



To: Gerald Lilienthal

1st September 2001

From: John Delderfield

SPIRE-RAL-NOT-000847

cc: Jamie Bock, Bruce Swinyard, Matt Griffin, Eric Sawyer, Eric Clark, Gary Parks.

JPL SPIRE Interface Drawings

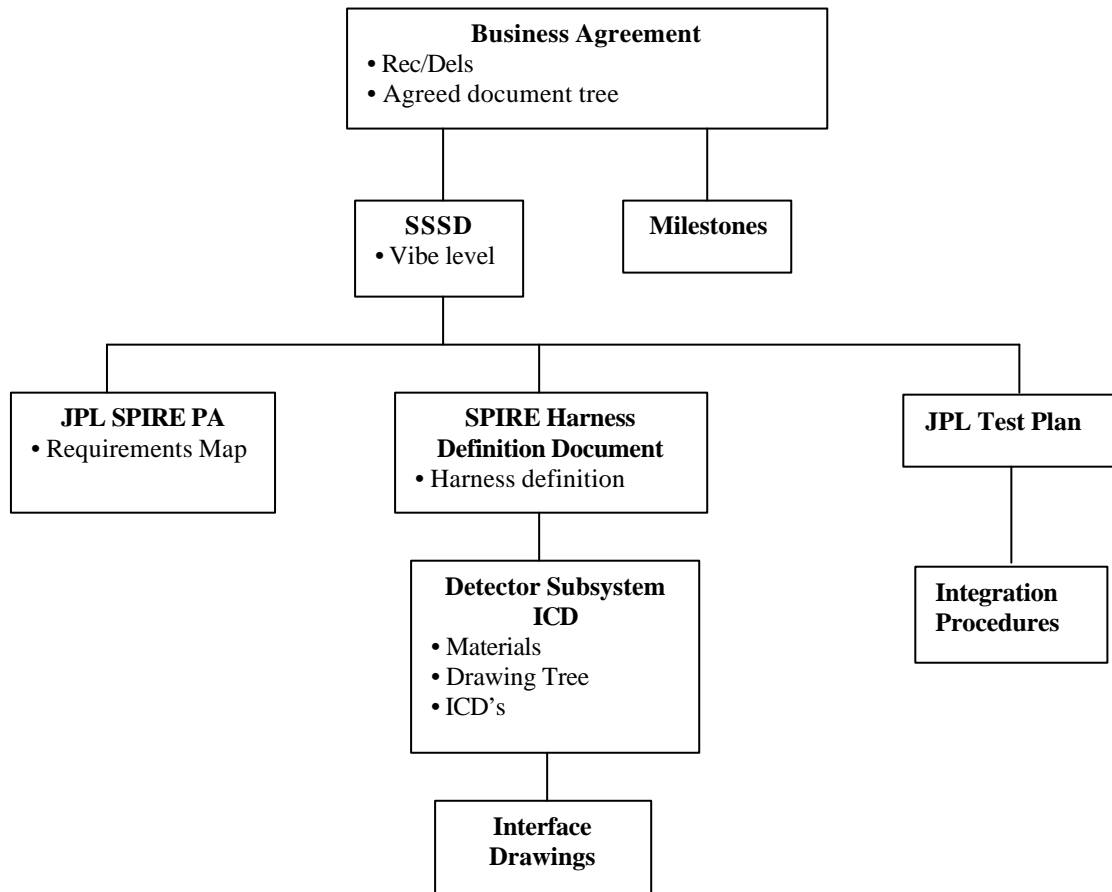
Thank you for sending:

| | |
|------------------|--------------------------------|
| BDA | A1-23835-10209721 Iss A Rev 4 |
| JFET Module | A1-23835-10209722 Iss X2 Rev 5 |
| RF Filter Module | A1-23835-10209723 Iss A Rev 4 |

The state of these drawings is such that they will not be suitable for RAL to sign-off next week unless the rate of progress is significantly increased.

As these drawings need to be under configuration control, they should each have an accompanying change list, in addition to a one-liner in their Issue box, not least because it's the rev. number not the issue that seems to be changing. These change lists were been omitted from what was sent.

As background let me note that the following is agreed:



This adds the slight complication that information omitted from a drawing may be in a full ICD, but I would suggest that if any information relates to position it is always better to see it on a drawing than to try and appreciate what it means buried in text.

I know that JPL has had diffuse responses from the UK. I have raised certain points, but for instance Eric Sawyer has provided ideas about what should be in an ICD with accompanying drawing(s), and maybe others such as Berend have responded also. You should NOT take omission from this note to mean that matters raised via such routes can be left un-addressed.

On 27th April I wrote *‘It was clear that the dimensions for feed-horn pattern orientation and their front position form a crucial opto-mechanical interface for the BDAs. The 1.8K box accommodations preclude rotating the BDA mounting flanges to sort out rotational I/Fs. Please include these dimensions WITH total error bands.’* The BDA ICD has just been modified by the addition of sheets to define pixel I/F position. I have not reviewed these sheets since I think the idea is that they should track Bruce’s latest note on the subject and he has specifically commented on these sheets as follows.

