Helioseismic and Magnetic Imager
for
Solar Dynamics Observatory

Concept Study Report

Appendix D

LMSAL Program Management Plan

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Stanford University Hansen Experimental Physics Laboratory
and
Lockheed-Martin Solar and Astrophysics Laboratory
Solar Dynamics Observatory
Helioseismic & Magnetic Imager
Program Management Plan

DRAFT

Originated by: Larry Springer
Program Manager

Approved by: Stanford University
Hansen Experimental Physics Laboratory
Stanford, CA

Prepared for: Lockheed Martin Space Systems Company
Space & Strategic Missiles
Advanced Technology Center – CAGE 65113
Lockheed Martin Solar & Astrophysics Laboratory (LMSAL)
3251 Hanover Street, Palo Alto, CA 94304-1191

LOCKHEED MARTIN
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1 Scope
This Program Management Plan defines the general management approach for the LMSAL portion of the Helioseismic and Magnetic Imager (HMI) investigation of the Solar Dynamic Observatory (SDO) mission. The HMI instrument is a PI class instrument with Prof. Phillip Scherrer of Stanford University as PI. The SDO program is managed by the Goddard Space Flight Center (GSFC). LMSAL has the responsibility for the design and development of the HMI flight instrument and its associated software and ground support equipment and are scientific partners with Stanford University.

2.0 Management Overview

2.1 Management Concept
The Principal Investigator (PI), Prof. Phillip Scherrer of Stanford University, is ultimately responsible for all technical and scientific decisions. At LMSAL the PI is represented by the LMSAL Program Leader, who provides scientific oversight for the program, and the Program Manager, who has responsibility for day-to-day financial, logistical, and technical management of the Program. The Program Manager reports the status of the HMI program to senior management at the Lockheed Martin Advanced Technology Center (LMATC) monthly. The majority of the personnel working on the HMI program are members of the Lockheed Martin Solar and Astrophysics Lab (LMSAL) organization. The HMI program also employs personnel assigned to certain specialty engineering and product assurance related organizations such as contamination control, reliability, safety, etc. Finance and Business Office (F&BO) personnel accomplish financial reporting, subcontract management, and contract management functions.

2.2 Web Utilization
The HMI Program makes extensive use of internet and intranet concepts, leveraging capabilities developed and in use on the TRACE, SXI, SECCHI, and FPP programs. The HMI home page (hmi.lmsal.com) contains a document repository, calendar, personnel register, email archive, e-mail distribution lists, meeting calendar and other features. A web-based application is used for logging ITAR compliance and another will be used to log test anomalies. The site is password protected.

2.3 Reviews
The HMI program has the normal program reviews, i.e., NASA Peer Reviews, PDR, and CDR. In addition, there are internal design reviews for various sub-systems and sub-assemblies. In addition to monthly reviews with LMATC management, there are internal business reviews approximately once per month with the LMSAL department manager and F&BO personnel. The HMI program has a weekly technical status review. The agendas of that meeting are posted on the HMI internal web page. This meeting is the primary method for determining overall status of the program.
2.4 Contract Data Deliverables (CDRLs)

F&BO personnel are responsible for delivery of contractually required documentation.

3 Organization

The HMI program is managed by Stanford University. LMSAL is scientifically partnered with SU and is responsible for the design and development of the HMI flight instrument and its associated software and ground support equipment. The LMSAL HMI program is executed in the Lockheed Martin Missiles and Space (LMMS) Advance Technology Center (LMATC) organization L9-41, the Solar and Astrophysics Laboratory (LMSAL). LMSAL personnel perform most management and design activities. The HMI program is organized as an integrated product team. The HMI organization chart is maintained separately and the most recent version is available in the on-line document library. A copy of the current version of the LMSAL HMI organization chart is included for reference as Figure 1. The LMSAL HMI Program Manager works with the L9-41 department manager and with the LMATC management to ensure availability of adequate resources and personnel. Figure 2 shows the organization of LMATC. The Program Leader and Program Manager both report directly to the LMSAL manager who in turn reports to the manager of the Space Science Office.

3.1 LMSAL Program Management Personnel

3.1.1 Program Leader

The HMI Program Leader, Dr. Alan Title, is the LMSAL representative of the HMI Principal Investigator and has overall responsibility for the program at LMSAL, has final say on all top-level issues at LMSAL, and is the primary technical interface with SU and NASA.

3.1.2 Program Manager

The LMSAL HMI Program Manager, Larry Springer, is responsible for the overall program management. He receives direction from the Program Leader and works with the Program Leader to provide the technical interface to NASA. The Program Manager is responsible for assembling program personnel and for directing their activities to realize the goals of the HMI science investigation and satisfy HMI contractual requirements.

3.1.3 Systems Engineer

The Systems Engineer has the primary responsibility for interface control, requirements tracking, and requirements verification. The Systems Engineer is the primary contact with SU and GSFC on interface and requirements issues.

3.1.4 Mechanical Lead Engineer

The HMI Mechanical Lead Engineer is responsible for design, fabrication, and verification of the HMI Optics Package (OP) mechanical features. The Mechanical Lead
Engineer works with the program manager to maintain the instrument development schedule.

3.1.5 Mechanisms Lead Engineer
The HMI Mechanism Lead Engineer is responsible for design, fabrication, and testing of the mechanisms used on HMI. The Mechanism Lead Engineer works with the Program Manager to maintain the instrument development schedule.

3.1.6 Electronics Lead Engineer
The HMI Electronic Lead Engineer is responsible for design, fabrication, and testing of the electronics used on HMI. The Electronic Lead Engineer works with the Program Manager to maintain the instrument development schedule.

3.1.7 Thermal Engineer
The HMI Thermal Engineer is responsible for modeling, design, fabrication, and testing of the thermal control systems for the HMI OP and the HMI Electronics Box (HEB). The Thermal Engineer works with GSFC Thermal Engineer to assure that HMI will have an acceptable thermal environment.

3.1.8 Optical Lead
The HMI Optical Lead is responsible for design, fabrication, and testing of the HMI Optics. The Optical Elements Lead works with the Program Manager to maintain the instrument development schedule.

3.1.9 Software Lead
The HMI Software Lead Engineer is responsible for HMI flight and ground support software development. The Software Lead works with the Program Manager to maintain the instrument development schedule.

3.2 Specialists

3.2.1 Mission Assurance Manager
The LMSAL HMI Mission Assurance Manager has overall responsibility for those activities defined in the HMI Product Assurance Implementation Plan (PAIP) (2H00021). The Mission Assurance Manager is the key point of contact with the Mission Assurance organization at GSFC. He reports directly to the LMMS Mission Assurance organization, providing objective independence from the HMI program.

3.2.2 Contamination Control Lead
The HMI Contamination Control Lead is responsible for the design, implementation, and verification of the contamination control features of HMI. The Contamination Control Lead also assures that the procedures and facilities provide the protection required by the HMI.
3.3 **Additional Management Systems**

3.3.1 **Configuration Management**
Configuration Management is conducted in accordance with the HMI Configuration Management Plan (2H00049).

3.3.2 **Management of Government Furnished Equipment (GFE)**
The HMI program has some GFE. The spacecraft simulator interface of the electrical GSE is supplied by the GSFC SDO project office. The HMI GFE is managed by the systems engineer.

3.3.3 **Spares Philosophy and Planning**
Due to extremely tight budgets, an extensive spares policy is not possible. There will be spares for selected high risk or long lead-time elements including optics and filters. In addition, there will be parts for spare mechanisms and electronics boards, however these mechanisms and boards will not be assembled and tested unless they are needed.

3.3.4 **Environmental Impact Management**
There is no requirement for environmental impact management on the HMI program.

3.3.5 **New Technology Reporting**
No new technology is foreseen on the HMI program. New technology reports will be filed in accordance with contract requirements.

3.3.6 **Export Control Management**
During Phase A of the HMI program, Technical Assistance Agreements (TAA) were sent to the Department of State for approval. These TAAs cover the LMSAL interactions with the foreign suppliers that provide hardware to the HMI suite.

3.3.7 **Risk Management**
The HMI Risk Management Plan (2H00075) covers the HMI risk management activities. It is prepared in a manner that complements the SDO risk Management Plan.

3.3.8 **Earned Value Measurement (EVM) System**
The HMI contract does not include an EVM system.
FIGURE 2  LMATC ORGANIZATION