



DCR / ECR Number:

HR-SP-RAL-ECR-011

Spacecraft / Project	Herschel-Planck	Originator's Name	JD
System / Experiment / Model	SPIRE	Signature	John Delderfield.
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, #8 based on Jean Bruston’s list. Largely a re-submission of information collated on 26 <sup>th</sup> September under pointsJD1-31, from even earlier information		
ECR Description			
Position/Provision of Cooling Strap Electrical Isolation. This ECR is written as if it were a change to IID-B issue 1.0. It is intended to be an instance in which IID-B overrides IID-A.			
Need /Justification For “Change”			
<p><b>Spire</b> needs DC isolation of the HSFPFU from the HOB. This is a signed off JPL requirement, intrinsic to how the detector system is intended to be accommodated. The requirement is thus included in and needed for compliance with the <b>Spire</b> Grounding Scheme. The various cooling straps could act as electrical shorts from the HSFPFU to the cryostat and the HOB. So they need to be electrically isolated. This is anticipated as a possibility in the IID-A which identifies a qualified implementation.</p> <p><b>Spire</b> considered incorporating this qualified design on the instrument side of the I/F, and concluded that such a placement of the isolation was non-optimum because:</p> <ul style="list-style-type: none"><li>i. <b>Spire</b> needs to support the ends of thermal straps that attach to it. This is particularly true for the sorption cooler thermal interfaces that are not designed for high mechanical loading and have thermal paths from them that need to pass through light/radiation traps to outside the HSFPFU</li><li>ii. The mechanical support for the straps is shared between the light/radiation traps and the formal A-frames, both joined back to the HSFPFU case.</li><li>iii. The HSFPFU case runs at a temperature somewhat above the level 1 interface.</li><li>iv. Thus there is a thermal differential across the support from level 0 to above the level 1 interface temperature.</li><li>v. To minimise thermal loads and maximise mission lifetime, these supports are optimised for minimum strength and hence minimum conductivity</li><li>vi.. So the mass “high up” the straps close to them has to be minimised</li><li>vii. The mass associated with implementing electrical isolation would appear to be best located down near the mechanically substantial sources of the cooling straps.</li><li>viii. This is well into the HERSCHEL system and far from the agreed instrument thermal I/Fs.</li></ul> <p>From a mass viewpoint, <b>Spire</b> does not include the mass budget for these items and <b>Spire</b> project resources do not include the design, procurement, test, etc. of strap isolation systems for flight.</p> <p>Finally, but by no means least, whatever the a posterioiri assessment of the above factors, <b>Spire</b> has been proceeding on the basis that this interface configuration is the case for many months, and hardware design of the instrument elements in this area is complete. They are at the DDR stage. The <b>Spire</b> delivery dates would be inevitably delayed if a different approach were to be adopted to these items that are on critical path.</p>			
Affected Items / Work package (Title, Number, Issue, Para)			
Section 5.7.1.2 as per ECR 9	Insert at end of section, “See section 5.10.2 for cooling strap electrical requirements.”		
Section 5.10.2	Ohmic isolation within all straps to the cryostat is baselined, each being >5MΩ and <50pF at the working temperature. Note that this isolation is within the strap system, should not form part of the instrument mechanical I/F itself, and is thus a HERSCHEL not a <b>Spire</b> element.		



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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