Drawing 10209721 sheet 6

This shows the arrangement of the photometer pixels presumably in the silicon (no drawing title)

General comment - no indication here or on previous sheets as to which way round the detector goes in the BDA housing. This is important for labelling and for spectrometer orientation.

Pitch of column A;C;E8 of LW array is wrongly labelled?

What does DP# stand for? If these are the Dark Pixels then there should be 2 on each array (cf sect 3.3.2.2 of the SSSD)

Column A;C...3 of MW array appears to be at 3.4 mm pitch from column 2 - is this correct or rounding error? Similarly A;C...13 - B;D;F4 - B;D;F8 and B;D;F11

Third and seventh rows of SW are not correctly labelled - so subsequent rows are also incorrectly labelled - should be sequential?

Drawing 10209721 sheet 7

The spectrometer LW array should be rotated by 30 degrees with respect to the (assumed) common interface direction (see notes on "Arrangement of detectors in SPIRE" - a draft of which was sent out 28/8/2001 - and notes on row and column labelling in ICD Contents I sent out 24/8/2001 - both went at least to Jamie)

The pitch of the SW array is incorrect - it should be 2.25 mm not 2.5 mm

The channel location in the array to pin number information is not present (at least not self evidently!)

In a way this is where the good news stops. Unless I've missed something (through there not being change lists!), these are the only sheets that have been substantially updated since the copies we received in the last review pack. I asked for the latest drawings in order to checkout the updates requested on these review drawings! So perhaps I should be very boring/repetitious and try to summarise the open items.

On 27th April I wrote, "*It would be appropriate to have the ICDs show the masses of the suspended and box mounted parts separately, as well as that for each whole unit.*" I still don't find this on the drawings, but perhaps the information is in the document.

I would now extend the previous paragraph to include *C. of Gs., mode frequencies and forms + effective mass in each mode*, as mentioned by telecon.

Also on 27th April I wrote, "*The drawing should apply at working temperature. It may vary from that at room temperature so little that they can be one and the same. If not, either two are needed, or one and a recipe for getting to the other.*" This is in line with ESA's EID-A requirements, an applicable document, although strictly the EID-A is written at the instrument level interface.

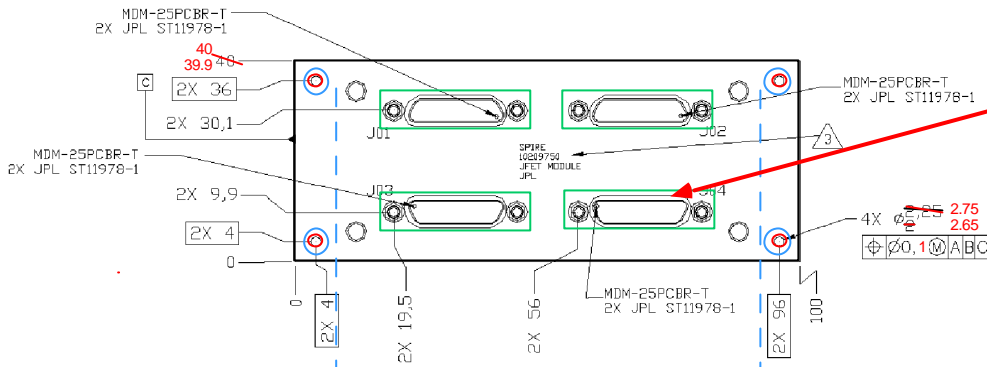
There were two other matters from my note of 27th April. They have been mentioned in certain replies from JPL, and I really do not mind in what form the information is given. The first is that for the BDA I/F to be defined we need to know *a positional error budget* covering: initial assembly, movement with temperature, stability criterion for before/after vibration, sag in 1G, any additional information provided by measurements on the assembly, etc. The second relates to this, namely now much *force the cold plumbing may apply to a BDA: a. during integration, and b. in operation.* From 15th May E-mail comes the additional suggestion that JPL might machine BDA to 1.8K box interface plates so as to provide nominal dimensions for BDA optical I/F w.r.t. its instrument I/F, taking out tolerance build-up including that of the Kevlar suspension...no response received!

Still on BDAs, my note of 8th August highlighted the need to *show how the harnesses are secured around the BDA rear bodies.* The wall thickness being small, Dustin pointed out direct tapping for set-screws was inappropriate, but I proposed a solution to this. There's also the need not to chaff harnesses on sharp corners. As queried several times in the past, we need to *ground the BDA 300mK invar to signal ground carried in the harness.* On 28th August his detail was re-queried with Leonard Husted.

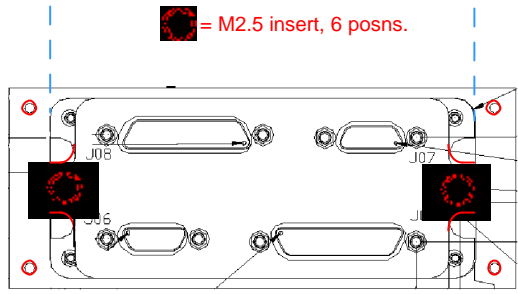
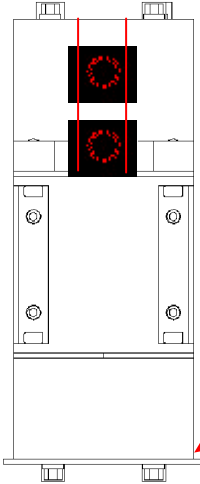
A related matter is that I think Berend still has to do the detailed routing of harnesses F1-15 to plates laid out as I suggested on 8th August and to pass the lengths/radii to JPL.

