# SPIRE FPU AND JFET BOXES MECHANICAL/THERMAL DUMMY

## Management Plan Proposal

in response to

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

Rutherford Appleton Laboratory
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**CHECKED BY:**

**APPROVED BY:**

# CHANGE RECORD

| ISSUE | DATE | REASON FOR CHANGE |
|---|---|---|
| 1 | 7/2/03 | First issue |

# CONTENTS

# 1. SCOPE

This plan covers the management activities for the production of a mass thermal dummy of the SPIRE instrument.

# 2. APPLICABLE AND REFERENCE DOCUMENTS

### 2.1.1 Applicable Documents

The following documents are applicable to this plan.

| | | |
|---|---|---|
| AD1 | SPIRE-RAL-PRJ-001526 | Technical proposal |
| AD2 | SPIRE-RAL-PRJ-001528 | Planning proposal |
| AD3 | SPIRE-RAL-PRJ-000017 | SPIRE PA plan |
| AD4 | HP-2-ASED-SW-0029 | Statement of work |

### 2.1.2 Reference Documents

# 3. INSTRUMENT TEAM ORGANISATION

## 3.1 Introduction

The management of the design and build of the SPIRE mass thermal dummy will be controlled by Rutherford Appleton Laboratory (RAL)

## 3.2 Collaboration

The main structure of the CQM and PFM instruments are designed and built by the Mullard Space Science Laboratory (MSSL). They will be subcontracted by RAL to produce the main structural components as listed in the technical proposal. Other components will be manufactured by RAL or subcontracted to UK industry.

## 3.3 Agreements

A contract will be placed by RAL on MSSL.

## 3.4 Management Structure

The Management Structure is shown in the organisation Chart given in figure 3.4-1.

### 3.4.1 Communications with Astrium

Communications of a technical and managerial nature will be via the nominated project manager, Mr Ruben Edeson, or if unavailable Mr Eric Sawyer.

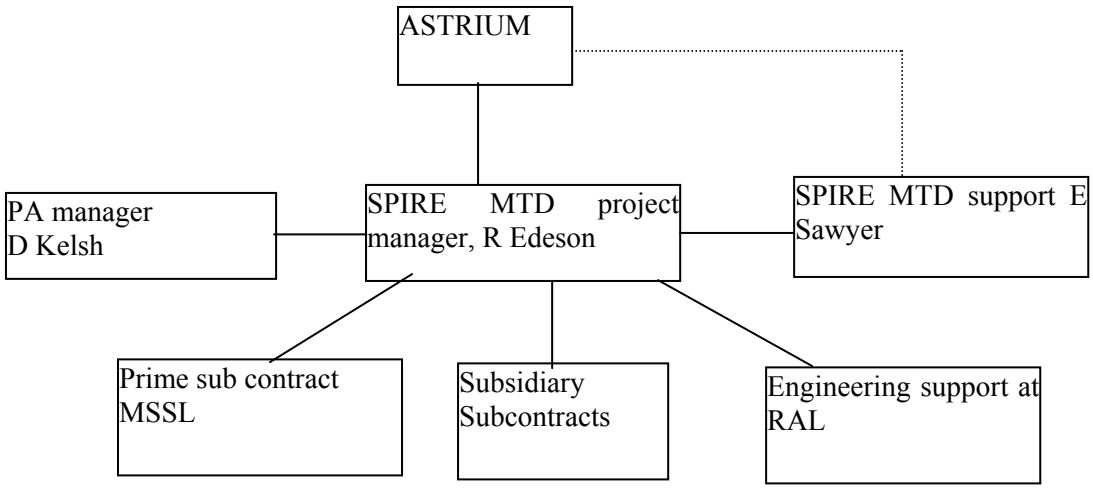


**Figure 3.4-1: Management Structure**

## 3.5 Responsibilities of key posts

The responsibilities of each key post are listed below. Full descriptions of all work packages are given in AD1 (SPIRE MTD Technical proposal).

