Meeting Date: 12-Sept-2002

<u>Participants:</u> <u>Australia:</u> W. Wilson, M. Kesteven <u>USA:</u> D. Kubo, M.T. Chen, B. Martin, J. Peterson, P. Ho <u>Taiwan:</u> C.T. Li, H.M. Jiang, W. Ho, C.C. Han, T. Huang, K.Y. Lin, Y.J. Hwang, C.J Ma, Y.J. Hwang, P. Shaw

#### I.<u>New Action Items:</u>

- 1) DC Power Routing on Platform >> Homin, Derek: Generate a spreadsheet of DC voltages and current necessary for each box.
- Optical Telescope >> C.J. Ma, K.Y. Lin: Now will be a good time to work on the installation and test of the optical telescope. Please make arranges for travel.

#### II.Previous Action Items (still open):

12sept02-4: Prototype Mount >> Ted, Ferdinand: Ted to finish/send the counter weight drawing, Ferdinand to have it fabricated at Dayton Jackson in Hilo.

Ming-Tang mentioned that the modified mount still appears to be top heavy but the counter weight receivers should help. Counter weight documents were taken to Dayton Jackson yesterday for his review. Dayton is reviewing this design to see if he can do this using his stock material. Design may be modified based on Dayton's feedback. IN PROCESS.

12sept02-5: 60 cm Dish >> Ted, Philippe: Prepare contract to Dr. Ong.

Ted still needs some time to check the final document. IN PROCESS.

6) ML Network >> Derek: Has network dropout issue been solved? Talk to Darryl about this.

e-mail from Ferdinand sent after the meeting:

Derek, I talked with Darrel yesterday on ML and asked him about the Network dropouts. He mentioned that the connection is working fine and that Verizon must have fixed the problem. He was happy with the speed of the line. He also mentioned something about the new IP-addresses and you already have them in your last email. Ferdinand

This action item will be closed after discussion at the next meeting.

On a related note, Darryl has asked whether we would like to have DHCP. Mike K. answered with "definitely yes". Please also note that we have been assigned a new set of IP addresses (see below).

7) ML Network >> Proty, K.Y. Lin, C.J. Ma: Bob has asked that a material list be generated so that we can easily identify and order the network hardware.

See e-mail attachment below from Proty. This action item will be closed after discussion at the next meeting.

15aug02-3: Prototype Schedule >> Bob: Bob has generated and distributed a schedule of activities. Proty asked that network activities be added to this schedule. Ming-Tang also added that names be added to each task.

Bob will provide a simple schedule with by the next meeting. He will include names and approximate time frames for their stay in Hilo. Currently plan for construction and assembly to be complete by early October, sky tests to begin in November.

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

1) Prototype Hardware >> Ming-Tang: Call customs broker to find out status of prototype shipment.

Ming-Tang and Ferdinand went over to the CSO lab and cleared out space last week. This week they took a look a the 7 prototype boxes and commented that they appear undamaged. These boxes are presently in the CSO lab. <u>COMPLETE.</u>

2) Prototype Mount >> Ferdinand, Ming-Tang: Pickup octagon from Dayton Jackson and re-assemble on ML.



Ming-Tang, Ferdinand, and Jackie picked up the upper octagon from Dayton Jackson on Sept 10. The 3 of them managed to install the octagon onto the mount with the aid of some helpful ML employees. <u>COMPLETE.</u>

3) Prototype Mount >> Ted, Homin, Jeff: The rotary table is broken and needs to be replaced (see Homin's e-mail below). Before replacing, Bob asked to research the possibility of going to a motorized design. If the motorized approach requires only simple modifications then we can proceed in that direction. If it's complicated then we will just replace the damaged table as planned.

Ming-Tang mentioned that the small allen screw adjustment on the bottom fixed the looseness/backlash problem with the worm gear. It was also mentioned that the hand wheel (clock drive) at the bottom was difficult to turn. It was not known whether this was caused by imbalance (counter balance not installed yet) or by some unknown friction. Jeff P. mentioned that a clock drive motor could probably overcome this resistance because it will be geared down for slow movement. <u>COMPLETE.</u>

8) Correlator >> Derek, C.T.: Jeff Rapadas will be shipping a packaged mixer to us on Sept 13. This mixer will incorporate the ~6 dB pads. Derek will instruct Jeff to send it directly to Taipei to save time. Bob has asked us to prepare a test plan on how to evaluate this mixer.

