

Minutes for AMiBA Engineering Telecon

Meeting Date: 25-Sept-2003

Participants:

Australia:

USA: Bob Martin, M.T. Chen, F. Patt, Derek Kubo, T.H. Chiueh, C.J. Ma, Kyle Lin, P. Ho, Jeff Peterson

Taiwan: C.T. Li, Robert Hu, H. Jiang, P. Shaw, Eugene Hwang, Johnson Han

USA Dial-in = 1-800-653-5390, 6668081#

Minutes Recorder: C.T. Li

[previous weeks comments](#)

I. New Action Items:

AI-25Sept03-1: Bob/Huei - Figure out our obligation to those residual MMIC Bob received. Are we supposed to get back to Todd Geir or not? Are they residual extra, or we're supposed to send somebody to Todd to package them?

AI-25Sept03-2: P. Ho - Review all the specs as much as we can, and collect them into one place so that we can look them up.

II. Previous Action Items (still open):

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

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

Derek - Checked the PIN diode attenuator, which is only spec for 48 GHz. Tried it at 21 GHz yesterday on ML. In fact, it does work still, a little bit lossier. We can still control the attenuation. Ended up connecting the TTL phase signal to a solid-state switch. Was able to manually set the feedback circuit using a pot to control the attenuation, synchronized with the phase switch. We are actually able to level out the AMing from 21 GHz LO of the receiver 2. We were able to get very close to 0dB difference between the two phase states. We did find another problem, which has to do with the latency that is created inside the phase switch. We can solve the timing issue by blanking. There is a un-usual offset that happens when we have offset below 50. It's possible that this is another source of offset.

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.

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

IV. Miscellaneous Discussions:

MMIC:

Bob - Received residual chips that will not be shipped to him. Ferdinand has ordered a desiccator to put them in. They are sealed in anti-static wrapping.

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-

Minutes for AMiBA Engineering Telecon

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:

Ming-Tang - Got the quartz vacuum windows. Found some error there. We specified to have window thickness of 2mm. They came in as 3mm. After Talking to people in the factory (Thomas Kieting), the coating they put in makes it thicker. We have to modify our clamps to accommodate it. About 2 or 3 pieces, the coating at factory e-laminated? We are going to send them back to replace them.

Todd Gaier just found out that in this batch of LNA, they used slightly smaller DC bias connectors. That actually caused the problem we found on 2 amplifiers - the connectors are loose. He suggests curing the problem by putting some epoxy. Todd also found that in their bias circuitry, they made a mistake by not putting 2 bypassing capacitors. He is investigating whether this is going to affect the performance. However, we didn't find anything peculiar from our room temperature tests. Another group using these amplifiers also reports it's OK. Will do some tests in Hilo to close on this issue. The time for Todd to fix these problems will be a few days if we are sure this is a major problem.

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.

LO/IF:

Ming-Tang - Homin and Joshua found out that the IF/LO module is getting pretty hot after turning it on over-night. The outside temperature gets up to 50 degrees Celsius. Asked Prof. Chu's suggestion on this. During the week, Joshua has put a fan outside the module, reducing the temperature down around 30 degrees. One simple solution is to find a place to put more fans.

For each module, the relative phase difference between channels is 90 degrees. But the absolute phase change in each channel is different.

For the future maintenance of these modules, we need more detailed documentation if Prof. Chu prefers us to do it. The current documents only including assembling and performance. Operationally, we prefer to have one or two extra modules. If we found something suspicious, we can swap the entire module.

Jeff Peterson - Changing the overall phase of one of the Los, it is changing the phase of interference pattern on the sky. We find that phase basically by using the lag in the lag correlator.

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.

Correlator:

Derek - Finished integrating 14 Marki correlator modules with DC amplifiers. Power them up and align the pots. We found one defected module of 39 - lag 4 has diodes that were not responding. Turned that back to Marki. Still waiting for covers from the machine shop. Will send 32 Suhner SMA-BMA connectors to Taipei. Ted has agreed to design CFRT bracket. Asked him to do it in parallel. Ted sent out the quad pack for correlator frame for manufacturing. He also designed the enclosure.

T.H. Chiueh - For the production correlator module on prototype, the lags are not what we expected. What's been found was that the delay (phase?) between lag 1 and lag 4 is not 270 degrees, rather it's 90 degrees. That means that somehow most of peak power on the correlator shifts from 10 GHz to 3 GHz. On the other hand, for the engineering model, with the translation stage, adjacent lags differ by 90 degrees in fringe.

If you do a "zero-delay cross correlation", in other words, you take the time string data of lag 1, multiplied by the time string data of lag 2, with no delay, then sum them up, treat them as vectors, do the inner product. One would see a very huge response because they are basically the same noise. It turns out when you do this kind of zero delay cross

Minutes for AMiBA Engineering Telecon

correlation, lag 1 and lag 2 have response, lag 1 and lag 3 have smaller response, and lag 1 and lag 4 have even smaller response. That means that the noise for different lags are not coming from the same noise. The data dump is 2.2Hz. You integrate for 0.5 sec, then you take a dump. You compare the RMS of this 0.5 sec integration.

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.

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.

Calibration System:

DC Power/ Distribution:

Enclosures:

Site:

Ferdinand - sent out the update for site yesterday.

Bob/Paul Shaw/Paul Ho - Will schedule a meeting for detailed discussion about whether we're going to send people from Taiwan. Will talk to Bill Liu and Jerry for the possibility. We're running out of budget. We have to look for places to save money. Site is the only area where we haven't committed money. There is no other area to look for saving. We are projecting short fall of 6 or 7 million NT\$.

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.

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.

2-Element Prototype Issues:

Schedule: