Rutherford Appleton Laboratory	DOCUMENT / ENGINEERING CHANGE REQUEST (ECR)	PRODUCT ASSURANCE Space Science and Technology Department

DCR / ECR Number:	HR-SP-RAL-ECR-005

Spacecraft / Project	Herschel-Planck	**Originator's Name**	JD
System / Experiment / Model	**SPIRE**	**Signature**	*John Delderfield.* 26/11/01
Sub-System	Instrument level I/F	**Date**	19th November 2001
Assembly		**Classification**	Urgent
Sub-Assembly		**Ref. Doc. / Drwg No.**	Spire IID-B 2/0
Item		**Reference**	SCI-PT-IIDB/SPIRE-02124

ECR Title	SPIRE IID-B UPDATE, #1 and #7 based on Jean Bruston's list. Largely a re-submission of information collated on 26th September under pointsJD1-31, from even earlier information.

ECR Description

Section 5.6.1.2

Add word "provided" so it's clearer who sources A-frames. Add sentence so reason why there are 2 for cooler is clear

"..... The thermal straps will be steadied by non-metallic **Spire** provided A-frames on the outside of the FPU, designed to minimise the forces the straps can apply to thermal leadthroughs, but not to be Ohmic shorts. Separate supports are needed to minimise cross-coupling between the two sorption cooler straps."

Section 5.7.5.1

Use updated version as follows:

"The table below shows the measurement of instrument cryogenic temperatures. These data are available in DPU science packets (unless otherwise indicated) via whichever is powered of the prime and redundant sides of the **Spire** electronics. They may also be included in some hsk. packets.

"Each Prime/Redundant side uses different, electrically isolated sensors and will therefore have subtlely differing electrical to temperature calibrations. Note that the accuracy columns that follow refer to the performance of the complete system including cryoharness and electronics, not the sensors alone. "Resolutions" and "Accuracy" will need to be further defined as they are actually temperature dependant.

"Cernox sensors type CX-1030 are used for all **Spire** conditioned hsk. temperatures. The below table is consistent with **Spire** Wiring Definition.

Location IN HSFPU	Acronym	Sensor Type	Temp. Range	Resol.	Acc.
PSW BDA_1	T_PSW_1	NTD Ge Thermistor*	0.2 K>5 K	0.5mK	2mK
PSW BDA_2	T_PSW_2	NTD Ge Thermistor	0.2 K>5 K	0.5mK	2mK
PMW BDA_1	T_PMW_1	NTD Ge Thermistor	0.2 K>5 K	0.5mK	2mK
PMW BDA_2	T_PMW_2	NTD Ge Thermistor	0.2 K>5 K	0.5mK	2mK
PLW BDA_1	T_PLW_1	NTD Ge Thermistor	0.2 K>5 K	0.5mK	2mK
PLW BDA_2	T_PLW_2	NTD Ge Thermistor	0.2 K>5 K	0.5mK	2mK
SSW BDA_1	T_SSW_1	NTD Ge Thermistor	0.2 K>5 K	0.5mK	2mK
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300mK Plumbing Cntrl_1	TBD	NTD Ge Thermistor	0.2 K>5 K	0.05mK	0.2mK
300mK Plumbing Cntrl_2	TBD	NTD Ge Thermistor	0.2 K>5 K	0.05mK	0.2mK
300mK Plumbing Cntrl_3	TBD	NTD Ge Thermistor	0.2 K>5 K	0.05mK	0.2mK
JFET temps (6off? TBD)	TBD	"Heater"Thermistor?	10K>120K	0.5K	1K
HSFPU Opt. Bench (HOB)	TBD	CX-1030	3K>100K	25mK	50mK
Spectrometer 2K box	TBD	CX-1030	1K>10K	2mK	2mK
Photometer 2K box	TBD	CX-1030	1K>10K	2mK	2mK
M3,5,7 Optical SubBench	TBD	CX-1030	3K>100K	25mK	50mK
HSFPU Input Baffle	TBD	CX-1030	3K>80K	5mK	5mK
BSM/SOB I/F	TBD	CX-1030	3K>80K	5mK	5mK
HS Spect. Stimulus Flange	TBD	CX-1030	1K>50K	10mK	10mK
Sorption Pump	TBD	CX-1030	0.2 K>5 K	1mK	1mK
Evaporator	TBD	CX-1030	0.2 K>5 K	1mK	1mK
Sorption Pump Heat Switch	TBD	CX-1030	1K>50K	10mK	10mK
Evaporator Heat Switch	TBD	CX-1030	1K>50K	10mK	10mK
Thermal Shunt	TBD	CX-1030	0.2 K>5 K	1mK	1mK
HS Spect. Stim 4%	TBD	CX-1030	3K>80K	5mK	5mK
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BSM	TBD	CX-1030	3K>20K	10mK	10mK
SMEC	TBD	CX-1030	3K>20K	10mK	10mK
SMEC/HOB I/F		CX-1030	3K>100K	25mK	50mK

