportable items described in the article entitled "New Technology." Copies of transmittal letters for those reports shall be sent to the GSFC Intellectual Property Office Technology (IPO) and to the cognizant GSFC negotiator.

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT			1. CONTRACT ID CODE	PAGE OF PAGES 1 2
2. AMENDMENT/MODIFICATION NO. 00028	3. EFFECTIVE DATE See Block 16C	4. REQUISITION/PURCHASE REQ. NO. N/A	5. PROJECT NO. (If applicable)	
6. ISSUED BY NASA Goddard Space Flight Center Procurement Operations Division		CODE 210.S	7. ADMINISTERED BY (If other than item 6) NASA/Goddard Space Flight Center Space Sciences Procurement Office	
8. NAME AND ADDRESS OF CONTRACTOR (No. Street, county, State and ZIP Code) LOCKHEED MARTIN CORP. 12257 STATE HWY LITTLETON CO 80127-0000			(<input checked="" type="checkbox"/>) 9A. AMENDMENT OF SOLICITATION NO.	
			(<input type="checkbox"/>) 9B. DATED (SEE ITEM 11)	
			(<input checked="" type="checkbox"/>) 10A. MODIFICATION OF CONTRACT/ORDER NO. NNG09EK34C	
			(<input type="checkbox"/>) 10B. DATED (SEE ITEM 13) 04/02/09	
CODE 04235	FACILITY CODE			

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

The above numbered solicitation is amended as set forth in item 14. The hour and date specified for receipt of Offers is extended, is not extended. Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods:
 (a) By completing items 8 and 15, and returning one (1) copy of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.

12. ACCOUNTING AND APPROPRIATION DATA (If required)
BNC: GJE PR: NA AMT: *Funding Exists on Contract to Cover Action*

13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS, IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.

(<input checked="" type="checkbox"/>) A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.
B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation date, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(b).
<input checked="" type="checkbox"/> C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF: FAR 52.243-2 CHANGES - COST REIMBURSEMENT (AUG 1987)
D. OTHER (Specify type of modification and authority)

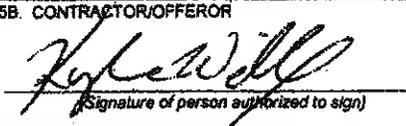
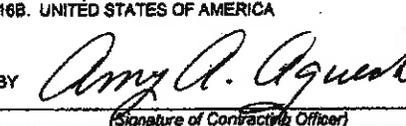
E. IMPORTANT: Contractor is not, is required to sign this document and return 1 copies to the issuing office.

14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible)
This modification definitizes Contractor's proposal dated February 9, 2011 (2011-SEP-CP-0051) for MAVEN Phase CDE MAG Harness Update and Increase Transition Duration to 5 Weeks and hereby completes CCB action item MAVEN-CCR-0247 and MAVEN-CCR-0240.

POC: Amy Aqueche. Email: amy.a.aqueche@nasa.gov

Continued...

Except as provided herein, all terms and conditions of the document referenced in item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER (Type or print) Kyle A. Wille, Contracts Negotiator	16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print) Amy A. Aqueche
15B. CONTRACTOR/OFFEROR  <i>(Signature of person authorized to sign)</i>	15C. DATE SIGNED 4/5/2011
16B. UNITED STATES OF AMERICA BY  <i>(Signature of Contracting Officer)</i>	16C. DATE SIGNED 4/5/2011

1. Revise Clause B.1 – ESTIMATED COST AND AWARD FEE (1852.216-85) (SEPT 1993) as indicated below:

	FROM	BY	TO
Estimated Cost			
Maximum/Final Award Fee (Phase B)			
Base Fee (Phase CDE)			
Maximum Available Award Fee (Phase CDE)			
Maximum Positive Performance Incentive (Phase CDE)			
TOTAL CPAF (BCDE)	\$237,923,425	\$622,826	\$238,546,251

2. All other terms and conditions remain unchanged and in full force and effect.

(END MODIFICATION)

1. Revise Clause B.3 – CONTRACT FUNDING (1852.232-81) (JUN 1990) is revised to increase funds as set forth below:

	FROM	BY	TO
Estimated Cost			
Base Fee			
Award Fee			
CPAF	\$73,020,075	\$5,000,000	\$78,020,075

*The allotment date is through May 6, 2011.

2. All other terms and conditions remain unchanged and in full force and effect.

END MODIFICATION

OMB Approval 2700-0042

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT				1. CONTRACT ID CODE	PAGE OF PAGES 1 2
2. AMENDMENT/MODIFICATION NO. 00030	3. EFFECTIVE DATE See Block 16C	4. REQUISITION/PURCHASE REQ. NO. N/A	5. PROJECT NO. (If applicable)		
6. ISSUED BY NASA Goddard Space Flight Center Procurement Operations Division	CODE 210.S	7. ADMINISTERED BY (If other than Item 6) NASA/Goddard Space Flight Center Space Sciences Procurement Office		CODE 210.S	
8. NAME AND ADDRESS OF CONTRACTOR (No. Street, county, State and ZIP Code) LOCKHEED MARTIN CORP. 12257 STATE HWY LITTLETON CO 80127-0000				(<input checked="" type="checkbox"/>) 9A. AMENDMENT OF SOLICITATION NO.	
				9B. DATED (SEE ITEM 11)	
				(X) 10A. MODIFICATION OF CONTRACT/ORDER NO. NNG09EK34C	
				10B. DATED (SEE ITEM 12) 04/02/09	
CODE 04235	FACILITY CODE				

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers is extended, is not extended.
Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods:
(a) By completing Items 8 and 15, and returning one (1) copy of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATA SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and data specified.

12. ACCOUNTING AND APPROPRIATION DATA (If required)

BNC: GJE PR: NA AMT: *Funding Exists on Contract to Cover Action*

13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS, IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.