Almost lastly, but certainly not least, there's the matters about JFET boxes and filters as also raised in my note of 8th August and addressed in subsequent E-mails. Unfortunately, as mentioned above, I see no resulting drawing updates. *Comments as per BDA about C. of G., inertia, mass, etc. also apply to these items.*

From my note of 8th August, edited to take account of subsequent E-mails, we have:



As I understand it, there are rear-bulk-head mounted plug connectors on bot ends of this unit. Please add a note that the "Walls have apertures sized such that, when assembled with worst case PCB to wall tolerances, the rims on the socket shells will be able to pass through these apertures, giving full connector mating." or some equivalent wording.



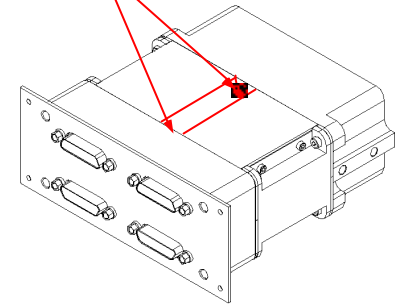
Red shows changes for M2.5 mounting.

Need small amount of extra material on rear web to stop thread insert breakout.

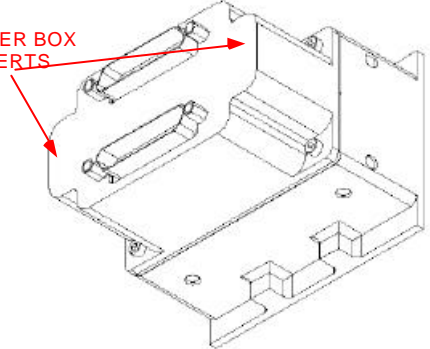
Blue construction lines show front face can be left unchanged, but I've made module's width downwards only to keep a 40mm rack spacing.

Rmax 0.25 typ
Rmin 0.2 typ

To meet spec, on distance between fasteners when holding RF seal along the unit's two dividing walls. One soln. would be to add 4 fasteners like the two shown. Please specify JPL choice.



ONLY CHANGE TO FILTER BOX IS PAIR OF M2.5 INSERTS



The items in red need to be addressed. It has been clarified that if non-isometric or UNC thread inserts are used, JPL needs to supply the fasteners, shown by a note on the ICD [and tool to fit heads if non-standard]. This drawings has always shown in red that extra material will be needed to accommodate M2.5 inserts in the JFET modules. We have also discussed thread depths and positional tolerances. If only M2 can be fitted so be it...but not M1.6 please. Also specify mounting fastener tightening torques.

Regarding the R.F. filter modules, the comment about wall cut-out sizes for the connectors applies as for the JFETs. The modules appear to be 1:1 wired (sorry about my earlier comments to the contrary) but their connectors are TBC. Please make socket facing towards CVV and plug towards FPU items. This will save track cross-overs, permitting suggested linking and mean, I hope, that we can test if necessary with harness either side of a filter unit just plugged together.

Now let me make a new comment, although I did raise similar one a long time ago. We need the MDMs to mate really well at their I/Fs to keep out R.F. This means pulling the mating shells into contact leaving the columns around the fastening screws just not touching. The drawings do indeed show the shells projecting past the column tops, but the vital plane of the shell tops is undimensioned. Add toleranced dimension by which MDM shell

centres project past fastening column tops. There's a variation on this in which a gasket is added around the plug on to which the socket presses. *Will JPL be fitting an MDM gasket to work at 4K?*

Another interface is the rate of change of temperature/pressure, as will have been tested with margin during unit qualification before delivery. Insert this information as text in ICD, but *show vent port on diagram.* Needless to say, the JFET modules will need internal porting to avoid blasting out the silicon nitride membranes during pump-down.

Can we have the options for *potentially dividing the detector biases in the filters?* System noise considerations would suggest that this is beneficial.

As questioned in the Harness Definition Document, we still need to know how the *BDA 300mK temperature control bias and signal channels* come out of harness F12 and into associated JFET unit HSJFP12.

I recently sent to Jamie asking what *the arrows to "JFET module EE" mean on the BDA wiring schematic,* labelling them X on my drawing. No reply yet received.

Given the new unjiggled layup of the 300mK to 1.6K Kapton, what is *its estimated track/track capacitance* and as also recently queried *what should be the dB/dT limit* for BDA magnetic pick-up...invar having lost just about all of its permeability and thus magnetic screening effect at 300mK.

So, to conclude, there's a good number of outstanding I/F items shown in italics that have yet to appear in ICD or interface drawing change lists, and hence for them to be ready for sign-off.

Best regards

John