PACS Newsletter

Nr. 19, 12 March 2008

The PACS Picture of the month

Fig.1: *Pacsi (aka Flocke) definitely set a trend! Or how would you explain the current hype on polar bears?*

Welcome

This edition of the PACS Newsletter comes to you after a little break of ~9 months. Did Pacsi take a winter sleep? Not at all! Many milestones have been achieved since the delivery of the instrument to ESA/Industry. In good PACS tradition many of these steps went remarkably smoothly, but - also in good PACS tradition, you might say - there were a number of nerve wrecking surprises. But do not despair: it is the best of all PACS traditions to overcome inexpugnable obstacles, and so we dare say that PACS is in a good shape right now. With this Newsletter we want to update you on the recent achievements and incidents and provide an overview of the current status.

The Never Ending Concern: Bolometer H-Field Susceptibility

The main mechanism of pick-up is large-area loops in the satellite harness, with the main source of magnetic fields being the current loops in the solar panels. Dedicated EMC test by PACS during IST are agreed with Project to assess possible performance deterioration. PACS agreed to provide a representative mock-up solar panel + drive electronics:

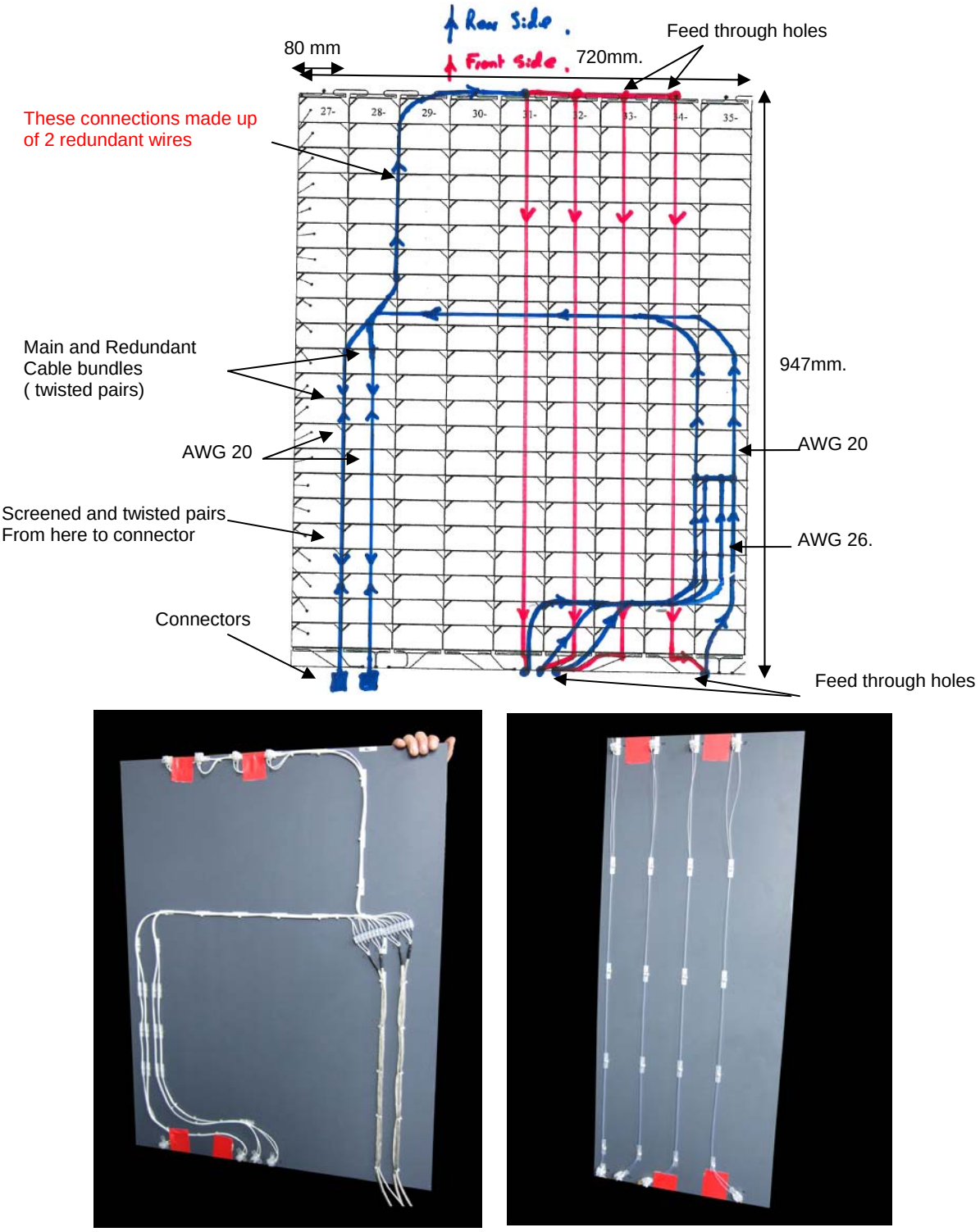


Fig. 2: top: *current current-cable routing on the solar array (SA) in front of PACS. Red: front side, blue: rear side (as would be seen from the outside, if SA would be transparent).* ***Bottom****: the mock-up provided by PACS. Left: rear side (as seen from inside), right: front side. The fingers will be removed before mounting…*

Since the Solar Array (SA) will be installed *before* the test, the mock-up needed to be modified (split up) for a representative test because of attenuation by the SA structure. Project committed to further reduction of interference including harness rerouting, should it turn out necessary.