*NTD Ge Thermistor is equivalent to a detector element, but it is not mounted on an isolating web. JFET temperatures are not presently included in hardware baseline, although very pertinent.

Section 5.7.5.3

Clarify some locations and remove TBDs in the accuracy column.

Location	Acc.
Level 0 Strap A to cooler	10mK
Level 0 Strap B to cooler	10mK
Level 0 Strap to HFSFPU 1.8k boxes	10mK
Level 1 strap to HSFPU	50mK
HSJFS Frame temperature	1K
HSJFP Frame temperature	1K
HOB at HSFPU centre foot	1K
HOB at HSFPU +Y foot	1K
HOB at HSFPU -Y foot	1K

Lower values for resolution and accuracy apply at bottom end of range, higher when hot and the absolute value of the requirement is much less stringent. The temperature of an item should be determined (accuracy+ resolution errors) to 2% of its absolute value in Kelvin, TBC.

Section 5.8

Insert replacement section as follows:

"Spire's only optical interface is that toleranced in section 5.3.2. The instrument's internal beam sizes have been optimised

"For information, figure 5.8-1 shows the Spire optical beam envelope viewed as it passes out of the HSFPU, showing the contributions from the photometer and the spectrometer. The differing beams are extremes of BSM's jiggle and chop. The beam envelope formed is the geometric optical beam passing through the Spire cold stop. The 6mm clearance around it through the shutter frame is the allowance required for beam diffraction.