(<input checked="" type="checkbox"/>) A.	THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.
B.	THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation data, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(b).
(X) C.	THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF: FAR 52.243-2 CHANGES - COST REIMBURSEMENT (AUG 1987) & 1852.216-85 Estimated Cost & Award Fee
D.	OTHER Specify type of modification and authority)

E. IMPORTANT: Contractor is not, is required to sign this document and return 1 copies to the issuing office.

14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)

This modification definitizes Contractor's proposal dated April 5, 2011 (2011-SEP-CP-0116) for MAVEN Spacecraft Models and hereby reflects action item MAVEN-CCR-0291 approved.

POC: Amy Aqueche. Email: amy.a.aqueche@nasa.gov

Continued....

Except as provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER (Type or print) <i>Kyle Wille, Contracts Negotiator</i>		16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print) Amy A. Aqueche	
15B. CONTRACTOR/OFFEROR <i>Kyle Wille</i> (Signature of person authorized to sign)	15C. DATE SIGNED 4/12/2011	16B. UNITED STATES OF AMERICA BY <i>Amy A. Aqueche</i> (Signature of Contracting Officer)	16C. DATE SIGNED 4/14/2011

1. The Table in Clause B.1 of item #2 is updated to reflect the correction of an administrative mathematical error from MOD 00027 wherein the calculations for Base Fee and Award Fee were calculated incorrectly.
2. Revise Clause B.1 – ESTIMATED COST AND AWARD FEE (1852.216-85) (SEPT 1993) as indicated below:

	FROM (Mod 28)	Mod 27 Correction	BY	TO
Estimated Cost				
Maximum/Final Award Fee (Phase B)				
Base Fee (Phase CDE)				
Maximum Available Award Fee (Phase CDE)				
Maximum Positive Performance Incentive (Phase CDE)				
TOTAL CPAF (BCDE)	\$238,546,251	\$0	\$13,189	\$238,559,440

3. SOW REVISION

SECTION 1.1.1 PHASE C AND D SYSTEMS ENGINEERING ACTIVITIES

LM shall provide 3 spacecraft models and shipping containers to support the mission design reviews, navigation reviews and mission planning, and mission operations.

The named revision will be reflected with the next major revision to the SOW

4. All other terms and conditions remain unchanged and in full force and effect.

(END MODIFICATION)

OMB Approval 2700-0042

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT			1. CONTRACT ID CODE	PAGE OF PAGES 1 2
2. AMENDMENT/MODIFICATION NO. 00031	3. EFFECTIVE DATE See Block 16C	4. REQUISITION/PURCHASE REQ. NO. N/A	5. PROJECT NO. (If applicable)	
6. ISSUED BY NASA Goddard Space Flight Center Procurement Operations Division	CODE 210.S	7. ADMINISTERED BY (If other than item 6) NASA/Goddard Space Flight Center Space Sciences Procurement Office	CODE 210.S	
8. NAME AND ADDRESS OF CONTRACTOR (No. Street, county, State and ZIP Code) LOCKHEED MARTIN CORP. 12257 STATE HWY LITTLETON CO 80127-0000			(X) 9A. AMENDMENT OF SOLICITATION NO.	
			9B. DATED (SEE ITEM 11)	
			10A. MODIFICATION OF CONTRACT/ORDER NO. NNG09EK34C	
			10B. DATED (SEE ITEM 13) 04/02/09	
CODE 04235	FACILITY CODE			

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers is extended, is not extended. Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods:

(a) By completing items 8 and 15, and returning one (1) copy of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATA SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and data specified.

12. ACCOUNTING AND APPROPRIATION DATA (If required)

BNC: GJE PR: NA AMT: *Funding Exists on Contract to Cover Action*

13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS, IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.

(X) A.	THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.
B.	THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation date, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(b).
(X) C.	THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF: FAR 52.243-2 CHANGES - COST REIMBURSEMENT (AUG 1987)
D.	OTHER (Specify type of modification and authority)

E. IMPORTANT: Contractor is not, is required to sign this document and return 1 copies to the issuing office.

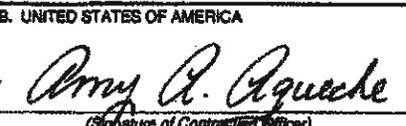
14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)

This modification definitizes Contractor's proposal dated April 7, 2011 (2011-SEP-CP-0124) for MAVEN MOIT Engine Extension and hereby reflects action item MAVEN-CCR-0297 approved.

POC: Amy Aqueche. Email: amy.a.aqueche@nasa.gov

Continued....

Except as provided herein, all terms and conditions of the document referenced in item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER (Type or print) Kyle A. Wille, Contracts Negotiator		16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print) Amy A. Aqueche	
15B. CONTRACTOR/OFFEROR  (Signature of person authorized to sign)	15C. DATE SIGNED 4/18/2011	16B. UNITED STATES OF AMERICA BY  (Signature of Contracting Officer)	16C. DATE SIGNED 4/19/2011

- 1. Revise Clause B.1 – ESTIMATED COST AND AWARD FEE (1852.216-85) (SEPT 1993) as indicated below:

Estimated Cost			
Maximum/Final Award Fee (Phase B)			
Base Fee (Phase CDE)			
Maximum Available Award Fee (Phase CDE)			
Maximum Positive Performance Incentive (Phase CDE)			
TOTAL CPAF (BCDE)	\$238,559,440	\$128,151	\$238,687,591

- 2. SOW REVISION

Section 6.2.2.1.1 Propulsion

LM shall implement the Mars Orbit Insertion Thruster (MOIT) design “opportunity” that uses a 35:1 extended nozzle ratio. This design improves propellant margin and performance while providing an opportunity for extended science and/or relay mission operations.

The named revision will be reflected with the next major revision to the SOW

- 3. All other terms and conditions remain unchanged and in full force and effect.

