SPIRE FPU AND JFET BOXES MECHANICAL/THERMAL DUMMY

Executive Summary

in response to

Astrium GmbH RfQ: HP-ASED-LT-0884-02

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CHANGE RECORD

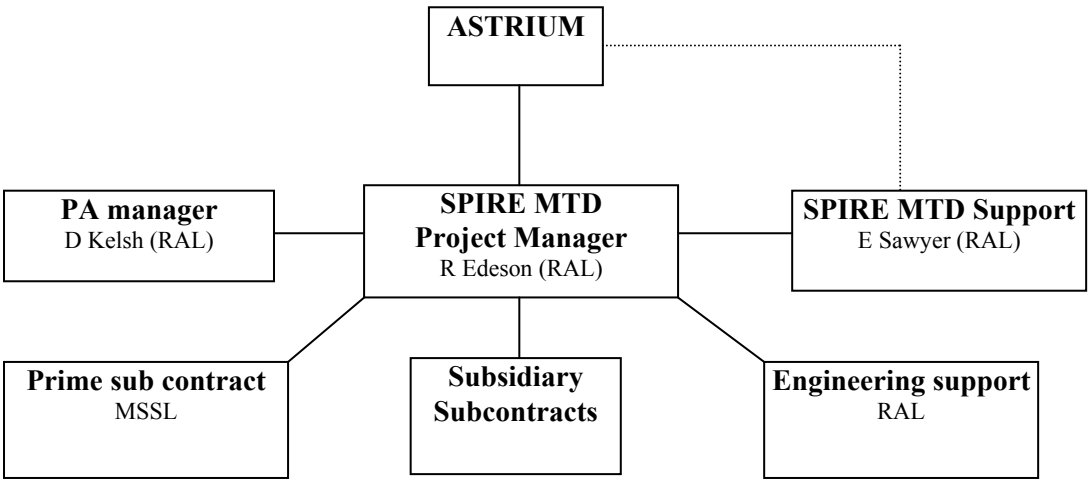
ISSUE	DATE	REASON FOR CHANGE
1	10/2/03	First issue

Contents

This document gives a brief outline of the proposal put by RAL to Astrium GmbH in response to the Astrium request for quotation HP-ASED-LT-0884-02. The proposal is for the Mechanical and Thermal Dummies (MTDs) for the SPIRE instrument on Herschel, including the two JFET boxes.

1. THE PROJECT

The project will be managed from RAL. Design, analysis and AIV activities will take place mainly at RAL. The proposed MTDs will make heavy use of flight model (FM) equivalent parts; these parts will be supplied to RAL by Mullard Space Science Laboratory (MSSL), who are also supplying the FM parts. Electrical, electronic and thermal parts (ie thermistors, heaters) will be purchased separately
The proposed project structure is summarized as follows:



Product Assurance and configuration control will be covered by the current SPIRE system.

2. THE MTDS

The SPIRE FPU MTD will make use of an FM equivalent structure with internal dummy masses to simulate the various subsystems. The external mechanical interfaces will be identical to the FM. Thermal straps to simulate the FM L0 straps will be used, with the mechanical interface the same as the FM. Electrical connectors to FM specification will be used to mechanically and thermally simulate the electrical interfaces.

Internally to the FPU MTD, the L0 thermal straps to the cooler pump and evaporator will have Resistors mounted on the strap-ends to simulate the heat load. The L0 thermal strap will be connected to an FM-equivalent detector enclosure, connected to the L1 stage with FM-equivalent mounts.

The JFET MTDs will be mounted on FM-equivalent isolating spacers. They will house FM-equivalent connectors, again for mechanical and thermal representation.

Dummy harnesses will be supplied to represent the mechanical and thermal link between each JFET and the FPU.

3. DESIGN AND ANALYSIS

Thermal design and analysis will be performed at RAL, with an ESATAN model of each MTD being deliverable. Mechanical design will be conducted at RAL, using an FM CAD model to design and place dummy masses. It is proposed that an FEA model for the FPU MTD will not be generated, as it is not likely to differ significantly from the FM FEA model. A matrix will be presented with the delivery documentation showing any variances from the FM model. An FEA analysis will be performed for individual dummy masses if there are likely to be stiffness or stress problems.

4. MAIV

Dummy masses will be manufactured at RAL or through a local subcontractor.

AIV activities will be performed in a Class 100 area in a RAL cleanroom. When not being worked on, parts and assemblies will be bagged. All three MTDs will be baked out at RAL before delivery, with possible bakeouts at component level occurring before assembly. Surface particulate contamination will be monitored by tape-peel testing. Molecular contamination will be monitored using witness mirrors.

5. PLANNING

Delivery of MTDs will take place 9-10 months after kickoff. A PDR will be scheduled early on in the project, with a CDR about 4 months after kickoff. Several long-lead time items will need to be ordered soon after kickoff to avoid any delays during MAIV.