

LAT EMI RELATED ISSUES

<u>DATE</u>	<u>ITEM</u>	<u>ISSUE</u>	<u>STATUS</u>
e Ni PLATING OF Ti			
8/19/2003	1.	Issue between SAI and LAT as to whether or not to use the four flexures as the ground connection between the instrument and the spacecraft. Can the 2.5 mohm requirement be met and keep the inductance low? Any other method would probably infringe upon the thermal impedance at the interface.	-LAT has suggested coating the flexures with electro less nickel which should keep the resistance well below the 2.5 mohm requirement. Still negotiating with SAI. -See item 2.
8/19/2003	2.	The implementation of titanium (Ti) with electro less nickel (e Ni); SAI claims there is a possible contamination issue, while SLAC expert says there isn't. SAI concerns were directed at the use of a commercial plating house.	-Telecon held between SAI and SLAC on 8/19. SAI to call F. Gross (GSFC) to find out if GSFC has any experience with e Ni plating of Ti. SLAC to research the possibility of corrosion under the plating and will prepare a test plan for some samples. SAI will review. -Dr. S. Harvey has written a proposal addressing SAI's concerns. Has been sent to SAI for review.
9/2/2003	17	Do the Ti standoffs for the calorimeter baseplate need e Ni plating?	-Yes. Same as item 2.
e Ni PLATING			
8/19/2003	3.	Electro less nickel on the calorimeter/grid structure; D. Nelson wants to use for grounding. M. Nordby says the design still relies on friction to carry the LAT loads. Friction testing has been done only on bare aluminum and alodined surfaces. Is there value added by plating with electro less nickel, instead of just an aluminum to aluminum contact?	-To be discussed 9/2 at the Subsystem Engineering meeting. -Per D. Nelson presentation e Ni is orders of magnitude lower in Ω/in^2 than alodine. Per M. Nordby presentation e Ni must be tested to establish friction allowables.
9/2/2003	18	For grounding purposes it would be preferred to have the calorimeter boxes e Ni plated.	-Per D. Nelson presentation e Ni is orders of magnitude lower in Ω/IN^2 than alodine.
9/2/2003	26	Plate the ACD BEA boxes with e Ni for grounding.	-Per M. Nordby presentation recommend anodizing the grid perimeter and BEA inside surfaces for thermal purposes. J. Wang to review.

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| 9/2/2003 | 24 | Is there a minimum internal edge radius requirement for e Ni plating? | -Yes. However, for e Ni plating, the surfaces that must be plated are flat. Therefore, this should not be an issue. |
| 9/2/2003 | 25 | Does e Ni have spaceflight history? | -F. Blanchette to check. |

JOINTS

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| 8/19/2003 | 4. | There are gaps in the ACD BEA boxes; no gaskets or flanges (butt joints only). Investigate. | -G. Shibley says they are not butt joints. Need to review box design. |
| 8/19/2003 | 5. | EMI shield is a butt joint design; therefore contact at the interfaces is questionable. | -Discussed with M. Campell and D. Nelson. Various mitigations are under consideration.
-Mechanical Systems reviewing the possibility of adding a "tongue and groove" with an EMI gasket. |
| 8/19/2003 | 6. | Cross LAT plate is a butt joint design also; same reasoning. | -Discussed with M. Campell and D. Nelson. Various mitigations are under consideration.
-See item 7. |
| 8/19/2003 | 7. | Cross LAT plate is three pieces; one piece would be better. Would remove two long joints in the plate and provide better shielding effectiveness. | -Discussed with M. Campell and D. Nelson. Under consideration.
-Discussed with LM; they have no issue with a single plate. Mechanical Systems to look at the tolerance stack up. |

CONDUCTIVE TAPE

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| 8/19/2003 | 8. | Flex cables on tracker are not shielded and connectors are not sealed; do not need to seal connectors if cable is not shielded. 50 micron aluminum face sheet will cover the four sides of the tower; any greater thickness would impact the science. Corners will be sealed with conductive tape. Look into the use of conductive tape on boxes for spaceflight. | -F. Gross (GSFC) will investigate.
-NRL expert says there is no data to say that adhesive will last ten years.
F. Gross supplied vendor and part number info for three acceptable tapes.
Will set up interchange between NRL expert and F. Gross. |
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| 8/21/2003 | 13. | The tracker will use copper tape to seal all the “cracks” in the towers. The Calorimeter also has gaps in their panel joints but say that the use of copper tape is not an option as the adhesive deteriorates in space, and the tape will come loose in a few years. Should adhesive backed conductive copper tape be allowed on the LAT? Similar to item 8. | -F. Gross (GSFC) will investigate. See item 8 status. |
| 8/19/2003 | 9. | 4 in ² vent holes are being designed into the EMI shield. Are these holes really needed for venting? Ruins the integrity of the shield. Applying a band aid to this scenario is not recommended. | -Discussed with M. Campell and D. Nelson. Need to have someone take a look at the necessity of these vent holes.
-Mechanical Systems to review this item. |

CONNECTORS

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| 8/19/2003 | 10. | Are the bands on the connector back shells flight qualified? On Terra had an issue with the bands during vibration testing. Check. | -T. Perry (GSFC) and N. Vermani (NRL) will investigate. |
| 9/2/2003 | 20 | Both ends of the tracker cables have connectors that are not terminated in a 360° shield. | -This should be a moot issue as the flex cables do not have any shielding. Hence, shielding the connector backshells would provide little value added. |
| 9/2/2003 | 14 | Not all LAT connectors are e Ni. Should they be? Some are gold at present. | -Either e Ni or gold are acceptable; no issue. |

HEATERS/RADIATORS

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| 8/20/2003 | 11. | No EMI testing of the heater/radiator arrangement is planned. Emissions from the heaters will not be measured. The converters supplying the power have a chopper frequency of 550 KHz. Cannot wait until instrument level testing to find there is a problem.. | -To be worked.
-D. Nelson doing bench testing with a heater supplied by M. Campell. |
| 9/2/2003 | 19 | Do the heaters need to be shielded? | -Per J. Wang the design is to shield the heaters. |

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8/20/2003	12.	The present design for mounting the radiators calls for the insertion of G10 spacers between the radiators and instrument structure to provide thermal isolation. From the EMI perspective it would be much more beneficial to the instrument for the radiators to be tied electrically (very low resistance) to the LAT structure such that they become part of the LAT ground plane.	-Discussed with M. Campell and D. Nelson. Under consideration. -Thermal to do an analysis of the proposed foil wrap (to provide the low impedance ground connection) over the spacers.
9/2/2003	15	The radiators, at present, will not be on the instrument during EMI testing. For a truly valid test, the radiators must be mounted during instrument level EMI testing.	-To be worked with M. Lovellette.
9/2/2003	16	Heat pipes do not have a low impedance connection to ground. Does the silver impregnated bonding material provide this low impedance path?	-The contact area is 12 in ² each. Need vendor volume resistivity data from G. Lam.
9/2/2003	23	Heat pipes penetrate the X LAT plate and EMI skirt. How are these penetrations going to be sealed?	-Options are under consideration.

BOARD DESIGN

9/2/2003	21	Review board level designs for EMI compliance.	-The board designs can be reviewed for compliance with general EMI board design rules. However, if the issue is whether or not additional filtering is required (for CS and CE), this should be determined through analysis by the board designer.
9/2/2003	22	Calorimeter board may be noisy; there were indicators in the EMI test data.	-Review the design and determine whether or not filters are required.