***Project Manager***

- Formal point of contact with ASTRIUM
- Financial control of the project,
- Regular reports to ASTRIUM
- Technical and Programmatic management of all work packages,
- Programmatic management of subcontractors
- Development and maintenance of a detailed planning procedures to monitor and control the programme and provide ASTRIUM with schedule and progress information,
- Chairing or supporting Instrument reviews and progress meetings, as appropriate,
- Reports to internal RAL management
- Overall control of all aspects of systems engineering,
- Maintain project documentation.
- Manage provision of AIT Plan and AIT Procedures and reports

***Product Assurance Manager*:**

- Implement the Product Assurance Plan
- Carry out PA surveillance and control of sub-contractors, to include Audits and Acceptance of equipment.
- Set in place a project non-conformance and waiver system including sub-contractor and supplier N.C.R's.
- Carry out out a planned system of audits internally on the project and externally on sub-contractors and suppliers.
- Attend all major design test and delivery reviews, providing necessary PA inputs such as safety, defects and failure data
- Agree and provide the necessary documentation in the form of Log Books and End Item Data Packs.
- Convene and chair MRB's, and attend the Test Readiness/Qualification Status Reviews for all Qualification and Verification tests
- Provide management and cost control for the complete P.A. work package
- Implement Parts, Materials and Processes control activities
- Ensure the Cleanliness and Contamination Control Plan is prepared and implemented
- Advise on mechanical and electrical parts
- The PA manager has an independent role within the Project Management team and can therefore act independently of the Project Manager in PA matters when necessary.

# 4. PROJECT CONTROL

## 4.1 Project Control Objectives

In order to manage the programme, the Project Manager will implement project control systems and procedures focusing on the definition, maintenance and reporting of schedule, costs, and configuration information.

## 4.2 Project Breakdown Structures

To clearly identify the instrument, scope of work and responsibilities involved, the following structures will be created and maintained:

- The Work Breakdown Structure (WBS) to define the scope of the work and the responsibilities involved.

The WBS is defined in AD1 (SPIRE MTD Technical proposal).

## 4.3 Schedule Control

A top-level Baseline Master Schedule is given in AD2 (Planning proposal).

# 5. CONFIGURATION MANAGEMENT

This is fully covered in AD3 (Product Assurance Plan).

# 6. REVIEWS AND REPORTING

## 6.1 Reporting to ASTRIUM

The technical and programmatic aspects of the SPIRE MTD programme will be assessed between ASTRIUM and the instrument team through:

- Regular progress reporting.
- Instrument progress meetings,
- A cycle of formal Instrument Reviews,
- Schedule visibility,
- Management/organisational reporting.

### 6.1.1 Instrument Progress Meetings

Regular instrument progress meetings or teleconferences will be held with ASTRIUM. The meetings will be chaired by the SPIRE MTD Project Manager and attended by appropriate members of the instrument team; the meetings will be held as required. Detailed technical problems occurring on either side of the interface will be flagged during these meetings and corrective actions, including their schedule impact, will be agreed and implemented.

### 6.1.2 Instrument Reviews conducted by ASTRIUM

The ASTRIUM Project Manager will conduct the SPIRE MTD instrument reviews listed below. The SPIRE MTD Project Manager will be responsible for providing documentation for review, as required, in the form of Review Data Packages.

The instrument will be subjected to the following reviews by ASTRIUM:

- A preliminary design review (PDR) which would occur about six weeks after kickoff. This is a formal review that would take place at RAL. It would be at a point in the project where most of the thermal analysis, and a preliminary mechanical design would be complete. The purpose would be to give the customer a clear indication of the status of the project and identify any technical issues that need resolving at an early stage.
- A critical design review (CDR) which would occur about 4 months after kickoff at a point where all mechanical analysis, design and detailing would be complete. This is a formal review that would take place at RAL. The purpose of this review would be to present the final design to the customer, and gain approval to move into the manufacture and AIV phases.
- An acceptance review would take place on delivery of the MTDs to the customer. The review would focus on the results of any acceptance tests relevant to the delivery of the MTDs and within the framework of the units' requirement matrices.

### 6.1.3 Internal Project Reviews

The following reviews will be carried out as necessary.

**Material Review Boards**: The Material Review Boards are responsible for the disposition of non-conforming parts and materials and for determining future corrective and preventative measures. In reaching their conclusions the boards shall analyse the available data and initiate such actions as may be necessary to determine, as far as possible, the cause of the non-conformance.

**Test Readiness Reviews**: Before each qualification test a review will be held.

**Test Review Board:** Following qualification or acceptance testing of each sub-system the sub-system engineer will hold a Sub-system Test Review at which it must be demonstrated that the objectives of the test have been met. The conclusions of the meeting must be approved by the Project Manager.

### 6.1.4 Progress Reports

The SPIRE MTD Project Manager will submit to ASTRIUM Project Office a regular progress report. A suitable frequency of these reports is expected to be monthly. The reports will take the form of a short status report covering the following:

- Changes since last report
- Schedule
- Problem areas

### 6.1.5

## 6.2 Reporting by Contractors to the SPIRE MTD Project

### 6.2.1 Progress Meetings

Regular progress meetings will be held with contractors. The meetings will be approximately monthly and will be held either at RAL or at a contractor's premises.