Jeff R. has informed us that the packaged mixer delivery will be slipped until Sept 27. He will be delivering 2 mixers, one with the ~6 dB pads, the other without. This will allow us to perform a direct comparison between the original Device Technology, biased Marki, Meridian w/o custom pads, Meridian w/ custom pads. See input below for mixer test plan. <u>COMPLETE.</u>

<u>15aug02-1:</u> Platform >> Bob/Philippe: Complete bidding package for the platform. Bob has circulated 1<sup>st</sup> draft to Philippe, Ted and Paul(?) for comments. This action item will be closed when it is agreed that the bidding package is complete.

Bob has received comments from the team and has incorporated them into the final document. This document has been sent to Paul S. for distribution to the vendors with a request to reply by early October. <u>COMPLETE.</u>

<u>15aug02-4:</u> Prototype Mount >> Bob, Philippe, Ted, Ferdinand: The modification to the mount is presently in process at Jackson Machine works in Hilo. It is expected to be completed at the end of August. Open items:

- b) Ferdinand/Ted/Ming-Tang to investigate and solve "loose worm gear" issue. Problem solved.
- c) Bob/Ming-Tang to determine where to mount the various components on the mount (should not be a problem). Tentative locations determined.

#### IV. Miscellaneous Discussions:

<u>Prototype Mount:</u> Mike asked whether the optical telescope with physically interfere with the translatable noise source assembly. Ming-Tang said the optical telescope will be mounted below the translatable table assembly so this should not be a problem.

Baseline is East-West direction. Alignment of mount will be discussed in the science meeting.

<u>Correlator</u>: Jeff Rapadas is currently working the mechanical issues of the correlator module. He is having some concerns about the blind mate BMA connector we selected. The pin diameter is large at 0.050 inches which is several times larger than is microstrip trace on for the power divider. He may have to make a transition substrate.

The current schedule for the 4-lag correlators is October 31 (ship date).

We are modifying the correlator frame to reduce the vertical height dimension to ease the requirements of the platform design. This unfortunately requires C.T. and company to design a new custom 4-way power divider for the rear 3<sup>ml</sup> section assemblies. The front and rear power dividers will now be of 2 different designs.

C.T. asked about the parts status for the  $1^{st}$  section. Still to go are the slope equalizer, LPF (ordered 5 for prototype, need 14 + 2 more), various pads, coax cables.

C.T. asked about the status of the DC amplifier board. Real board layout has not begun yet. Derek mentioned that we have dropped the demodulator from the design and Warwick commented that this was probably OK. This board is fairly trivial so we probably can modify it later if need be.

Vertex CDR will be held in Taipei on or around Dec 10 of this year. Bob suggested again that we prepare to present our designs at that time. Paul Shaw asked whether long lead parts for the 7-element system will be ordered before this review. Answer is yes, we

have already begun some of these orders (I.e., we are not waiting for the CDR for design consensus).

Someone brought up the issue of assembly labor for the 7-element hardware. No answer to this issue at this time.

#### V. Other Inputs:

From ==== AMi ===v	Proty on 9/12/02: ====================================				
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1. I a w T	. IP (the following is what's available currently): around 40~50 (virtual; inside-out access), will request one to have outside-in access. This particular IP will be accessed a. by "amibadata" to download data for backup everyday, b. by off-site machines to monitor/control the hardware onsite.				
2. N O T N t	etwork cable: F connection from the router to both the office and the dome. I connection from the router to the outside world. eed a OF/Ethernet converter for each hub (already purchased). eed to set up Ethernet cable(s) going from the hub inside the dome o the prototype mount, for the correlator reader (PC(b), see below).				
3. Н	ub: (a) 8 ports x 2 (already purchased; one for the office and one for the dome) (b) 4 ports x 1 (currently available but not used)				
4.0	. OF/Ethernet converter: one for each hub (already purchased).				
5. P ( ( (	<pre>C's: a) system monitor: to monitor the operation of the entire system. (already shipped with the prototype) b) correlator reader: to record the output of the correlator. (already shipped with the prototype) c) mount control: connected to the mount, to control the pointing. (a PC to be purchased, depending on the motor drive) d) OT reader: connected to the optical telescope (OT), to monitor the pointing and record the accuracy. (a notebook to be purchased; temporarily using Ma's/Mike's notebooks) e) backup PC x 2: prepared for any situations with other PC's. (e1) One PC will be assigned with the IP that has the outside-in access. This allows a remote control of the entire network system from off-site. "amibadata" will access it to backup all data on site. Password-protected web access will be also set up. Once this PC is used to replace some PC that is out of order, its original IP will be given to PC(a) for this outside-in access. (e2) The other PC will be mostly idle, except for operating a USB camera to monitor the prototype mount.</pre>				
6. P	rinter x 1: hooked onto the local network, shared by all PC's.				
7. U	SB Camera x 1: mounted on but outside the dome, to monitor the prototype from indoors or from off-site. It will take a picture every 20 seconds, and post it onto a password-protected web (PC(e1)).				

