

Minutes for AMiBA Engineering Telecon

Meeting Date: 18-Sept-2003

Participants:

Australia: Mike Kesteven

USA: Bob Martin, F. Patt, Derek Kubo, T.H. Chiueh, Kyle Lin, P. Ho

Taiwan: Huei Wang, C.T. Li, H. Jiang, West Ho, P. Shaw, M.T. Chen

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Minutes Recorder: C.T. Li

[previous weeks comments](#)

I. New Action Items:

AI-18Sept03-1: Bob - Re-visit the testing of phase shifter in a month.

II. Previous Action Items (still open):

AI-14Aug03-1: Warwick - Become directly involved with offset issue (assigned by Paul H.)

Kyle - Do not have new result yet. Aimed to do some test on Friday. Have forwarded last week's result to Warwick for comment. If the offset is less than 100, we haven't had a conclusion.

Derek - Under the assumption that large fraction of offset could be from AMing of phase switched LO. There might be another un-related offset source that we don't know yet. Plan to purchase one PIN diode attenuator by General Microwave that works at 21 GHz. We can even do that suggestion that Jeff Peterson mentioned last week about open-loop tuning of two levels using a synchronous 44-88 vs TTL pot. Try to balance out two manually with a pot. Try to go for the zero offset. Find out where we are with amplitude.

T.H. Chiueh - It's probably because at that more offset regime data is very difficult to check. It becomes very noisy when you read from the power detector. That leads to the scattering data. Tried to replace the noisy detector with a better one to characterize the power level.

Kyle/Derek - Have taken some data about the offset. Will send the latest results to Warwick for further comment.

Kyle - Don't have new test results yet.

Warwick - From the recent test results, which show quite large RMS (~ 400), it seems correlators have been driven very hard, that might cause the non-linearity in the correlator. Suggest testing the offsets with different IF power.

Kyle - Offsets also changed as swapping two IF inputs with the same IF power.

III. Closed Action Items (as of this meeting):

IV. Miscellaneous Discussions:

MMIC:

Bob - Received residual chips (Sandi's design) today.

Huei - Those are LNA chips with the same design as that we're using right now. TRW tested them already. Will be out of country for three weeks. Hopefully the export license has been approved after coming back. In the last proposal, after receiving the chips, it will take about 9 months for testing and re-designing the chips.

Warwick asked about the possibility of using WIN's foundry. Haven't had further discussion with him. Liked to discuss with him after coming back if Warwick needs some discussion.

Receiver:

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Ming-Tang - Vacuum windows supposed to come in this afternoon. Try to set up to test these vacuum windows. The 1st receiver is coming together. Did the cold alignment tests. The movement of feed horn at 18K is less than 0.1mm (in the transverse direction) after several thermal cycles. We should be able to finish (and ship) one in the end of this month. Like to keep one in Taipei for testing receiver electronics. We're working on the next 3 cryostat parts. Expect to have major cryostat parts coming in in mid Oct. if all the POs go through in these days. For the testing of the phase shifter, there were 2 vacuum feedthrus missing as Ted and Johnson tried to put together parts. We are getting a compressor for the test dewar. It is confirmed (more or less) that the noise coupler we have doesn't work. Have made some change on the design. Try to fabricate a similar device in Taipei and test it.

Ming-Tang - have new feed horns and vacuum windows coming in next few weeks (vendors sent them out few days ago). Like to test the new quartz vacuum windows. Have cooled down receivers with plastic windows, looked for alignment change. It seems that we're able to make it stable during cool-down. Not sure if it's necessary for each receiver to get through thermal cycles. Received 3 more OMTs in Taipei. Should be able to ship receiver(s) by the end of Sept.

Eugene - Have 7 mixers ready. Need Johnson to wire-bond more for 7 elements.

LO/IF:

Derek - What is the plan to do with the problem that LO at 42 GHz having AM on it? Have been working on automatic leveling approach. If that's the approach we choose, we have to modify the production hardware to accommodate that.

Ming-Tang - Will check with Prof. Chu whether there is a mechanism to adjust amplitude.

Ming-Tang - Got two IF/LO modules from Prof. Chu. Reviewing their documents and will feedback to them. Will perform some tests with these two modules. Production LO source will come later. Currently use a synthesizer to generate the 21 GHz signal. Had machine shop to make another set of (stiffer) supporting structure for IF/LO modules.

Correlator:

Derek - Received assembled DC amplifier boards. Start to integrate with correlator modules. Will send them to Taipei for full characterization. Distributed schedule around and received comments from Ted and C.T. Will ask Ted to generate a one-to-one model for correlator frame to try out on platform. Estimated that we won't be able to have hardware here in Hawaii end of February or March. Plan to have one-month integration and testing in Taipei before shipping to Hilo.

C.T. - Will urge Mark to sub-contract all the PCB assembling to the outside firm. Might be able to deliver those products one or two weeks earlier. Also received a quote from Wisewave for MMIC packaging. The cost is within our budget. We are going to have more detailed discussion with Wisewave to package the rest of 33 units for the 7 elements. The delivery is 4 to 6 weeks ARO. That also solved the man power problem for MMIC packaging.