# 7. DELIVERABLE ITEMS

Deliverable items are listed in ADS 1 (technical proposal)

## 7.1 Review Documentation

### 7.1.1 ASTRIUM Reviews

- Review Data Packages as required by ASTRIUM Project Office will be provided for each scheduled Instrument Review
- An Acceptance Data Pack will be provided for the Acceptance Review.

## 7.2 Other Deliverable Documentation

### 7.2.1 Documentation Delivered to ASTRIUM

Other documents to be delivered to ASTRIUM are as defined in AD4 (Statement of work).

### 7.2.2 Documentation Delivered to the Project

Contractors will provide the SPIRE MTD Project Office with the following documentation and shall update it as changes are agreed:

- Sub-system detailed schedule -
- Sub-system Design, development and Verification Plan -
- Sub-system Configuration Item Data List -
- Sub-system Mass and Power Budgets-
- Sub-system Materials, Parts and Processes lists -
- Acceptance Data Pack (to include all test plans, reports etc.) - before delivery of each hardware model delivery.

# 8. KEY PERSONNEL

| | |
|---|---|
| **Name** | **Ruben Edeson** |
| **Company** | **Rutherford Appleton Laboratory** |
| **Assigned for:** | **Project Mechanical Engineer** |
| **Qualifications:** | B.Eng (University of Western Australia) |
| | B.Com (University of Western Australia) |
| | C.Eng, MIMechE (Institution of Mechanical Engineers) |
| **Age** | 29 |
| **Experience**: | |

1997-Present *Rutherford Appleton Laboratory:*

- Two years on the Laboratory's graduate training scheme.
- Project development engineer on the Rosetta Lander's Ptolemy instrument. I performed the mechanical design work on the unit's mass spectrometer and developed an SMA actuator as a gas release mechanism. I was also heavily involved in instrument and subsystem level qualification and AIV.
- Project engineer for the TopSat camera Structural Qualification Model. I also performed design, analysis and qualification testing on one of the TopSat camera's mirror mounts.
- Structural analysis work on:
  - D-CIXS (Smart 1) X-ray spectrometer instrument.
  - Planck 4K cooler.
  - Spire JFET electronics boxes (Herschel).

  Using the FEA program ANSYS.
- Project Engineer on the engineering model for the Smart 2 interferometer optics bench.
- Project Engineer on ESA's Star Tiger terahertz imaging project.
- Line management and Product Assurance responsibilities (writing internal analysis procedures as well as auditing).

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| **Name** | **Anne-Sophie GOIZEL** |
| **Company** | **Rutherford Appleton Laboratory** |
| **Assigned for:** | **Thermal Engineer** |
| **Qualifications:** | MSc Astronautics and Space Engineering,<br>(Cranfield University, 2001, Astrium and John Whiley Prizes)<br>BEng (Hons) in Aerospace Engineering<br>(Kingston University, 2000, First Class) |
| **Age** | 25 |

**Experience**:

| | |
|---|---|
| October 2001<br>To Present | Rutherford Appleton Laboratory:<br>Joined the Thermal Section within the Instrument Division of the Space and Science Technology Department to provide support with the thermal analyses of cryogenic instruments:<br>▪ Phase A Study of MIRI, a Mid Infrared Instrument on board the James Webb Space Telescope,<br>▪ Initial thermal analysis of the SPIRE Calibration Cryostat,<br>▪ Main thermal engineer on the SPIRE instrument. |
| May 2001 To October 2001 | Rutherford Appleton Laboratory:<br>Joined the MMT Group within the Atmospheric Division of the Space and Science Technology Department as part of MSc Research Thesis, to work on the "Pointing System Analysis of Marschals, an Airborne Receiver":<br>▪ Analysis and design of pointing control loop,<br>▪ Development of control algorithm (including commutation control of the DC brushless motor drive) and implementation on DSP based controller,<br>▪ Software testing and control loop optimisation. |

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| Name | **Graham Toplis** |
| Company | Rutherford Appleton Laboratory |
| Assigned for: | Head of Environmental Testing. |
| Qualifications: | HNC in Mechanical and Production Engineering in 1983 from Swindon College |
| Experience: | |
| 1976- 1980 | Joined Rutherford Appleton Laboratory as a Mechanical Engineering Apprentice. |
| 1980- 1985 | Design Engineer on the ISIS Neutron Facility |
| 1985 -1988 | Repsonsible for the design, assembly and test of the ATSR1 Scan Mechanism Unit, including AIV support to the ATSR1 Instrument. |
| 1988 -1995 | Environmental Test Engineer supporting the following projects: ATSR2, ISO LWS including cold vibration testing, Cassini, Cluster, Rosat, ISAMS, JET-X, CDS and Yohkoh. |
| 1995- present | Head of Environmental Testing supporting: Cluster 2, Spire, Rosetta, DCIXS, Beagle 2, GERB 1, 2 and 3, Solar B and Topsat. |

Name **John Firth**

Company Rutherford Appleton Laboratory

Assigned for: Electronics Production Manager

Experience:

27 years experience in space instrumentation with first with the United Kingdom Atomic Energy Authority and the Science Research Council (16 years) at Culham and then at RAL. Work covered the areas of electronic/system design and flight hardware production/testing and launch support on 30 Skylark rocket payloads and instruments for the following spacecraft: SMM (XRP), UARS (ISAMS), GIOTTO (DIDSY), ERS-1/-2 (ATSR), ERS-2 (AATSR, MIPAS), CASSINI/HUYGENS (CDA/SSP), ENVISAT (AATSR, MIPAS), MSG-1/-2/-3 (GERB 1,2 3 ), CHEM-1 (HIRDLS)

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| Name | **Eric Sawyer** |
| Company | Rutherford Appleton Laboratory |
| Assigned for: | UK Project Manager and Mechanical Systems Engineer |
| Experience: | Eric Sawyer is a project manager at the CLRC's Rutherford Appleton laboratory in Oxfordshire. A mechanical engineer by training he has worked on many scientific satellite programmes, in roles ranging from mechanical engineer to project manager. He was project manager for one of the SOHO instruments, the Coronal Diagnostic Spectrometer (CDS), The Ptolemy instrument on Rosetta, and for the GERB series of instrument, which will fly on the next generation of Meteosat satellites (MSG).<br>He is currently Instrument manager for the SPIRE instrument on Herschel. |

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| **Name** | **Martin Whalley** |
| **Company** | **Rutherford Appleton Laboratory** |
| **Assigned for:** | **Project Mechanical Engineer, Section Leader** |
| **Qualifications:** | C. Eng. Institution of Mechanical Engineers<br>M.Eng. Engineering Science, Oxford University (1993) |
| **Age** | 31 |
| **Experience**: | |
| 1993 – 1995 | Graduate training throughout RAL. |
| 1995 – Present | Mechanical Project Engineer, Space Science and Technology Dept.<br>Involved principally in the mechanical design, analysis integration and testing of the Ptolemy instrument for Rosetta, plus various design studies (including structural and thermo-elastic analyses for STEP and LISA proposals). Management responsibility for the procurement of components and scheduling of mechanical engineering work packages. Managing the assembly of the Ptolemy QM instrument.<br><br>Section Leader for Mechanical Engineering Section. |
| 2000 – Present<br><br>Publications: | *"Thermal Design and Gravitational Influence of Thermally Induced Mechanical Changes on the LISA Payload", S.* Peskett, B. Kent, M. Whalley, M. C. W. Sandford, Second International LISA Symposium on the Detection and Observation of Gravitational Waves in Space. AIP proceedings, Vol 456, Pasadena, California. 1998 |

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| **Name** | **David Kelsh** |
| **Company** | **Rutherford Appleton Laboratory** |
| **Assigned for:** | **Product Assurance Manager** |
| **Qualifications:** | 1965-1971 Luton College of Technology (Part time) City and Guilds Full Technology Certificate in Digital Switching Principles (TT5) |

**Experience**:

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|---|---|
| 1970 1976 | Royal Aircraft Establishment - Electronics Engineering Apprenticeship |
| 1976-1979 | Royal Aircraft Establishment Blind Landing Experimental Unit - Experimental |
| 1979-1981 | Technician R.F. Systems and Switching Power Supplies |
| 1981-1983 | Royal Military College of Science - Electronics Workshop Manager |
| 1983-1986 | AMPTE-UKS - R.F. engineer |
| 1986-1989 | UARS ISAMS - Electronics Design Engineer for mechanism drives |
| 1965-1970 | POLAR CAMMICE - Production and Test Engineer |
| 1990-1995 | CLUSTER Peace/Rapid - Technical Manager |
| 1995-1997 | ENVISAT-1 MIPAS - Production Manager |
| 1997-2000 | SSTD Deputy PA Manager |
| 2000 | SSTD PA Manager |