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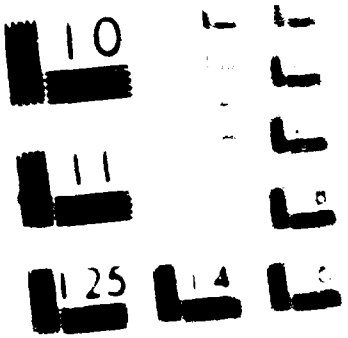
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The satellite flight of the MAXIE-1 (Magnetospheric Atmospheric X-ray Imaging Experiment) instrument is being implemented under ONR (the Office of Naval Research) sponsorship. The MAXIE-1 instrument is being developed as a joint activity of Lockheed, the Aerospace Corporation, and the University of Bergen; much of the Lockheed development has been done under the Independent Research Program. Under ONR sponsorship that institution is responsible for managing the program, for providing spacecraft interface requirements, for providing interface electronics for conditioning sensor signals, for developing test software and for conducting environmental tests needed for flight. This report describes some of the interface activities undertaken in the last three months, including meetings at TRW and at NRL.

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Preface

The MAXIE-1 instrument is being developed as a joint activity of Lockheed, the Aerospace Corporation, and the University of Bergen. By mutual agreement the MAXIE-1 fabrication effort is being split approximately equally among these three co-investigator institutions. Many of the concepts in MAXIE-1 were developed since 1984 under an LMSC continuing Independent Research program. The detailed design and fabrication of the instrument at Lockheed is being completed under the continuing Independent Research Program.

The satellite flight of MAXIE-1 as the ONR-401 experiment is being implemented under the present contract with ONR. In this contract Lockheed has overall responsibility for the activities required to test in satellite flight the MAXIE-1 instrument. The program management activities include the interface with appropriate government agencies. Under ONR sponsorship, Lockheed is also responsible for conducting environmental tests needed for flight and the development of spacecraft interface requirements. Aerospace is responsible for procuring and testing the sensors, for design and fabrication of part of the mechanical configuration, and for development of the ground support equipment. The prime responsibilities of the University of Bergen center around the electronic controlled motion systems. These activities at the Aerospace Corporation and at the University of Bergen are funded by separate sources. Additional instrument development items in MAXIE-1 for the ONR-401 flight experiment, such as a microprocessor interface for the on-orbit operations of a satellite-borne x-ray imaging experiment, are being funded by NASA headquarters to Lockheed.

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The following activities are being pursued under the present contract;

1) management of the program with responsibility for interfacing with the appropriate government agencies

2) provide interface electronics for on-board conditioning of sensor signals

3) development of the software for test and calibration of the flight units

4) perform environment and systems tests for the ONR-401 experiment

Introduction

An Accommodation Study was completed by RCA in 1986 to determine the feasibility and impacts of including the GNR-401 experiment on the NOAA-I or -J spacecraft. The primary goal of the missions of Opportunity Accommodation study was to include the GNR-401 experiment with a minimum of change to the existing spacecraft design. Analysis indicated that the MAXIE-1 payload can be accommodated without exceeding the specification for spacecraft pointing and jitter, and with very little effect on magnetic momentum unloading. Subsequently, in Jan. 1987 another meeting was held at RCA to discuss interface matters.

Activities in the Last Quarter

A Data Management meeting was held on June 26, 1987 at NOAA in Suitland, Maryland to discuss data requirements for the NOAA I and J Missions of Opportunity. Participating in the meeting were the experimenters, NOAA and STP representatives. The MAXIE needs were presented by D. Datlowe and V. Chinn of Lockheed. Representatives of the EHIC and RAIDS experiments also presented their requirements. Several Action Items were generated, seven relating to MAXIE but only two involved LPARL. The latter two are:

* MAXIE needs to specify formally if there is a requirement to have coincident SEM data. Response: the importance associated with particle spectrometer data has been written and sent to Bruce Needham as requested.

* Serial digital commanding requirements need to be resolved with RCA and NASA. Response: This has been resolved in that no serial commands are available.

A follow-on meeting took place on September 17, 1987 at NOAA. The purpose of this meeting was to review the information NOAA has and to formulate a plan to commence software design in FY88. Dr. D. V. Datlowe was the representative of the MAXIE experiment at this meeting. It was stated by NOAA representatives at the meeting that data meetings of this type will be held routinely three to four times per year. Also, a meeting to discuss the expected on-orbit commanding and orbital operations is to be held within the next two months.

Three members of LPARL (H. D. Voss, V. Chinn and M. Hilsenrath) and three members from the Aerospace Corp. participated in a meeting on July 14, 1987 at RCA to clarify various interface matters. Several action items were generated. Some of the key action items for the MAXIE experiment team are summarized below;

1) Supply RCA with a MAXIE Instrument to Spacecraft interface wiring list, specifying connectors and pin assignments;

   Response: We have submitted a preliminary wiring list to NASA/GSFC and RCA.

2) Provide drawings showing the MAXIE scan and stowed positions;

   Response: We are still within the physical envelope established in our March, 1987, drawings which RCA found to be acceptable. We are finalizing the drawings so that we can submit them to NASA/GSFC and RCA.

3) Provide continuous power profile and turn on power curve;

   Response: We are still working on our power requirements. (We are requesting 4 watts more of power so that we can use thermoelectric elements and eliminate the radiators).

4) Provide thermal model;

Response: Lockheed is requesting additional information from RCA on the thermal model they made on MAXIE, so that we can revise our present model.

Three members of the co-investigator group at the University of Bergen in Norway were in residence at the LPARL Laboratory, beginning July 14, 1987 and two remained until Aug. 12, 1987. They brought their prototype motion system to LPARL and demonstrated that their design was feasible. The system operated satisfactorily in an open loop mode. It still needs to be tested in a closed loop mode.

We also tested the Motion System / MAXIE Instrument interface successfully; proper signals and commands were sent and received.

On August 25 a meeting was held at LPARL between four members of the Aerospace Corp. group and several people from Lockheed to review the status of MAXIE. All aspects of the hardware program were reviewed in the day long meeting, and some simplifications in design were developed. Responsibilities of the group were further refined, particularly with respect to the fabrication of mechanical drawings.

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