+----> T1 connection to outside world VPN router----+ (OF connection) ..<office>.|..... ...<dome>. | ..... : OF/Ethernet converter: : OF/Ethernet converter : : : : : : hub(a1) hub(a2) : +---+ : : +----+ USB camera . . . . . . | . . . . . | . . . . . | . . . . . • PC(b) : : : corr. motor OT : : :....prototype mount....: 1. OS & drivers: will use Linex for all PC's except for (d), which may have to run Windows (because (c) has a program (controling OT) that runs only under Windows.) All HD's on all PC's will install all the drivers needed for all the PC devices. This is to make the contents of all HD's identical (the system part) and therefore easy to maintain/reinstall/repair (simply using the HD-to-HD copy). Will also prepare the CD's for all OS files and drivers. 2. Data backup system: (a) onsite: A script will be written on PC(e1), and automatically implemented everyday. It will back up all (new) data on all PC's. (The data here mean everything on the hard disks.) (b) offsite: A script will be written on "amibadata", and automatically implemented everyday. It will download the backup file on PC(e1). 3. Remote control: The network can be accessed from off-site via PC(e1). It allows secure shell only (ssh, sftp, scp). This allows the monitor and remote operations of the instruments from offsite. 4. Web access: A web server (Apache) will be installed on PC(e1). It will be passwordprotected (via .htaccess). This allows manual data download, and watching the instruments via the USB camera (see below). 5. USB camera: It takes picture every 20 seconds (for example), and save it as a picture  $% \left( \left( {{{\left( {{{\left( {{{\left( {{{}}} \right)}} \right)}} \right)}} \right)$ file on PC(e2). PC(e1) will have an internal link to this picture file, which can then be viewed via the web server above.

6. File system:

All partitions on all PC's will be mounted together. This allows the access to all files on all PC's when logged onto any PC. Technical detail: export each partition to all other PC's by specifying the IP's in /etc/exports, and then mount all the partitions onto each PC. Each HD will have four partitions: A. ntfs (for Windows) B. ext3 (for  $\setminus$  of Linex; containing OS files) C. ext3 (for \home of Linex; containing user data files) D. swap (for swap of Linex) (This setup will allow us to reinstall the OS that has problems while keeping the user data unchanged.)

7. Users:

All user accounts will be first set up on PC(e1), and then transfered to all other PC's (by copying the system files such as /etc/group, /etc/passwd, /etc/shadow, etc.)

1. Items already purchased/available: I.3, I.4, I.5(a), I.5(b).

2. Purchase plan for other items (please also refer to section I): (a) By the end of September or early October:

- The following items can be purchased directly at Hawaii. A. Ethernet cables connecting the hubs to the PC's (see I.2): especially the very long one which connects from the hub inside the dome to the mount for PC(b). For this connection, can prepare a short, spare cable for connecting the notebook to the mount when operating the notebook outdoors. Once everything (mainly the pointing) is set, the notebook will be moved indoors and connected to the long cable.
- B. PC(e1), PC(e2): desktops (e.g. P4 2GHz).
- C. PC(d): notebook. D. USB camera
- E. Printer with Ethernet connection.
- (b) When the motor drive is more settled: A. PC(c): This depends on the choice and design of the motor drive. It's possible to use PC(d) instead of using this extra PC.

From Derek on Sept 9, 2002

Answers to Correlator action items fom Sept 5, 2002 meeting:

6) ML Network >> Derek: Has network dropout issue been solved? Talk to Darryl about this.

Answer. Darryl has reconfigured the network. I haven't gone up to ML since he has done this so I'mnot sure if thedropoutisstill occurring. Darryl sent me the following e-mail:

Hi Derek,

I've attached your new range of IP addresses. I've added more address to your block. I will switch the line in the Denver Dome building so you can use these addresses.

We were also wondering if you will be using DHCP on your network at the observatory site.

Darryl

#### AMiBAObservatory IP address assignments

Subnetmask	255.255.255.0	DNS	4.2.2.1	
Gateway	172.16.1.200		4.2.2.2	
IP Addresses	Description			
172 161 201				

172.16.1.202	
172.161.203	
172.16.1.204	
172.16.1.205	
172.16.1.206	
172.16.1.207	
172.16.1.208	
172.16.1.209	
172.16.1.210	
172.16.1.211	
172.16.1.212	
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172.161.226	
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8) Correlator >> Derek, C.T.: JeffRapadas will be shipping a packaged mixer to us on Sept 13. This mixer will incorporate the ~6 dB pads. Derek will instruct jeff to send it directly to Taipei to save time. Bob has asked us to prepare a test plan on how to evaluate this mixer.

Answer: We will perform the same tests on this mixer as we have done with the Device Technology (Mica) and Markimixers. See following link for previous tests:

http://www.asiaa.sinica.edu.tw/amiba/New/correlator/image/corr mixer eval%20051102h.pdf

C.T. has shipped the noise sources to Hilo so we will conduct the following tests using CW sources:

Responsivity at 10 GHz (midband). Responsivity verses fiequency, at 2, 3, 4, ... 17, 18 GHz. Input P1dBcpower at 10 GHz. Plot output voltage verses input power. Output impedance at 10 GHz verses input power. Input port return loss (R and L ports)

One important thing to note is that I've asked for this mixer to include the  $\sim 6 \text{ dB}$  pads. The apparent responsivity will appear to be  $\sim 4x$  less than without the internal pads. The input P1dBc on the other hand should be about 6 dB higher due to the pads.

### General Correlator Happenings:

1) We have generated a fairly detailed mechanical package for the correlator frame. See following link for details:

http://www.asiaa.sinica.edu.tw/amiba/New/correlator/image/corr\_mech\_080602.pdf

C.T. has forwarded this information to the mechanical engineer for the generation of the metal fabrication drawings. Bob has reviewed these drawings and has made some very important comments as follows:

- a) There is too much unused vertical space between the correlator modules. This is largely because we are using the same 3<sup>rd</sup> section push-on power dividers for both the front horizontal ones as the rear vertical ones. Current total correlatorfane height dimension for the 13-element system (includes 2<sup>nd</sup> section plates and platform mounting plate) is 553 mm. If we make as excoud custom power divider for the rear then we probably can reduce the total vertical height by nearly 50%. C.T. and Iwill look into this in detail.
- b) The correlator frame is currently composed of stand-alone quad-packs which allow us to put together frames in incremental fashion. Doing this, however, doubles the thickness of the individual frame pieces at the quad-pack interfaces. Bobsuggested to eliminate these individual quad-packs and to just make one single 13-element frame. The 7-element systemwillonlyoccupy the top row. Expansion to 13-elements will require the insertion of more modules, push-on power dividers, additionofanother 2<sup>nd</sup> section plate, and semi-rigid cabling.
- c) Bob asked if the correlator module itself can be narrowed up a bit in width. Current width is 25.40 mm. We purposely nade the correlator a bit wider than necessary so that we could accommodate 8-lags if deemed necessary in the near future.



### 2) Updated functional block to reflect current design:

CORRELATOR IF DISTRIBUTION FUNCTIONAL BLOCK

updated: Sep-10-2002

3) Parts ordering status: Still to order are the slope equalizer, LPF, mechanical phase shifters, SPDTswitch, coaxialcables, pads, and termination. I still have to evaluate our slope situation then order what I think we will need for a flat response at the correlator modules. We have ordered 5 LPFs to date but these are for the prototype. If these work out fine then I willhave to order 16 more. I was alittle disappointed in the PV-18 phase shifter S-parameter data so I haven't ordered themyet. Iintend to look for alternates with better performance. I'm currently comparing SPDT switches from various vendors and plan toputan order in shortly.

4) The 1<sup>st</sup> section preliminary mechanical design has been completed. Note that we have firmed down the decision to utilize a standard 3U chassis to follow suit with the Receiver electronics. We will install 4 plate assemblies to support4IF pathsper3U chassis. The DC amplifier and readout board for the power detectors will occupy a 5<sup>th</sup> slot. I am currently looking into purchasing ablank 3U metal plate assembly. This way I can just modify the plate and install the components without much other work.



## 1st Section Eurocard Packaging Concept

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