(END MODIFICATION)

OMB Approval 2700-0042

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT				1. CONTRACT ID CODE	PAGE OF PAGES 1 2
2. AMENDMENT/MODIFICATION NO. 00032	3. EFFECTIVE DATE See Block 16C	4. REQUISITION/PURCHASE REQ. NO. N/A	5. PROJECT NO. (if applicable)		
8. ISSUED BY NASA Goddard Space Flight Center Procurement Operations Division		CODE 210.S	7. ADMINISTERED BY (if other than item 6) NASA/Goddard Space Flight Center Space Sciences Procurement Office		CODE 210.S
8. NAME AND ADDRESS OF CONTRACTOR (No. Street, county, State and ZIP Code) LOCKHEED MARTIN CORP. 12257 STATE HWY LITTLETON CO 80127-0000				(<input checked="" type="checkbox"/>) 9A. AMENDMENT OF SOLICITATION NO.	
				9B. DATED (SEE ITEM 11)	
				(<input checked="" type="checkbox"/>) 10A. MODIFICATION OF CONTRACT/ORDER NO. NNG09EK34C	
				10B. DATED (SEE ITEM 13) 04/02/09	
CODE 04235	FACILITY CODE				

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

The above numbered solicitation is amended as set forth in item 14. The hour and date specified for receipt of Offers is extended, is not extended. Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods:
 (a) By completing items 8 and 15, and returning one (1) copy of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATA SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and data specified.

12. ACCOUNTING AND APPROPRIATION DATA (if required)

BNC: GJE PR: NA AMT: *Funding Exists on Contract to Cover Action*

13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS, IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.

(<input checked="" type="checkbox"/>)	A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.
	B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation date, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(b).
(<input checked="" type="checkbox"/>)	C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF FAR 52.243-2 CHANGES -- COST REIMBURSEMENT (AUG 1987)
	D. OTHER Specify type of modification and authority)

E. IMPORTANT: Contractor is not, is required to sign this document and return 1 copies to the issuing office.

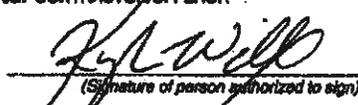
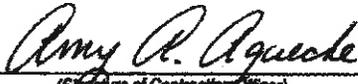
14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)

This modification definitizes Contractor's proposal dated March 10, 2011 (2011-SEP-CP-0090) for MAVEN EMI/EMC Test Plan and hereby reflects action item MAVEN-CCR-0293 approved.

POC: Amy Aqueche. Email: amy.a.aqueche@nasa.gov

Continued....

Except as provided herein, all terms and conditions of the document referenced in item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER (Type or print) Kyle Wille, Contracts Negotiator		16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print) Amy A. Aqueche	
15B. CONTRACTOR/OFFEROR  (Signature of person authorized to sign)	15C. DATE SIGNED 4/25/2011	16B. UNITED STATES OF AMERICA BY  (Signature of Contracting Officer)	16C. DATE SIGNED 4/26/11

1. Revise Clause B.1 – ESTIMATED COST AND AWARD FEE (1852.216-85) (SEPT 1993) as indicated below:

Estimated Cost	[REDACTED]		
Maximum/Final Award Fee (Phase B)	[REDACTED]		
Base Fee (Phase CDE)	[REDACTED]		
Maximum Available Award Fee (Phase CDE)	[REDACTED]		
Maximum Positive Performance Incentive (Phase CDE)	[REDACTED]		
TOTAL CPAF (BCDE)	\$238,687,591	\$221,531	\$238,909,122

2. SOW REVISION

Is Revised as Follows:

6.2.2.1 Subsystems

m. Present Environmental and Integration and Test Plans

GSFC considers the EMI/EMC testing as a workmanship test whereas Lockheed and some of their subsystem vendors consider the testing to put the flight hardware at risk. As a result, exceptions to the Subsystem EMI/EMC test program have been identified. LM shall implement the following in addition to the baseline:

Additional EMI/EMC testing

1. Command & Data Handling C&DH2
2. Two Axis Motor Electronics (TAME)
3. Transponder SDST2
4. Traveling Tube Wave Amplifier (TWTA2)

Reduction/Elimination in EMI/EMC testing

1. Reaction Wheels/Electronics (RWA 2, 3, and 4)
2. Inertial Measurement Unit (IMU2)
3. Reduction in Susceptibility testing for Reaction Wheel #1, IMU1, and Star Tracker (ST1)

The named revision will be reflected with the next major revision to the SOW

3. All other terms and conditions remain unchanged and in full force and effect.

(END MODIFICATION)

1. Revise Clause B.3 – CONTRACT FUNDING (1852.232-81) (JUN 1990) is revised to increase funds as set forth below:

	FROM (MOD 29)	BY	TO
Estimated Cost			
Base Fee			
Award Fee			
CPAF	\$78,020,075	\$6,500,000	\$84,520,075

*The allotment date is through May 27, 2011.

2. All other terms and conditions remain unchanged and in full force and effect.

END MODIFICATION

1. Revise Clause B.3 – CONTRACT FUNDING (1852.232-81) (JUN 1990) is revised to increase funds as set forth below:

	FROM (JOB #)	BY	TO
Estimated Cost			
Base Fee			
Award Fee			
CPAF	\$84,520,075	\$25,000,000	\$109,520,075

*The allotment date is through August 27, 2011.

2. The SOW reference from Item #3 in Modification 00030 is hereby corrected to reflect 6.1.1 in lieu of 1.1.1.
3. All other terms and conditions remain unchanged and in full force and effect.

END MODIFICATION

CMS Approval 2700-0042

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT				1. CONTRACT ID CODE	PAGE 1 OF 2 PAGES
2. AMENDMENT/MODIFICATION NO. 00035	3. EFFECTIVE DATE See Block 16C	4. REQUISITION/PURCHASE REQ. NO. N/A	5. PROJECT NO. (if applicable)		
6. ISSUED BY NASA Goddard Space Flight Center Procurement Operations Division		7. ADMINISTERED BY (if other than item 6) NASA/Goddard Space Flight Center Space Sciences Procurement Office		CODE 210.S	
8. NAME AND ADDRESS OF CONTRACTOR (No. Street, county, State and ZIP-Code) LOCKHEED MARTIN CORP. 12257 STATE HWY LITTLETON CO 80127-0000				(*) 9A. AMENDMENT OF SOLICITATION NO.	
				9B. DATED (SEE ITEM 11)	
				X 10A. MODIFICATION OF CONTRACT/ORDER NO. NNG09EK34C	
				10B. DATED (SEE ITEM 13)	04/02/09
CODE 04225	FACILITY CODE				

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

The above numbered solicitation is amended as set forth in item 14. The hour and date specified for receipt of Offers is extended, is not extended. Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods:
 (a) By completing items 8 and 15, and returning one (1) copy of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATA SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and data specified.