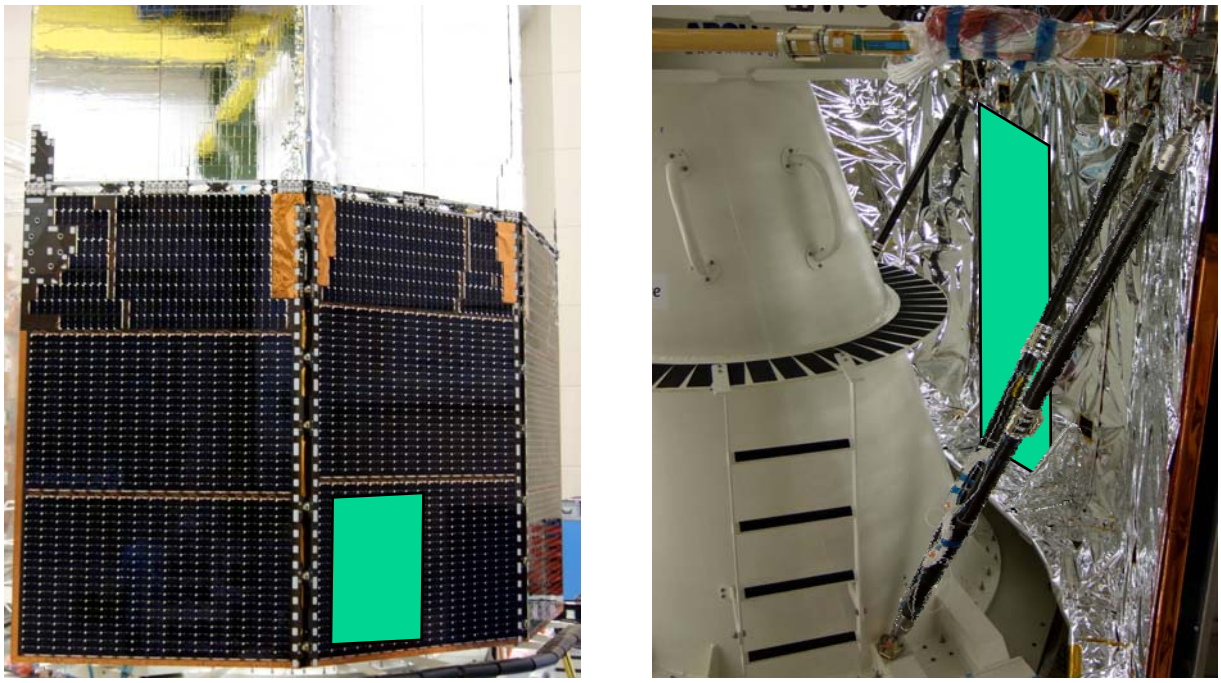


Fig. 3: *Intended position of the mock-up. The inner panel will be inserted/positioned with a boom on a dolly. A fit check was performed on a scaled model @ ASED*

NCR 3714: Supply Group 4 of Blue Ge:Ga Array not Working

During the Warm SFT of PACS on 19 Oct 2007 it was recognised that Supply Group 4 of the blue Ge:Ga array was not working, neither on the main nor on the redundant side. The connector (P01) of the Cryo Vaccum Vessel (CVV) to the CVV feed through was found unmated. As a consequence the related detector group was not powered and did not operate. The corresponding feed-through connector on bracket 211121 was covered through a metallic ESD cap (non-contacting) bonded to the structure.

As a consequence there was no short circuit protection on the affected group during/after PACS cryo-harness mating!

It was impossible even for cognizant engineers to detect this open connection, as the area was covered with a temporary installation, preventing a clear view on this bracket. The non-mated status of the connection J01/P01 on bracket 211121 was caused by a wrong entry in the Log Book of ASED.

After a proper connection of J01/P01 was established the Ge:Ga part of the Warm SFT was repeated: The Supply Group 4 seems to work, but a final confirmation can only be given after the SFT at HeII. An Astrium-external inquiry board chaired by ESA found no root cause for this mistake, but gave a number of recommendation to avoid such events in the future.

NCR 3722: Blue Ge:Ga Array Module 20 Anomaly

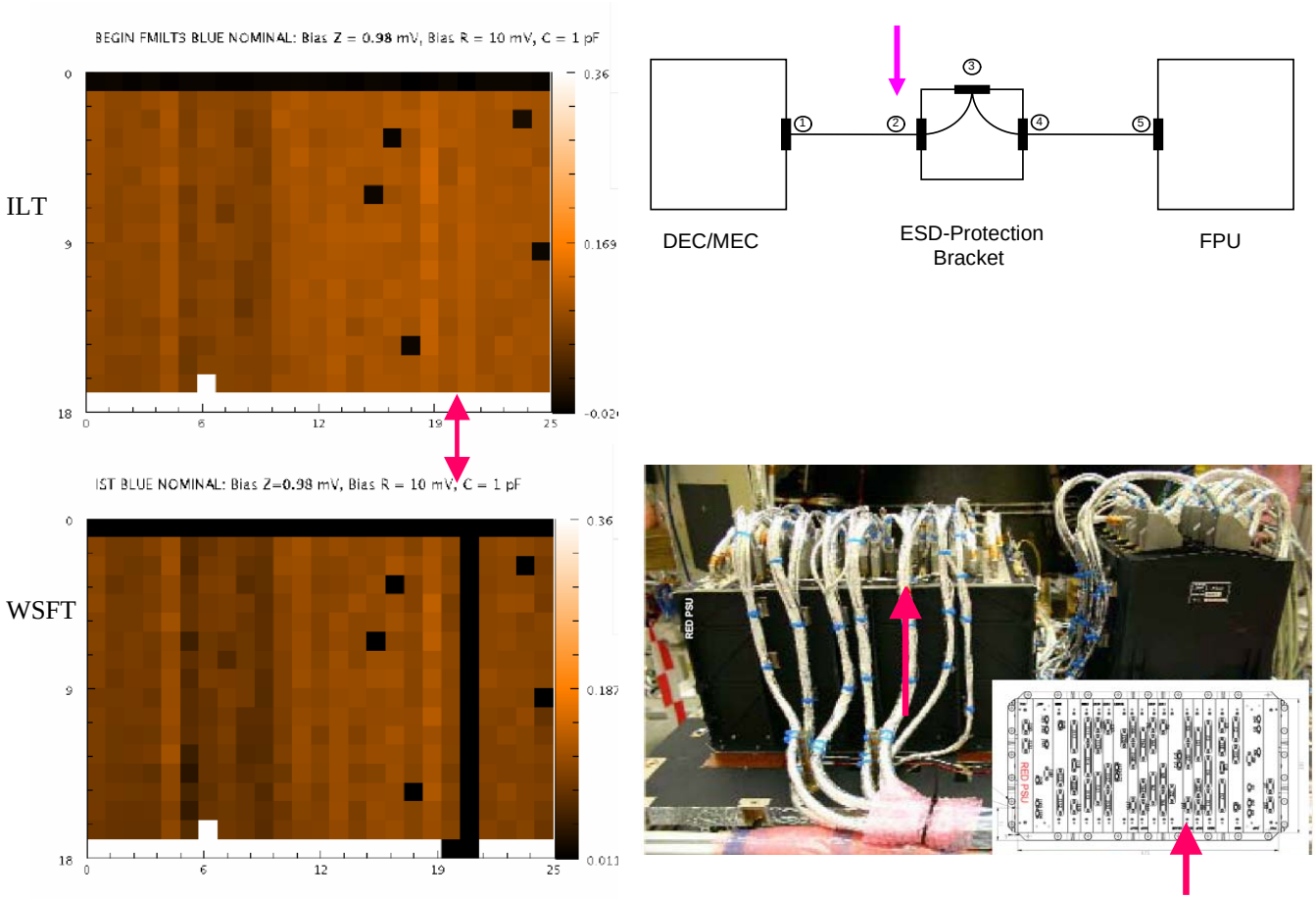


Fig. 4*: the drop out of module 20 at IST, and the potential culprits.*

Module 20 of the blue spectrometer array, which was perfectly functional at the ILT, was found to be completely switched off at IST. After some investigation two options remained as likely root causes, either an opening of the electrical line between **2** and DEC/MEC (see figure 4), or a defect of a DECMEC board (DECDATA-3). Finally a bad crimp in the satellite harness connector was identified as cause.

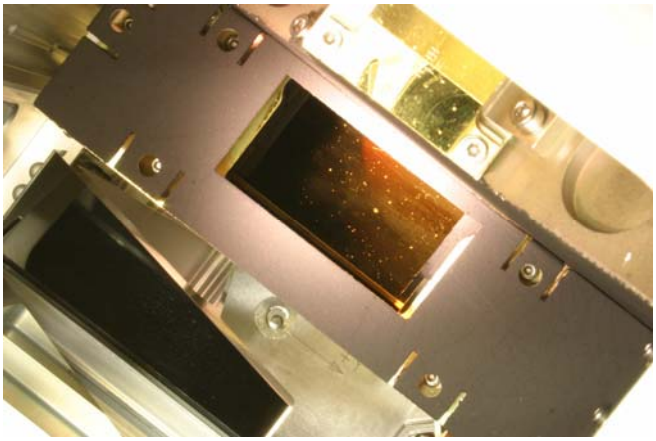
NCR 3743: PACS Mirror Contamination

After Astrium (Friedrichshafen) had mounted the shields over the Herschel optical bench, they did a last check, shining down a flashlight through the hole/baffle in the shields, when they noticed serious contamination, in the form of whitish spots, on the first mirror of our entrance optics. Similar contamination was also observed on an external, auxiliary alignment mirror on top of the PACS structure. A visual inspection confirmed that this was definitely different from the state the mirror was left in before ILT-3. Since the cause of this contamination was unknown, the fear grew that it could be something (condensation / corrosion) that may have affected more/all mirrors in PACS.

It was then jointly decided between Project and PACS to remove the shields for further investigation. Application of a camera with special optics allowed focusing through the PACS entrance optics all the way down to the Lyot stop and to take pictures of individual mirror surfaces. The key initial findings are shown in figure 5 ("Trog1-before" and "Trog2-before"), which showed spots all over the place on the first mirror, but also a strip of contamination on the adjacent, second mirror. The relatively sharp border of the contamination on this second mirror strongly suggested that the contamination must have come from the outside, through our rectangular entrance aperture, and in a rather directional way. This hypothesis was further supported by the images of the mirrors further downstream, which - apart from a few scratches - didn't show any contamination or other degradation of their optical surfaces.

It was then agreed by all involved parties that under these circumstances an in-situ cleaning attempt should be made, to avoid the otherwise unavoidable de-integration of the FPU with all associated risks, like ESD damage of the CREs and other, smaller issues. Indeed, it was possible to perform a wet cleaning process (with de-ionised water and various forms of alcohol) on the affected mirrors with good results - see figure 5 ("Trog1-after"), which even in strong light shows hardly any contamination anymore. What comes out more prominently on the clean surface, however, are lots of fine scratches, which have been introduced by an earlier attempt to wipe off some dust before the ILT. (Note in passing: whatever we have measured in the lab was done with these scratches, already).

After various discussions of the cleaning results, PACS and Project, with the endorsement of the HIFI and SPIRE PIs, decided to "use as is" and close up the cryostat. In parallel, ESA PA/QA tried to get a chemical analysis of the contaminant taken away by the wet cleaning tissue. The final conclusion was that the contamination was external, i.e. must have happened before cover installation, and that it was not a growth of aluminium or corrosion. The chemical analysis revealed that the ESD-proof clean-room gloves that were used cause contamination and mask any original organic contaminant.



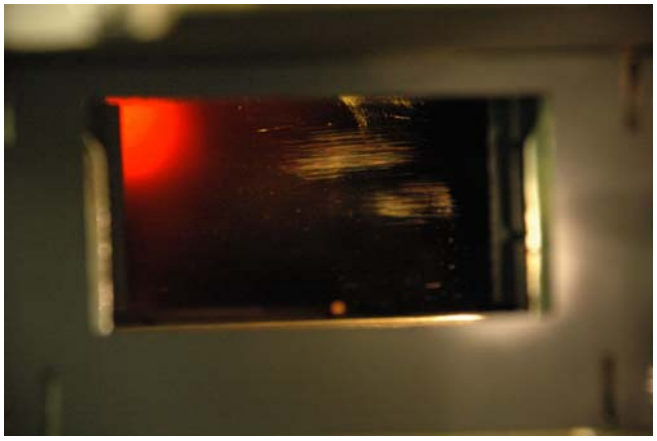


Fig. 5: Left: *Contamination of Trog 1 and 2 mirrors, other mirrors not affected. Above: Trog 1 mirror after cleaning, some old scratches remain.*

Herschel Key Project Statistics

In total, 42 Key Programmes covering a wide variety of research topics were approved (21 GT and 21 OT). The total allocated time for these programmes exceeds 11200 hours of Herschel observing time, corresponding to approximately 57% of the nominally available Herschel routine mission science time. Statistics on the KP call are available at:
http://herschel.esac.esa.int/Docs/KP/KP_Overview.pdf

6118 PACS AORs were requested, i.e. a large fraction of all Herschel observations include PACS. This is a great compliment and encouragement for the PACS team, but it also means we will have to work extremely hard on calibration and AOT validation to fulfill the great expectations of so many scientists. Hey, PACS team: you thought it was hard work to get us here? Well, you ain't seen nothing yet! This is just the beginning…

Fig. 6: *definitely* ***not*** *Pacsi! This polar bear takes a rest – something that would never occur to Pacsi….*

The PACS Number of the month: 5342.4

the total number of hours of PACS observations requested in the successful key projects. Expressed in (earth) days: 222.6

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