Spacecraft / Project	Herschel / SPIRE	**Meeting Place**	RAL telecon
Instrument / Model	CQM	**Subsystem**	L1 interface

CONTENTS

Dates of NRB Telecon's

1st Part of NRB 13/12/04

2nd Part of NRB 5/1/05

3rd Part of NRB 12/1/05 (Concludes NRB)

This NRB has been phased over the three telecon listed above, and the MoM's of each Telecon follows in chronological Order.

Participants		Agenda
Print Name & Company	***Signature Required***	
Chairman Eric Sawyer RAL	Signature Not Verified Digitally signed by Eric Sawyer Date: 2005.01.24 12:56:18 Z	- Anomaly presentation (RAL) - Proposed solution (RAL) - Discussion (all) - Conclusion (all)
RAL Eric Clark Bruce Swinyard Doug Griffin	Digitally signed by Eric Clark Date: 2005.01.27 10:45:02 Z	
Company ESA Carsten Scharmberg		
Company Alcatel Bernard Collaudin		
Company ESA Jan Rautakoski		
Company ESA Gerry Crone		
Company EADS Christian Schlosser		**Additional Distribution**
Company EADS Seigmund Idler		

Action			Title & Description
No	**Responsibility**	**Due Date**	
			Background: During the trial fit exercise, the L1 interface was found to be electrically shorted to FPU chassis. The isolation should be achieved by a layer of Stycast glue and a Dacron net separator. This interface was changed from the Kapton film baseline ref NCR 51
			SPIRE request the return of the FPU so that the anomaly can be investigated and rework carried out. It was discussed if this investigation and rework could be done at EADS. It is considered by SPIRE too difficult to do at EADS.
			Plans for investigation: SPIRE plan to make dummy copper to aluminium interface to use as a tool for investigation. Unfilled Stycast is used as it has the best thermal conductivity at 4K SPIRE will investigate modification of the MGSE so that it does not use the L1 interface for lifting. Investigations will involve removal of the copper strip; SPIRE will attempt to avoid destroying the evidence during this procedure. A similar design of joint is already fitted to FM It was noted that if heat is applied to the joint the FPU will heat also.

			During the return of the FPU to RAL, the JFET will also will be modified so that the proposed “connector savers” will not be required. It was suggested that PACS and HIFI integration can go ahead. It was pointed out by Astrium that this will result in additional work for Astrium. SPIRE estimate that the FPU can be fitted to the OBA with the other instruments in position.
			Logistics: EADS were asked if it would be possible to collect the FPU on Saturday, EADS reply was that this is probably not possible but they would investigate. Confirmed after the telecon that this is not possible. A Fork lift is not available out of hours. Agreed return date to EADS is 17th Jan with L0 straps. SPIRE lifting frame required at RAL, for possible modification. An outgoing inspection to be performed by SPIRE/Astrium

Spacecraft / Project	Herschel / SPIRE	**Meeting Place**	RAL
Instrument / Model	CQM	**Subsystem**	L1 interface

Participants		Agenda
Print Name & Company	***Signature Required***	Tests completed post return Future plans
Chairman E Sawyer		
Secretary		
Company RAL D Griffin		
Company RAL J Delderfield		
Company RAL A Pearce		
Company RAL D Smith		
Company		**Additional Distribution** C Sharmberg, G Crone, Jan Rautakoski, Bernard Collaudin, Christian Schlosser, Seigmund Idler
Company		

Title & Description

Test completed so far are detailed in the NCR.

Reproduced below:
The CQM was returned to RAL on 22/12/04
Left in G56 for 24 hours to warm up to room temperature.
Unpacked and moved into the clean room.
The isolation between L1 and FPU chassis was measured and found to be open circuit.
The L1 strap was fitted and tightened as per the cryostat test set up and left over Christmas (2xM8 and 4xM4 bolts fitted)
5/1/04 investigation continued.
Isolation test on L1 interface – open circuit, L1 strap still fitted at this stage.
Remove L1 strap, bolts and bushes – still open circuit
Lifting frame fitted – still open circuit, frame removed
Individual M8 bolts fitted with washers and kapton tape to protect the gold surface. Bolts tightened – still open circuit.
Individual M4 bolts fitted with washers and kapton tape to protect the gold surface. Bolts tightened – still open circuit.
Applied first 5v then 10v from a power supply, with current limit set to 0.5 A. no current drawn.
Heated copper strap with hot air blower. Resistance reduced from open circuit to 20 MΩ, when the copper reached an estimated 50 ^{0}C, returned to open circuit when cool.

Conclusion.
It is not possible to reproduce the short measured at EADS.

Future plans:

Repeat hot test with 10v power supply.
20M ohm result during previous test is probably due to extra curing of the epoxy. (Resistance does change during the cuing process).
Try exerting extra load by fitting bar into the holes and applying modest side loads.
It is noted that during transport from EADS, storage temperature dropped to an estimated -7 ^{0}C.
It was agreed to do a trial using the now unused MTD (Mass Thermal Dummy).

- Bond a dummy strap to MTD tomorrow, using the same procedure as used on the CQM.
- Leave to cure over weekend.
- Try removing on Monday using the following procedure:
  - Manufacture large 'soldering iron' using large block of copper on steel handle.
  - Heat and tin the soldering iron to solder melt temperature +50^{0}C.
  - Pre warm L1 interface to 50^{0}C.
  - Apply hot soldering iron and wait until it cools.
  - Apply load to handle to detach copper plate form optics bench.

- If successful repeat on CQM.
- Inspect glued joint for signs of thin or missing glue.
- Clean up interface

Replace with new copper plate using thicker glue joint or other TBD method to improve robustness of the finished joint.

Hold MRB continuation on Monday 10/1/05

Action			Title & Description
No	**Responsibility**	**Due Date**	
1	ECS	6/1/05	Repeat hot test with 10v power supply.
2	ECS	6/1/05	Try exerting extra load by fitting bar into the holes and applying modest side loads.
3	JD	6/1/05	Bond a dummy strap to MTD tomorrow, using the same procedure as used on the CQM.
4	AP	10/1/05	Manufacture large 'soldering iron' using large block of copper on steel handle.

Participants		Agenda
Print Name & Company	***Signature Required***	-
Chairman Eric Sawyer RAL		
RAL Eric Clark Doug Griffin	Digitally signed by Eric Clark Date: 2005.01.13 08:59:07 Z	Results of actions from part 2 recommendations
Company ESA Carsten Scharmberg		
Company Alcatel Bernard Collaudin		
Company ESA Jan Rautakoski		
Company Alcatel Guy Doubrovik		
Company EADS Dave Henry		
Company EADS Seigmund Idler		
Company		**Additional Distribution**

Action			Title & Description
No	**Responsibility**	**Due Date**	
1	ECS	6/1/05	Repeat hot test with 10v power supply. Results. Copper plate heated and 10v applied, no current flow. Still OC
2	ECS	6/1/05	Try exerting extra load by fitting bar into the holes and applying modest side loads. Results. Bar fitted and load applied, approx 40N. Still OC
3	JD	6/1/05	Bond a dummy strap to MTD tomorrow, using the same procedure as used on the CQM. Results Completed
4	AP	10/1/05	Manufacture large 'soldering iron' using large block of copper on steel handle. Results Completed.

Actions above carried out, results as indicated above.

Removal of bonded plate on MTD was attempted using the procedure identified previously. Removal was successful, leaving an intact layer of epoxy on the MTD, no epoxy on the copper plate. The epoxy layer was continuous with only a few very small areas without epoxy (less than 2mm diameter). Thus we have established that the removal technique works, on a sample of one, and that the gluing procedure does result in a thin even layer of glue with no significant voids, again on a sample of one.

Despite this successful removal, the SPIRE team is reluctant to carry out this procedure on the CQM for the following reasons.

- Danger of shock loads being transmitted when the epoxy joints separate. No large shock was experienced during the test separation, but the CQM joint has been bonded much longer and may separate in a different and more violent manner. The detector is sensitive to shock, especially at room temperature when the tension in the Kevlar is higher.
- Solder flux has to be applied to the copper plate to ensure a correct soldered joint. The flux will melt and is likely to creep into the joints between the optics bench and the covers. We do not want to separate theses joints for cleaning.
- The joint separated at the copper to glue interface, the glue would still need cleaning from the optical bench.
- Although the separation on the test piece was successful, there is no guarantee that it will be so easy on the CQM. With this procedure, there is no opportunity to stop one it has started. We could end up with the removal tool soldered onto the copper plate which will not then detach from the PFU. We would not be able to heat the tool to desolder.

Questions asked:
Can you test for isolation when in the cryostat? Yes tests can be done at the DRCU connector. This should be done periodically during the EQM test programme, before and after EMC test. This could be done at 128 way connector or SVM bracket if the DCU is not accessible. A 128 way breakout box is available at Astrium, but this means disconnection of all the 128 way connectors.

Could this short have been present during IST? Yes a short was identified but thought to be due to harness not L1 interface, which could still be the case. We cannot say for sure if there was a short at L1.

If SPIRE arrives at ASTRIUM and a short has reappeared. We could use a Kapton gasket for isolation. This would have a significant thermal effect, RAL to estimate.

Plate is already fitted to PFM. Open circuit greater than 30 Mohms.

If short is found after integration, SPIRE agree that the EQM tests should go ahead and accept that the test results may be invalid.

Agreed to use as is.

Leave NCR open until isolation test plan is established.

Redeliver CQM on 18/1/05

NRB Closed