12. ACCOUNTING AND APPROPRIATION DATA (if required)

BNC: GJE PR: NA AMT: *Funding Exists on Contract to Cover Action*

13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS, IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.

(*) A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.
B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation data, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.109(b).
X C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF: FAR 52.243-2 CHANGES - COST REIMBURSEMENT (AUG 1987)
D. OTHER (Specify type of modification and authority)

E. IMPORTANT: Contractor is not, is required to sign this document and return 1 copies to the issuing office.

14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)

This modification definitizes Contractor's proposal dated May 6, 2011 (2011-SEP-CP-0177) for MAVEN Relay Enhancement Capability and hereby reflects action item MAVEN-CCR-0300 approved.

POC: Amy Aqueche. Email: amy.a.aqueche@nasa.gov

Continued....

Except as provided herein, all terms and conditions of the document referenced in item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER (Type or print) Kyle A. Wille, Contracts Negotiator		16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print) Amy A. Aqueche	
15B. CONTRACTOR/OFFEROR <i>Kyle Wille</i> (Signature of person authorized to sign)	15C. DATE SIGNED 6/3/2011	16B. UNITED STATES OF AMERICA BY <i>Amy A. Aqueche</i> (Signature of Contracting Officer)	16C. DATE SIGNED 6/6/2011

NNG09EK34C
Modification 00035
Page 2 of 2

- 1. Revise Clause B.1 – ESTIMATED COST AND AWARD FEE (1852.216-85) (SEPT 1993) as indicated below:

	BCDE	BE	BD
Estimated Cost	[REDACTED]	[REDACTED]	[REDACTED]
Maximum/Final Award Fee (Phase B)	[REDACTED]	[REDACTED]	[REDACTED]
Base Fee (Phase CDE)	[REDACTED]	[REDACTED]	[REDACTED]
Maximum Available Award Fee (Phase CDE)	[REDACTED]	[REDACTED]	[REDACTED]
Maximum Positive Performance Incentive (Phase CDE)	[REDACTED]	[REDACTED]	[REDACTED]
TOTAL CPAF (BCDE)	\$238,909,122	\$20,676	\$238,929,798

2. SOW REVISION

Is Revised as Follows:

6.1.1 PHASE C and D SYSTEMS ENGINEERING ACTIVITIES

Add:

LM shall improve the relay capability of the spacecraft by creating and supporting the use of a second forward link buffer in mass memory. This enhancement allows for nominal relay operations to be conducted out of one buffer while storing a large file load for use in a future forward link in the other buffer.

The named revision will be reflected with the next major revision to the SOW

- 3. All other terms and conditions remain unchanged and in full force and effect.

(END MODIFICATION)

OMB Approval 2700-0042

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT				1. CONTRACT ID CODE	PAGE OF PAGES 1 2
2. AMENDMENT/MODIFICATION NO. 00036	3. EFFECTIVE DATE See Block 16C	4. REQUISITION/PURCHASE REQ. NO. N/A	5. PROJECT NO. (if applicable)		
6. ISSUED BY NASA Goddard Space Flight Center Procurement Operations Division	CODE 210.S	7. ADMINISTERED BY (if other than Item 6) NASA/Goddard Space Flight Center Space Sciences Procurement Office	CODE 210.S		
8. NAME AND ADDRESS OF CONTRACTOR (No. Street, county, State and ZIP Code) LOCKHEED MARTIN CORP. 12257 STATE HWY LITTLETON CO 80127-0000				(X)	9A. AMENDMENT OF SOLICITATION NO.
					9B. DATED (SEE ITEM 11)
				X	10A. MODIFICATION OF CONTRACT/ORDER NO. NNG09EK34C
					10B. DATED (SEE ITEM 13) 04/02/09
CODE 04236	FACILITY CODE				

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers is extended, is not extended. Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended; by one of the following methods:
 (a) By completing Items 8 and 15, and returning one (1) copy of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATA SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and data specified.

12. ACCOUNTING AND APPROPRIATION DATA (if required)

BNC: GJE PR: NA AMT: *Funding Exists on Contract to Cover Action*

13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS, IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.

(X)	A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.
	B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation date, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 48.103(b).
X	C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF: FAR 52.243-2 CHANGES - COST REIMBURSEMENT (AUG 1987)
	D. OTHER Specify type of modification and authority)

E. IMPORTANT: Contractor is not, is required to sign this document and return 1 copies to the issuing office.

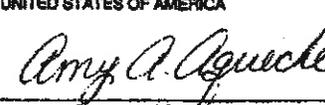
14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)

This modification definitizes Contractor's proposal dated April 21, 2011 (2011-SEP-CP-0147) for MAVEN Operations (OPS) Complexity and hereby reflects action item MAVEN-CCR-0274 approved.

POC: Amy Aqueche. Email: amy.a.aqueche@nasa.gov

Continued....

Except as provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER (Type or print) Kyle A. Wille, Contracts Negotiator		16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print) Amy A. Aqueche	
15B. CONTRACTOR/OFFEROR  (Signature of person authorized to sign)	15C. DATE SIGNED 6/9/11	16B. UNITED STATES OF AMERICA BY  (Signature of Contracting Officer)	16C. DATE SIGNED 6/10/11

NNG09EK34C
Modification 00036
Page 2 of 2

- 1. Revise Clause B.1 – ESTIMATED COST AND AWARD FEE (1852.216-85) (SEPT 1993) as indicated below:

	[REDACTED]		
Estimated Cost	[REDACTED]		
Maximum/Final Award Fee (Phase B)	[REDACTED]		
Base Fee (Phase CDE)	[REDACTED]		
Maximum Available Award Fee (Phase CDE)	[REDACTED]		
Maximum Positive Performance Incentive (Phase CDE)	[REDACTED]		
TOTAL CPAF (BCDE)	\$238,929,798	\$1,783,073	\$240,712,871

- 2. SOW REVISION

Section 14.2.1 Operations

LM shall provide sufficient Phase E operations and planning that support the increased science and mission operations defined at the Science Operation Technical Interchange Meeting (TIM) on August 26-27 at LASP, Boulder, CO

The named revision will be reflected with the next major revision to the SOW

- 3. All other terms and conditions remain unchanged and in full force and effect.

(END MODIFICATION)

CMS Approval E700-0048

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT			1. CONTRACT ID CODE	PAGE OF PAGES 1 2
2. AMENDMENT/MODIFICATION NO. 00037	3. EFFECTIVE DATE See Block 16C	4. REQUISITION/PURCHASE REQ. NO. N/A	5. PROJECT NO. (if applicable)	
6. ISSUED BY NASA Goddard Space Flight Center Procurement Operations Division	CODE 210.S	7. ADMINISTERED BY (if other than item 6) NASA/Goddard Space Flight Center Space Sciences Procurement Office	CODE 210.S	
8. NAME AND ADDRESS OF CONTRACTOR (No. Street, county, State and ZIP- Code) LOCKHEED MARTIN CORP. 12257 STATE HWY LITTLETON CO 80127-0000			(<input checked="" type="checkbox"/>) 9A. AMENDMENT OF SOLICITATION NO.	
			9B. DATED (SEE ITEM 11)	
			X 10A. MODIFICATION OF CONTRACT/ORDER NO. NNG09BK34C	
			10B. DATED (SEE ITEM 13) 04/02/09	
CODE 04235	FACILITY CODE			

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

The above numbered solicitation is amended as set forth in item 14. The hour and date specified for receipt of Offers is extended, is not extended. Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods:
 (a) By completing items 8 and 15, and returning one (1) copy of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATA SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and data specified.

12. ACCOUNTING AND APPROPRIATION DATA (if required)

BNC: GJE PR: NA AMT: \$193,645 *Funding Exists on Contract to Cover Action*

13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS, IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.

() A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.

B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation data, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 48.103(b).

X C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:
FAR 52.243-2 CHANGES - COST REIMBURSEMENT (AUG 1987)

D. OTHER Specify type of modification and authority)

E. IMPORTANT: Contractor is not, is required to sign this document and return 1 copies to the issuing office.

14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)

This modification definitizes Contractor's proposal dated April 21, 2011 (2011-SEP-CP-0148) for MAVEN High Efficiency Power Supply Testing (HEPS) and hereby reflects action item MAVEN-CCR-0296 approved.

POC: Amy Aqueche. Email: amy.a.aqueche@nasa.gov

Continued....

Except as provided herein, all terms and conditions of the document referenced in item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER (Type or print) <i>Kyle Wille, Contracts Negotiator</i>	16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print) Amy A. Aqueche
15B. CONTRACTOR/OFFICER <i>Kyle Wille</i> (Signature of person authorized to sign)	15C. DATE SIGNED 6/27/11
16B. UNITED STATES OF AMERICA BY <i>Amy A. Aqueche</i> (Signature of Contracting Officer)	16C. DATE SIGNED 6/27/11

NNG09EK34C
 Modification 00037
 Page 2 of 2

1. Revise Clause B.1 – ESTIMATED COST AND AWARD FEE (1852.216-85) (SEPT 1993) as indicated below:

Estimated Cost	[REDACTED]		
Maximum/Final Award Fee (Phase B)	[REDACTED]		
Base Fee (Phase CDE)	[REDACTED]		
Maximum Available Award Fee (Phase CDE)	[REDACTED]		
Maximum Positive Performance Incentive (Phase CDE)	[REDACTED]		
TOTAL CPAF (BCDE)	\$240,712,871	\$193,645	\$240,906,516

2. SOW REVISION

Is Revised as Follows:

6.2.2.1 SUBSYSTEMS

LM shall perform early testing of the EPS High Efficiency Power Supply (HEPS) card to mitigate risk regarding its single point failure and excessive white wire configuration. LM shall also perform a minimum of 4 Thermal Vacuum cycle tests at the Power and Data Distribution Unit (PDDU) box level as part of the risk mitigation as well as GSFC mandatory quality assurance inspections.

The named revision will be reflected with the next major revision to the SOW

3. All other terms and conditions remain unchanged and in full force and effect.

(END MODIFICATION)

OMB Approval 2700-0042

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT				1. CONTRACT ID CODE	PAGE OF PAGES 1 3
2. AMENDMENT/MODIFICATION NO. 00038	3. EFFECTIVE DATE See Block 16C	4. REQUISITION/PURCHASE REQ. NO. N/A	5. PROJECT NO. (If applicable)		
6. ISSUED BY NASA Goddard Space Flight Center Procurement Operations Division		7. ADMINISTERED BY (If other than item 6) NASA/Goddard Space Flight Center Space Sciences Procurement Office	CODE 210.S	CODE 210.S	
8. NAME AND ADDRESS OF CONTRACTOR (No. Street, county, State and ZIP Code) LOCKHEED MARTIN CORP. 12257 STATE HWY LITTLETON CO 80127-0000				(*) 9A. AMENDMENT OF SOLICITATION NO.	9B. DATED (SEE ITEM 11)
CODE 04235 FACILITY CODE				X 10A. MODIFICATION OF CONTRACT/ORDER NO. NNG09EK34C	10B. DATED (SEE ITEM 13) 04/02/09

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

The above numbered solicitation is amended as set forth in item 14. The hour and date specified for receipt of Offers is extended, is not extended. Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods:
 (a) By completing items 8 and 15, and returning one (1) copy of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATA SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and data specified.

12. ACCOUNTING AND APPROPRIATION DATA (If required)

BNC: GJE PR: NA AMT: \$4,326,712 *Funding Exists on Contract to Cover Action*

13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS, IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.

(*) A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.
B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation data, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(b).
X C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF: FAR 52.243-2 CHANGES - COST REIMBURSEMENT (AUG 1987)
D. OTHER (Specify type of modification and authority)

E. IMPORTANT: Contractor is not, is required to sign this document and return 1 copies to the issuing office.

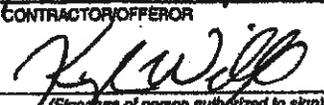
14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)

This modification definitizes Contractor's proposal dated April 25, 2011 (2011-SEP-CP-0153) for MAVEN Spare Hardware Requirements and hereby reflects action item MAVEN-CCR-0292 approved.

POC: Amy Aqueche. Email: amy.a.aqueche@nasa.gov

Continued....

Except as provided herein, all terms and conditions of the document referenced in item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER (Type or print) Kyle A Wille, Contracts Negotiator	16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print) Amy A. Aqueche
15B. CONTRACTOR/OFFEROR  (Signature of person authorized to sign)	15C. DATE SIGNED 7/20/11
16B. UNITED STATES OF AMERICA BY  (Signature of Contracting Officer)	16C. DATE SIGNED 07/20/2011

NNG09EK34C
Modification 00038
Page 2 of 3

1. Revise Clause B.1 – ESTIMATED COST AND AWARD FEE (1852.216-85) (SEPT 1993) as indicated below:

	[REDACTED]		
Estimated Cost	[REDACTED]		
Maximum/Final Award Fee (Phase B)	[REDACTED]		
Base Fee (Phase CDE)	[REDACTED]		
Maximum Available Award Fee (Phase CDE)	[REDACTED]		
Maximum Positive Performance Incentive (Phase CDE)	[REDACTED]		
TOTAL CPAF (BCDE)	\$240,906,516	\$4,326,712	\$245,233,228

2. SOW REVISION

Is Revised as Follows:

Sec 6.2.2.2 Spares

Spare flight hardware may be available per agreements with the Jet Propulsion Laboratory and identified in the following Memorandum of Understanding's:

1. FHLP-08-013, Agreement to Transfer JPL Hardware to GSFC for the MAVEN Project, dtd April 2008
2. FHLP-10-009, Agreement to Transfer JPL Hardware to GSFC for the MAVEN Project, dtd 2-23-10
3. FHLP-11-010, Agreement to Transfer JPL Hardware to GSFC for the MAVEN Project, dtd 11-17-10
4. FHLP-11-027, Agreement for the Allocation of Pyro Valves and PCAs between the SMAP Project and the MAVEN (GSFC) Project, 3-9-11

LM shall procure the following spare flight hardware and test hardware

1. Spare Small Deep Space Transponder (SDST)
2. SDST Special Test Equipment (STE)
3. Spare Adcole Sunsensor,
4. Spare Propulsion High and Low Pressure Service Valves and High Pressure and Bi-Prop Filters
5. Spare SFC (BAE Rad-750 flight computer card)
6. Spare CPS-J card (SEAKR Power supply card)
7. Spare Reaction Wheel Assembly (RWA)
8. Spare EEE parts for EPS and C&DH.

The named revision will be reflected with the next major revision to the SOW

NNG09EK34C
Modification 00038
Page 3 of 3

3. In consideration of this modification agreed to herein as complete equitable adjustment based on the Contractor's email dated June 27, 2011, the Contractor hereby releases the Government from any and all liability under this contract for further equitable adjustment attributable to such facts or circumstances giving rise to the proposal for adjustment.

4. All other terms and conditions remain unchanged and in full force and effect.

(END MODIFICATION)

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT				1. CONTRACT ID CODE	PAGE OF PAGES 1 2
2. AMENDMENT/MODIFICATION NO. 00039	3. EFFECTIVE DATE See Block 16C	4. REQUISITION/PURCHASE REQ. NO. N/A	5. PROJECT NO. (If applicable)		
6. ISSUED BY NASA Goddard Space Flight Center Procurement Operations Division	CODE 210.S	7. ADMINISTERED BY (If other than Item 6) NASA/Goddard Space Flight Center Space Sciences Procurement Office		CODE 210.S	
8. NAME AND ADDRESS OF CONTRACTOR (No. Street, county, State and ZIP Code) LOCKHEED MARTIN CORP. 1257 STATE HWY LITTLETON CO 80127-0000				(4)	9A. AMENDMENT OF SOLICITATION NO.
					9B. DATED (SEE ITEM 11)
				X	10A. MODIFICATION OF CONTRACT/ORDER NO. NNG09EK34C
					10B. DATED (SEE ITEM 13) 04/02/09
CODE 04235	FACILITY CODE				

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers is extended, is not extended. Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods:
 (a) By completing Items 8 and 15, and returning one (1) copy of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATA SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and data specified.

12. ACCOUNTING AND APPROPRIATION DATA (If required)

BNC: GJE PR: N/A AMT: \$-1,030,353.14 *Credit Due Government*

13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS, IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.

(4)	A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.
	B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation date, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(b).
	C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:
X	D. OTHER Specify type of modification and authority Unilateral Pursuant to 1852.216-77 Award Fee for End Items (JUNE 2000)

E. IMPORTANT: Contractor is not, is required to sign this document and return ___ copies to the issuing office.

14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)

This modification documents the amount of interim award fee earned by the Contractor and credit due the Government for the Award Fee Period 1, from November 1, 2010 – April 30, 2011 for Phase C/D/E.

POC: Amy Aqueche. Email: amy.a.aqueche@nasa.gov

Continued....

Except as provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER (Type or print)		16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print) Amy A. Aqueche	
15B. CONTRACTOR/OFFEROR (Signature of person authorized to sign)	15C. DATE SIGNED	16B. UNITED STATES OF AMERICA BY <u>Amy A. Aqueche</u> (Signature of Contracting Officer)	16C. DATE SIGNED 07/20/2011

1. The Government has determined that the Contractor has earned provisional award fee in the amount of [REDACTED] for the period of November 1, 2010 through April 30, 2011, Evaluation Period 1 (Phase C/D/E). This earned amount represents 95% of [REDACTED] available for Evaluation Period 1.