Derek - Received the remaining of Marki modules. We have all 55 modules now. Fully assembled DC amplifier boards were shipped yesterday. Will integrate the board with its housing and put them together with correlator modules. Will power up the DC amplifier, adjust the DC offsets, then ship them over to Taipei. Waiting for some parts (pads) for 1st section IF modules.

C.T. - Looking for outside vendor to sub-contract the MMIC packaging for the rest of 30 units. Finished the schematic designs of 2 interface cards between data acquisition card and tp, xy modules, as well as readout boards. Still have 3 PCBs left for schematic design, including 2 back planes. Wish to finish it by end of this month. Got processed readout boards back. Mark is putting together one unit. Also have Prof. Chiehuh's (EE) student test the new batch readout chips. They worked as designed after taking few set of data.

Ted - Have sent out another drawing of a quad pack correlator frame with tighter tolerance requirement to machine shop.

Platform/Mount:

Bob - With the mount/platform assembly, Vertex sent out a new updated schedule. Trying to make all the assembly, testing, and everything, and shipping in the middle of December before that Christmas shutdown. A little concerned how many items are cracked together tightly, not sure that is realistic, e.g. packing and shipping in one week. Will talk to them to figure out how they do it.

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Calibration System:

Ferdinand/John Payne/Jeff Peterson - Will generate a pdf file describing the noise injection / calibration system for Paul Shaw to post it on the web that everybody can look into that and comment on it. The whole thing has become possible because of high-power, noise-wise? Transmitter, centered around wavelength of 1.5 micron. If you take that and shot it onto a photo-detector, then you get a broadband noise output over the range the photo-detector is designed to cover. With the output of photo-detector matched to a WR-10 waveguide, you got a potentially appealing calibration source for projects like AMiBA or ALMA. NEL (sub-company from NTT) will start marketing the photo-detectors. The pre-production unit is about \$27,000 per unit. The price will drop drastically when they go to production. Digital data communication bandwidth is now 60 GHz. Discovery Semiconductor in New Jersey offers photo-diodes with a 60-GHz data bandwidth. Have two of these components in Hilo from Germany, which have V-type connectors on it, then V-type to WR-15 transition, then WR-15 to WR-10 transition. That would be our first test. What RAL in Cambridge actually does is that they take the square-T? detectors apart, then put an E-field probe on the diodes. Fix-tuned back-short might be desirable for our uses. We are not power starving. Wait for the polarization scrambler. Just to see if it works, we can go up the mountain and hang the probe over the 30-cm dishes. Would like to see if V connectors with 60 GHz bandwidth photonic detectors actually work in W-band.

DC Power/ Distribution:

Homin - Plan to mount the DC converter board in the opposite way. Joshua is making custom-made heat sinks that can be attached to the box. The last step would be to put a shield around. Once the DC converter board is reversed, the PCB will likely act as a shield. Finished the design of (receiver) back plane. Need to verify if the I/O ports of cards from Australia as designed. If so, will make another batch of back planes. For the layout, move some of the analog connectors to the central, far away from the DC converter. For back plane mounting, the new back plane will have two options to fit in either VME? Standard or Eurocard standard by cutting the board short along the V-groove.

Enclosures:

Site:

Ferdinand - received another quote (for Clofer?) for the site excavation. Called number of other contractors this morning. Would like to have few more numbers from one particular contractor about the excavation. But he doesn't answer the phone. Will try later this afternoon.

Bob /Ferdinand - Had more discussion with the architect and how to set that in line. Filled out the PO with Neil Harrison. Got hooked up with an interested contractor. Took him up the other day. Will meet with him tomorrow morning and go over the cost and detailed information. Sent out electrical drawing to Paul Shaw for him to circulate around.

Dishes:

Ferdinand/Bob - Located most of the parts for testing. Ming-Tang will bring back one of the 90 GHz Gunn oscillator. Talked to Pierre about finding out the total weight we can put on back of Antenna 8, behind the shutter. Asked him to think about what would be involved and how the 60-cm antenna could be mounted into the plate. 60-cm dishes will all be delivered to Taipei soon. Received surface measurement data from Ted. Do not ship them to Hilo until Nov. that we have to pack them up and move them again to new building.

Ferdinand - For the testing of 60-cm dishes, have an idea how to test our dishes by using antenna 8. The idea is to mount the 60-cm or any other dish behind the sub-reflector, with the transmitter on Subaru. The distance between antenna 8 and Subaru is couple of hundred meters. We are somewhere in the far field. Have to build a mechanical structure to hold the dish, feed horn, LO, down-converter, maybe a second down-converter, and a total power detector. Then bring the DC power down, feed into antenna data system. All the softwares are there for beam map. Will have antenna 8 for 2 to 3 weeks to do this.

2-Element Prototype Issues:

Schedule: