



2nd October 2002

To: Chris Jewell

SPIRE-RAL-NOT-001400

From: John Delderfield

cc: Thomas Passvogel, Jürgen Lange, Wolfgang Rühre, Horst Faas.

## Spire CVV Connectors

After I hope putting Spire grounding to bed again and attending the mechanical I/F meeting, I'm back to the harness again. Although it's not as critical as the thermal/vibration level issues, shouldn't we be progressing the harness a bit faster?

There are two and a half options:

- a. 13 x 128 ways as per Spire Harness Definition + Grounding Review Update.
- b. 26 x 100ways as per Astrium's proposal splitting of **a.** harnesses through 2 CVV connectors 2... I suspect sometimes the split can be over all their length and sometimes we get a 4 legged beast, maybe just in the S harness. Spire has yet to see a detailed pin allocation proposal for this option.
- c. Some 15 x 100ways as a fully loaded version of Spire Harness Definition, the detailed pin configurations for which would have to be worked up with support as agreed.

I say two and a half options because c. has largely gone away as a result of the Grounding Review!

Now **b.** is incompatible with only using top ring CVV connectors, and **a.** has certain implementation difficulties as are very fairly explained by Jürgen in what I have attached to the end of this note.

We need to be able to retrofit spares in the case of harness damage. Considering **a.**, although Spire has 13 harnesses, there are only 6 different designs (1, 2, 3, 4-9, 10712 and 11&13). Therefore if 6 spares were made for the CVV internal harnesses we could always have a fitable spare for this most awkward link.

With such a philosophy, how do we get the connector into their CVV wall interfaces down the gap between its inside and the MLI, missing any internal pipes? One answer is shown in Jürgen's information below. Such an approach is only feasible for the top row of CVV connectors.

A better approach might be not to do it this way around but to note that for Spire at least there can be 300mm tails on the FPU ends of the harnesses each with a small MDM connector. It should surely be possible to put in a temporary MLI protection (local sheet of 10thou Mylar?) and to feed the harness through from the outside of the CVV. This is particularly true because unlike the CVV wall connectors the FPU MDMs have to have Faraday shield cable overshield linked 360° on to their backshells which precludes the use of unmodified ISO construction (I would not like to reverse feed ISO style MDM bent plate adaptors back up through the CVV wall to MLI gap).

Now if we feed the harnesses in this direction, we should reconsider three factors. First, can the technique be used for both rows of CVV connectors, permitting the Spire groupings in the bundles to be closer together? Second, can we use a local geometry that moves the CVV wall connectors radially outwards a bit given that they do not now have to be side loaded and kept so flat that they fit down the CVV wall to MLI gap? We know that 128ways can be loaded as Spire designed in this instance, even for

stainless conductors. Third, can we change to scoop-proof series 3 MIL-38999 LJT connectors that are much preferable for integration and I believe RF seal better.?

The best way to consider the feasibility of feeding the harness through from the outside of the CVV might be to try on the old ISO cryostat! RAL is just taking delivery of its manufactured Ground Test harness and if we move quickly I might persuade Dave Smith not to put it into the Spire Test Cryostat absolutely straight away.

The following photographs may prove interesting, and some of the techniques therein could be a useful addition to the ISO-type cryoharness repertoire.



37way sample



128way+Shields

Note that is sort of potting has 4K heritage and is very robust!

Cheers

John

From: Chris.Jewell@esa.int

To: J.Delderfield@rl.ac.uk

Date: Mon, 23 Sep 2002 18:17:18 +0100

Subject: AW: 100way connector solution

Can I forward Jürgen's response to you without having really looked into it. Not the correct thing to do but I can only plead lack of time.

If you have problems in accepting/understanding the arguments given, try and sort it out directly with Jürgen. If still you have problems then we will have to go into the real details with ASED/ESA/SPIRE.

Happy reading

Chris

>-----|

High Chris,

The SPIRE SIH and the SPIRE Test cryostat-harness has been designed by use of 128 contact connectors.

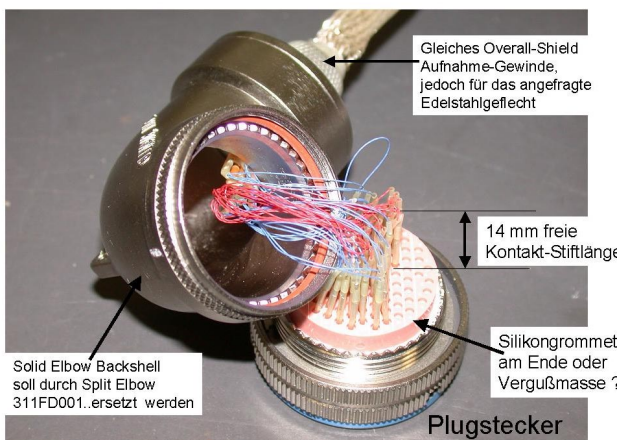
When we reviewed the IIDB issue 1.0 dd: 31.07.01 related SPIRE Harness lists ref. SPIRE-RAL-PRJ-000608, we detect, that man need 156 contacts to be wired under condition of the Cryostat EQM / PFM conditions, see also HP-2-ASED-MN-0112\_SPIRE\_180402, where up to 10 shield-jumper wires have to be connected on 1 contact. [For our design we split afterwards each "alias 128 pol. connector" into 2 connectors accordingly, to cover also the Alcatel spare philosophy requirements.]

During our technical meeting with J.Delderfield at RAL, we have been informed by the SPIRE cable supplier, that SPIRE developed special "Ribbon"-cables, using solid wire & shield cores of manganin, while we in heritage to the former ISO harness and the thermal requirements have to use stainless steel wires and shields.

Further, taking into account the CVV internal geometry, that means the space between the CVV inner wall and the 3 radiation shield, with approx. 30 mm, there was no way to accommodate the wires axial from rearside to the connector (see Folie1.jpg). Therefore we have to use same interconnection method as used on ISO. (see backshell4.jpg).

An: Herrn Kortmann Fa.Glenair

CVV Plugstecker mit Backshell, die dieses mal Mal durch die 311FD001 ersetzt werden soll. Frage war, hat der Plugstecker ein solches Grommet wie hier auf dem Bild zu sehen ist, oder hat er ein vergossenes Ende und aus welchem Material ?



Bitte das Bild nicht weiterverteilen

Astrium Harness C

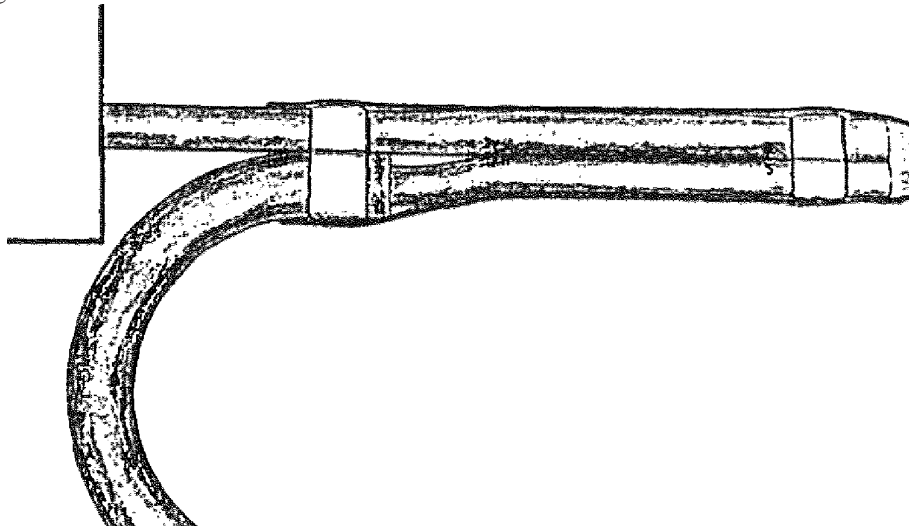
Folie1.jpg



backshell4.jpg

The ISO design foresees that all harness cables are routed from side (90°) towards the connector contacts. The single wires are routed through the solid-wire spills and will be bend by 90° in direction to and close to the contact rear-side end, where they will be soldered.