2. In recognition of the foregoing, Clause B.1, Estimated Cost and Award Fee (1852.216-85) (SEPT 1993) is revised as follows:

Period 1

Interim Available Award Fee
Interim Earned Award Fee
Available Fee for Final Evaluation
Interim Award Fee Paid

[REDACTED]

3. Clause G.1, Clause G.1, Award Fee for End Item Contracts (1852.216-77) (JUNE 2000), limits interim award fee payments to the lesser of the interim evaluation score or 80 percent of the fee allocated to that period, less any provisional payments made during the period. For this period, the interim evaluation score (95%) represents the greater amount, so the 80% limit does apply; 80% of the fee allocated for Period 1 equals [REDACTED]. There was one provisional payment made during the period totaling [REDACTED] (voucher 00000065/dated 5/20/11). Thus, upon execution of this modification, the Government shall pay the Contractor award fee in the amount of [REDACTED] because of the resulting credit from the provisional payment processed during the period. The Contractor, subsequently, shall furnish the Government a credit in the amount [REDACTED].

4. All other terms and conditions shall remain in full effect.

END OF MODIFICATION

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT				1. CONTRACT ID CODE	PAGE OF PAGES 1 3
2. AMENDMENT/MODIFICATION NO. 00040	3. EFFECTIVE DATE See Block 16C	4. REQUISITION/PURCHASE REQ. NO. 4200402229	5. PROJECT NO. (if applicable)		
6. ISSUED BY NASA Goddard Space Flight Center Procurement Operations Division	CODE 210.S	7. ADMINISTERED BY (if other than Item 6) NASA/Goddard Space Flight Center Space Sciences Procurement Office	CODE 210.S		
8. NAME AND ADDRESS OF CONTRACTOR (No. Street, county, State and ZIP Code) LOCKHEED MARTIN CORP. 12257 STATE HWY LITTLETON CO 80127-0000				(*) 9A. AMENDMENT OF SOLICITATION NO.	9B. DATED (SEE ITEM 11)
CODE 04236 FACILITY CODE				X 10A. MODIFICATION OF CONTRACT/ORDER NO. NNG09EK34C	10B. DATED (SEE ITEM 13) 04/02/09

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers is extended, is not extended.
Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods:
(a) By completing Items 8 and 16, and returning one (1) copy of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATA SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and data specified.

12. ACCOUNTING AND APPROPRIATION DATA (if required)

BNC: GJE PR: 4200402229 AMT: \$18,121,256 *Incremental Funding*

13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS, IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.

(*) A	THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 16A.
B	THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation title, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(b).
X	C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF: FAR 52.243-2 CHANGES - COST REIMBURSEMENT (AUG 1987)
X	D. OTHER Specify type of modification and authority: NFS 1852.232-81 CONTRACT FUNDING (JUN 1990)

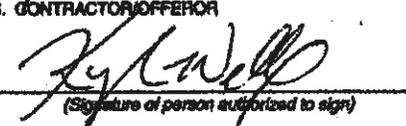
E. IMPORTANT: Contractor is not, is required to sign this document and return 1 copies to the issuing office.

14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)

This modification adds incremental funding for continued contract performance and definitizes Contractor's proposal of July 7, 2011 (2011-SEP-CP-0269) for MAVEN IUVS Fly "Y" Articulation, Systems/Orbiter Magnetics Testing, Non-Occulting Arrival Dates, and MAG Roll Operations and Frequency. This hereby reflects action items MAVEN-CCR-0245, CCR-0252, CCR-0257, and CCR-0276 approved.

POC: Amy Aqueche. Email: amy.a.aqueche@nasa.gov

Except as provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remain unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER (Type or print) Kyle Wille, Contracts Negotiator		16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print) Amy A. Aqueche	
15B. CONTRACTOR/OFFEROR  (Signature of person authorized to sign)	15C. DATE SIGNED 8/15/11	16B. UNITED STATES OF AMERICA BY  (Signature of Contracting Officer)	16C. DATE SIGNED 08/17/2011

1. Revise Clause B.1 – ESTIMATED COST AND AWARD FEE (1852.216-85) (SEPT 1993) as indicated below:

	[REDACTED]		
Estimated Cost	[REDACTED]		
Maximum/Final Award Fee (Phase B)	[REDACTED]		
Base Fee (Phase CDE)	[REDACTED]		
Maximum Available Award Fee (Phase CDE)	[REDACTED]		
Maximum Positive Performance Incentive (Phase CDE)	[REDACTED]		
TOTAL CPAF (BCDE)	\$245,233,228	\$342,368	\$245,575,596

2. SOW REVISION

Is Revised as Follows:

CCR245 – Fly-Y Nod Articulation :
 Add: LM shall design the mission to accommodate IUVS Fly “Y” nod articulation.

CCR257 – Non-Occulting Arrival Dates:
 Add: LM shall support the arrival of MAVEN at Mars on any day between the periods September 22, 2014 through September 28, 2014 to elimination occultation at the end of MOL.

CCR 252 - Orbiter Magnetics Testing Systems
 Add: LM shall perform specific testing to verify the magnetic environment for the MAG instrument. They shall include:

1. Orbiter Magnetic Moment Test
2. Magnetic Compatibility Test.
3. Solar Array Electrical Configuration Test
4. Solar Array String Magnetic Characterization

CCR 276- MAG Roll Operations and Frequency
 Add: LM shall accommodate MAG Calibration Roll operational events.

The named revision will be reflected with the next major revision to the SOW

3. In consideration of this modification agreed to herein as complete equitable adjustment, the Contractor hereby releases the Government from any and all liability under this contract for further equitable adjustment attributable to such facts or circumstances giving rise to the proposal for adjustment.

4. Revise Clause B.3 – CONTRACT FUNDING (1852.232-81) (JUN 1990) is revised to increase funds as set forth below:

Estimated Cost			
Base Fee			
Award Fee			
CPAF	\$109,520,075	\$18,121,256	\$127,641,331

*The allotment date is through October 28, 2011.

