

SPIRE

System Design Review Board Report

30 November 2000
(Cosener's House, Abingdon, UK)

<i>Board Members</i>	<i>Signature</i>	<i>Date</i>
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R. Carvell PPARC
A. Heske ESA/ESTEC/SCI-PT
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ANNEX 1 - LIST OF DOCUMENTS REVIEWED

1. Introduction

The meeting of the System Design Review of the Spectral and Photometric Imaging Receiver (SPIRE) was held on 30 November 2000 at Cosener's House, Abingdon. This meeting was the first in a series of instrument internal Detailed Design Reviews, DDRs, of all subsystems. The series will culminate in the final DDR, which is planned to be combined with the ESA Instrument Intermediate Design Review in April 2001.

This report provides the Review Board findings, recommendations and conclusions of the first SPIRE DDR, the System Design Review.

2. Review Objectives

The System Design Review was the first step towards finalising the system and subsystem designs of SPIRE to be closed out with the Instrument Intermediate Design Review.

The review objectives of the IIDR are defined in the ESA document "FIRST/Planck Instrument Reviews", SCI-PT/FIN-06692, and are as follows:

It shall be demonstrated that:

- the instrument detailed system design has been finalised
- the instrument subsystem design has been finalised
- the detailed interface requirements have been finalised
- the design for the on-board software has been finalised (User Requirements Document)
- the design of the necessary MGSE, EGSE and OGSE has been finalised.

In line with their review plan, SPIRE defined as the main objectives for this System Design Review:

- to assess the state of the system design as part of the IIDR process and
- to show that the instrument systems design is mature, thoroughly understood and properly documented.

To achieve that the objectives set by SPIRE were to:

- present the instrument and its operating modes as a set of systems,
- present the proposed instrument design solutions that are to be adopted to meet the system level requirements,
- present the modelling and analysis of the instrument as a system to show that the design will be compliant with the system level requirements,

- present the instrument development and test philosophy to show that this addresses the verification of the system level requirements,
- present the instrument level criticality analysis and show that the instrument design can cope with failures without total loss operations,
- show how system requirements flow down to the subsystems,
- present the documentation tree,
- present the interface control scheme.

3. SPIRE System Design Review Board

The review board for the System Design Review consisted of the board members listed below.

<i>Name</i>	<i>Affiliation</i>	<i>Function</i>
M. Anderegg	ESA	Chairman
O. Bauer	MPE	
R. Carvell	PPARC	
A. Heske	ESA	Secretary, Interfaces
P. Olivier	ESA	Product Assurance
T. Paßvogel	ESA	FIRST/Planck Project Manager
G. Pilbratt	ESA	Co-chairman, Project Scientist
S. Thürey	ESA	Electrical and CDMS

4. Proceedings of the Review

4.1 Documentation reviewed

The list of documents reviewed is given in Annex 1.

4.2 Presentations

Presentations were given by various members of the SPIRE team on 30 November 2000 at Cosener's House.

4.3 Panel Meetings

The Board members, with the exception of G. Pilbratt (excused) attended the presentations at Cosener's House.

5. Board Findings and Recommendations

The Board noticed that, since the arrival of the additional system engineer, the output in system engineering activities has significantly improved and is looking forward to the further strengthening of the team by another system engineer to start early in 2001.

The Board noticed that good progress has been made in particular in the following areas:

- thermal analysis of the FPU and the JFET box
- definition of cryogenic harness
- EMC analysis and grounding scheme

However, the Board is concerned that since the last review – the ISVR closeout in June 2000 – SPIRE could not yet remove the structural subsystem and the detector development from the critical path.

The Board noticed with concern that the following items were not part of the documentation provided for the review:

- Design and Development Plan
- AIV Plan
- Consolidated Schedule
- Completed IID-B update
- Product Assurance plan
- Configuration Management plan
- FMECA and Single Point Failure List

The above items will be reviewed, as they become available, however at the latest as part of the IIDR.

The Board is concerned that for the activities at subsystem level not always the latest issues of the relevant documentation (in particular specifications and interface documents) seemed to be available and asks the SPIRE engineering team to ensure that the latest versions are used.

Regarding power and mass budgets, the board is concerned that these have not yet stabilised. In particular the dissipation of the JFET boxes, which is a critical factor for the instrument operation, has increased significantly (by 50%).

In the view of the status of the design activities on one hand and the timeline for the Instrument Intermediate Design Review on the other, the Board would like to issue only one recommendation which it considers of highest importance for SPIRE to be able to proceed successfully in the subsystem definition:

- SPIRE should urgently and with highest priority:
 - consolidate the Design, Development and Verification Plan,
 - resolve the - subsystem and overall - schedule problem,
 - resolve and consolidate the proposed model philosophy.

The required activities and the issue of the plan, including the consolidated schedule and model philosophy and product assurance, should be finished well before the envisaged date for the Instrument Intermediate Design Review, i.e. the Board asks SPIRE to provide the required information within the next two months.

6. Board Conclusions

The Board recognises the detailed work made by the SPIRE team in a number of areas and subsystems and it recognises that first steps have been taken towards consolidating the subsystem activities at system level since the last review.

The Board considers particularly important that SPIRE carries out a detailed analysis of their revised model philosophy – including trade-offs for schedule, costs and margins – to arrive at a consolidated schedule supported and backed by all subsystems.

The Board asks SPIRE to formally reply in due time to the recommendation and does not see a need to issue separate Review Item Discrepancy (RID) notes at this stage.

ANNEX 1

List of documents reviewed

Document Title	Date and Issue	Reference
Management and Configuration Control		
Organisation of the SPIRE Systems Team	27/10/2000 0.00	SPIRE-RAL-NOT-nnnn
SPIRE Configurable Documents Tree	13/11/2000 1.0	SPIRE-RAL-PRJ-000033
Interface Documents		
Instrument Interface Document, Part B Updated chapter 4	01/09/2000 1/0	SCI-PT-IIDB/SPIRE-02124
Requirements Documents		
Science Requirements Document	21/11/2000 3.0	None
Instrument Requirements Document	23/11/2000 1.0	SPIRE/RAL/N/0034
DPU/ICU On Board Software User Requirements Document	28/09/2000 1.0	SPIRE-IFS-PRJ-000444
System and Design Descriptions		
SPIRE Sensitivity Models	24/11/2000	None
SPIRE System Budgets	14/06/2000 1.1	SPIRE/ATC/DOC/????
SPIRE Operating Modes Document	24/11/2000 2.3	SPIRE-RAL-DOC-000320
Electrical System Design Description	34/11/2000	None
Optical System Design Description	25/05/2000 Draft	SPIRE-LAM-DOC-???
SPIRE Optical Configuration Control Document	24/11/2000	None
Thermal Configuration Control Document	22/11/2000 Draft 1/2	SPIRE-RAL-RP-xxx
Failure Analysis		
Assessment of System Level Failure Effects for SPIRE	01/11/2000 0.30	SPIRE-RAL-NOT-000319