The contact pitches are small and will be eaten very soon by all the solid wires passing in between, + the needed individual protection sleeves around each solid wire contact + the bigger diameter at the contact-end , covering the soldered SST wire + the wire-pin interconnection by use of a "tube / wrapped coil" around each single contact

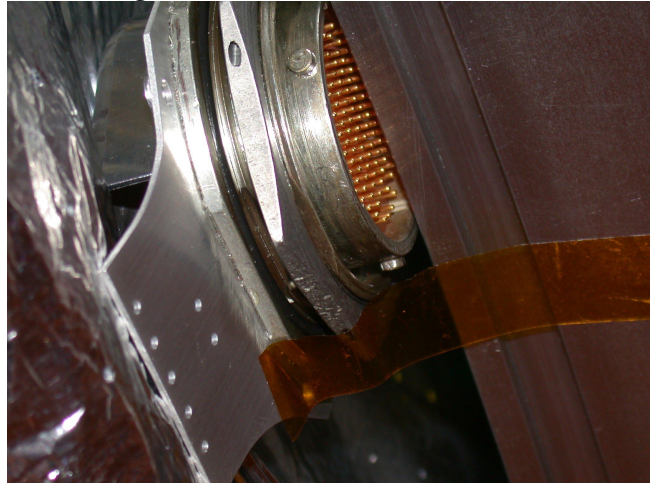


Taking into account the SPIRE SIH Pin-Lay-out and Shield interconnection lay-out required, the connectors would have to have a "shield-ring / plate", with several isolated segments, where the individual cable shield-groups have to be connected to. In addition the Alcatel requirement, requests single contacts / shield (= no shield daisy-chaining) as designed by "SPIRE PRJ-608", see (HP-1-ASPI-PL-0027; GDEL-345).

Such kind of interconnection ring, we tried first to design, but we failed w.r.t. the unavailable space and the possibility to fix such a "shield-ring" when the harness wires have to be routed from the side through the ring first would have to be and afterwards all the welded shield-jumper leads have to be fold back and soldered to the ring. The shield-ring should not have any contact to the "integration protection-cap", which is mounted rearside on the feedthrough connector flange.(see backshell 1.jpg + backshell6.jpg, to fit harness to upper connector ring, the integration protection cap is need)



backshell1.jpg



backshell6.jpg

Another design investigated, foresaw to use Kapton enclosed Multi-layers, like heater mats, which would have to be soldered to the solid-wire contacts by use of waved solder baths, we skipped, when we analysed the developing time and cost of all individual Pin lay-outs. The problem with the from side coming harness we would have solved, but the interconnection of soldered SST cables would have been shifted, but not covered.

Best Regards  
Jürgen

Following our conversation last week on the phone I tried to convince SPIRE that the 128 pin connector solution was not technically a good solution for the CVV feedthroughs. Obviously I have failed to verbally convince SPIRE (probably due to my lack of expertise in this field) and I would appreciate it if you could summarise your arguments for selecting 100 pin feedthroughs in an e-mail or fax.  
Thanking you in advance

Chris

----- Forwarded by Chris Jewell/estec/ESA on 2002/09/12 16:50 ----- |-----+----->

Chris,

Just to reflect back what we said yesterday,

You had received SPIRE's 100 way option comments, and were waiting for the like in writing from PACS and HiFi.

You have agreed to get to the bottom of the 128/100 way question. Last week I took our conversation to mean that 128ways could not be used because Astrium cannot get them loaded. I proposed a work around to this. You responded in another call that 128 ways were not "a goer" because there were other technical reasons why they could not be used.

I requested that you set out the whole definitive list of technical reasons why 128ways cannot be used, so SPIRE can either see the sense in this conclusion or can reasonably request that they be used....they are better suited to the instrument's design.

Looking forward to your working this all through.

Cheers

John

--

John Delderfield,

Rm 1-63, R25, RAL.

Tel:44-1235-446412

[j.delderfield@rl.ac.uk](mailto:j.delderfield@rl.ac.uk)