5. All other terms and conditions remain unchanged and in full force and effect.

(END MODIFICATION)

OMB Approval 2700-0042

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT				1. CONTRACT ID CODE	PAGE OF PAGES 1 4
2. AMENDMENT/MODIFICATION NO. 00041	3. EFFECTIVE DATE See Block 16C	4. REQUISITION/PURCHASE REQ. NO. N/A	5. PROJECT NO. (if applicable)		
6. ISSUED BY NASA Goddard Space Flight Center Procurement Operations Division	CODE 210.S	7. ADMINISTERED BY (if other than Item 6) NASA/Goddard Space Flight Center Space Sciences Procurement Office		CODE 210.S	
8. NAME AND ADDRESS OF CONTRACTOR (No. Street, county, State and ZIP Code) LOCKHEED MARTIN CORP. 12257 STATE HWY LITTLETON CO 80127-0000				(4) 9A. AMENDMENT OF SOLICITATION NO.	
				9B. DATED (SEE ITEM 14)	
				10A. MODIFICATION OF CONTRACT/ORDER NO. X NNG09BK34C	
				10B. DATED (SEE ITEM 13) 04/02/09	
CODE 04236	FACILITY CODE				

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers is extended, is not extended.

Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods:

(a) By completing items 8 and 15, and returning one (1) copy of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATA SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.

12. ACCOUNTING AND APPROPRIATION DATA (if required)

BNC: GJE PR: N/A AMT: N/A

13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS, IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.

(4) A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.	
B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation date, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(b).	
C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF: X FAR 52.243-2 CHANGES - COST REIMBURSEMENT (AUG 1987)	
D. OTHER Specify type of modification and authority)	

E. IMPORTANT: Contractor is not, is required to sign this document and return 1 copies to the issuing office.

14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)

This modification revises Clause B.6 and definitizes the following Contractor's proposals: 1) August 11, 2011 (2011-SEP-CP-0305) for the MAVEN Spare C&DH EDU, 2) August 30, 2011 (2011-SEP-CP-0325) for MAVEN Electra Diode Box, and 3) August 23, 2011 (2011-SEP-CP-0320) for update to Clause B.6 Payment of Overtime Premium (FAR 52.222-2). This hereby reflects action items MAVEN-CCR-0147 and CCR-0345 approved.

POC: Amy Aqueche. Email: amy.a.aqueche@nasa.gov

Except as provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER (Type or print) Kyle Wille, Contracts Negotiator	15B. NAME AND TITLE OF CONTRACTING OFFICER (Type or print) Amy A. Aqueche
15C. CONTRACTOR/OFFEROR <i>Kyle Wille</i> (Signature of person authorized to sign)	15D. DATE SIGNED 9/21/2011
15E. UNITED STATES OF AMERICA BY <i>Amy A. Aqueche</i> (Signature of Contracting Officer)	15F. DATE SIGNED 09/21/2011

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1. Revise Clause B.1 - ESTIMATED COST AND AWARD FEE (1852.216-85) (SEPT 1993) as indicated below:

Estimated Cost			
Maximum/Final Award Fee (Phase B)			
Base Fee (Phase CDE)			
Maximum Available Award Fee (Phase CDE)			
Maximum Positive Performance Incentive (Phase CDE)			
TOTAL CPAF (BCDE)	\$245,575,596	\$225,082	\$245,800,678

2. SOW REVISIONS

Is Revised as Follows:

1) Electra Diode Box Section Update:

Section

1.1.1 PAYLOAD ACCOMMODATIONS AND SUPPORT

Add: "LM shall provide redundant isolated primary power services to the single string Electra Payload."

2) Spare EDU C&DH Cards Update:

Section

6.2.2.2 SPARES

Add: 9. Procure a spare Engineering Development Unit (EDU) C&DH Space Flight Computer (Rad750) from BAE Systems and and a CPS-J Power Supply from SEAKR.

The named revision will be reflected with the next major revision to the SOW

3. In consideration of this modification agreed to herein as complete equitable adjustment, the Contractor hereby releases the Government from any and all liability under this contract for further equitable adjustment attributable to such facts or circumstances giving rise to the proposals for adjustment.

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4. Clause B.6, PAYMENT FOR OVERTIME PREMIUM (52.222-1) (JUL 1990) is updated to increase the authorized overtime premium costs from \$0 to \$291,402.00 for the contract which is necessary in order to meet the aggressive program schedule.

Accordingly, clause B.6, PAYMENT FOR OVERTIME PREMIUM (52.222-2) (JUL 1990) is deleted in its entirety and replaced with the following revised language:

CLAUSE B.6 52.222-2 PAYMENT FOR OVERTIME PREMIUMS (JULY 1990)

(a) The use of overtime is authorized under this contract if the overtime premium does not exceed **\$291,402.00** or the overtime premium is paid for work—

(1) Necessary to cope with emergencies such as those resulting from accidents, natural disasters, breakdowns of production equipment, or occasional production bottlenecks of a sporadic nature;

(2) By indirect-labor employees such as those performing duties in connection with administration, protection, transportation, maintenance, standby plant protection, operation of utilities, or accounting;

(3) To perform tests, industrial processes, laboratory procedures, loading or unloading of transportation conveyances, and operations in flight or afloat that are continuous in nature and cannot reasonably be interrupted or completed otherwise; or

(4) That will result in lower overall costs to the Government.

(b) Any request for estimated overtime premiums that exceeds the amount specified above shall include all estimated overtime for contract completion and shall—

(1) Identify the work unit; *e.g.*, department or section in which the requested overtime will be used, together with present workload, staffing, and other data of the affected unit sufficient to permit the Contracting Officer to evaluate the necessity for the overtime;

(2) Demonstrate the effect that denial of the request will have on the contract delivery or performance schedule;

(3) Identify the extent to which approval of overtime would affect the performance or payments in connection with other Government contracts, together with identification of each affected contract; and

(4) Provide reasons why the required work cannot be performed by using multishift operations or by employing additional personnel.

(End of clause)

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5. All other terms and conditions remain unchanged and in full force and effect.

(END MODIFICATION)