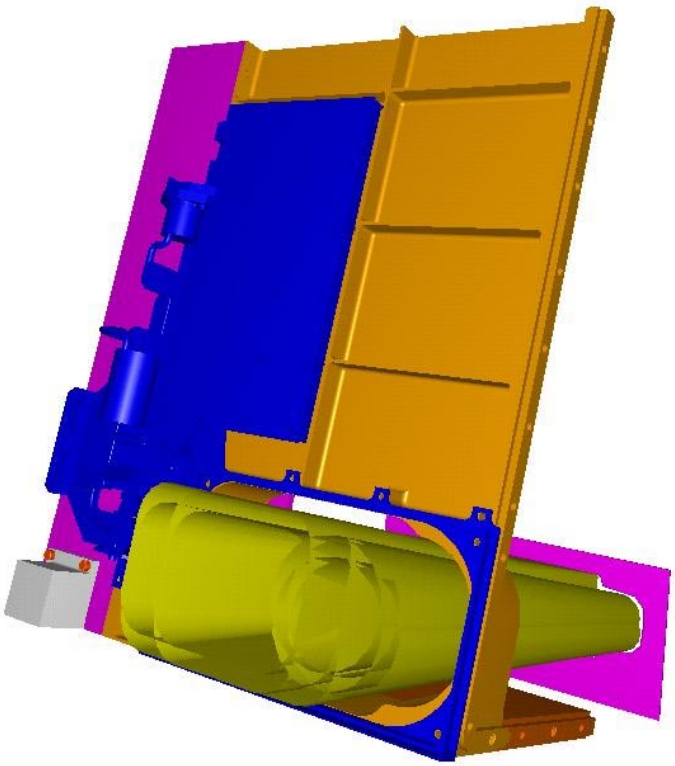

Figure 5.8-1 Spire optical beam envelope as it leaves the HSFPU

The spectrometer's almost circular used beams are the farther from HERSCHEL field centre and lie to the side of the semi-rectangular beams of the photometer. FOV switching is not used within Spire to boresight the photometer and the spectrometer; both are illuminated simultaneously by the HERSCHEL telescope.

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Section 5.9.3

Update SVM unit thermal dissipation Table as follows:

Project Code	Instrument Unit	Dissipation	Comment
HSDPU	HS Digital Processing Unit	15.3W	
HSFCU	HS FPU Control Unit	42.9W	Includes power cond. losses
HSDCU	HS Detector Control Unit	37W	Lower in spectrometer Mode
HSWIR	HS Warm Inter-unit Harness	0.1W	
	Total	95.3W	

Remove "These apply to all modes, and"

Section 5.9.6.1

Update tables as follows:

Spire Operating Mode	Mean BOL	Mean EOL	Peak BOL/EOL
Observing	95.3W	95.3W	TBD
Parallel	95.3W	95.3W	TBD
Serendipity	95.3W	95.3W	TBD
Standby	95.3W	95.3W	TBD
Cooler Recycle	95.3W	95.3W	TBD
On	15.3W	15.3W	TBD
Off	0W	0W	0

Project Code	Instrument Unit	Mean Load per LCL
HSDPU	HS Digital Processing Unit	15.3W
HSFCU	HS FPU Control Unit	80W

Section 5.9.6.3

Update LCL current measurement resolution to read" 25mA or 1/256 of (trip x 1.5) whichever is the larger"
Change sub-section title to "Interface Characteristics", but add to middle paragraph, "Instrument power input circuits are shown in sections 5.9.6.4.1&2."

Section 5.9.6.4.1

Spire still needs to generate information to close out the I/F circuit TBD

Section 5.9.6.4.2

Spire still needs to generate information to close out the I/F circuit TBD

Section 5.11.3

This clarification only arises due to persons mis-reading of the text. Change "better than 5TBC milliseconds" to "better than 5msecs, although the actual UT of the pulse only needs to be within one second of its planned time."

Section 5.13.1

Put in paragraph, "Each HSDPU shall use a different 1553 bus address"

Section 5.15.3

Insert directly after heading
"For reasons of possible damage caused by vibration during transport, environmental testing and launch, mechanisms shall be transported in their launch latched state.

All

Replace any FIRST('s) with HERSCHEL('s), change FS to HS appropriately, clearly identifying both HOB and SOB, e.g. put both HOB (HERSCHEL) Optical Bench and SOB (Spire Optical Bench) in the abbreviations list, and make line 2 of para 5.3 read "Plane Units (FPUs) for HIFI, PACS and Spire on the HERSCHEL Optical Bench (HOB)

Need /Justification For Change

Global Typos and minor clarifications/additions, all deemed to be uncontentious

Affected Items / Work package (Title, Number, Issue, Para)

See Description.

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INDUSTRY ASSESSMENT / IMPACT OF CHANGE
System design
Schedule
Cost
Industry Assessor Signature

Related Factors			
Spacecraft	Performance	Power	Others (Specify)
Ground Segment	Elect. Interfaces	Weight	I/F.
Launch Vehicle	Mech. Interfaces	Schedule	
Payload	Test/Verification	Cost	

Attachments	Distribution
None	See covering Sheet

Change Approved		Signature / Date	