

DSES Technical and Operations Meeting 9-10-2018

Location: IHop restaurant, Constitution Street, Colorado Springs

Attendance: Gary Agranat, Ed Corn, Floyd Glick, Dave Molter, Steve Plock, Bob Haggart, Rich Russel, John Royo, Bill Miller,

Attending Remotely via TeamViewer: Tony Bigbee, Jay Wilson

Last Trips: August 25th Work and Observation Trip, Open House: August 10th thru Sunday August 12th

Next Trips to site: The regularly scheduled 3rd Saturday of the month, Saturday September 15th

Meeting Schedule:

DSES Technical and Operations Meeting- 2nd Monday of Every Month

DSES Science Meeting – 4th Monday of Every Month

Accuracy: As always if I have misstated, omitted or misrepresented anyone please feel free to correct me WKM.

Agenda and Notes from Last Meeting of 9-10-2018:

- 1) System 1 status
 - a) System 1 is in place.
 - b) Dave will build the control amps to emulate the hand controller and install on-site.
 - c) Bill gave Dave the linear power supply to replace the switch and minimize noise in the elevation circuit chain.
 - d) Dr Dennis Acos was the CU professor who lead the undergrad team who did the first control and tracking design. We may ask him if he has any documents or insights on the dish control.
- 2) System 2 Status
 - a) Ed Johnson will come down with Bill on Sept 23rd and work on system 2 control and tracking.
 - b) Bill has added LEDs to each relay driver to facilitate Software debug.
- 3) Rich's items
 - a) Prep for Observation on 22 Sept. for Rich and Gary
 - b) Rich has a new radio astronomy guide with RA and DEC of all the radio objects we can observe. He has about 6 objects from the list that he and Gary have observed.
 - c) Rich will observe with the Spectra Cyber and Tony Bigbee will bring a RASDR 4.
 - d) Prepare for a predicted supernova at 1400 LY in 5 years
 - e) The Open House Report is the first of 3 papers for the SARA journal.
 - f) The Journal articles are due Oct. 2nd.
 - g) Rich gave Bill the Radio Jove for repair.
- 4) Install amp in RX chain

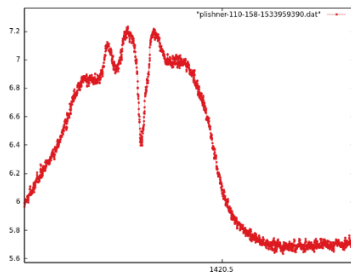
- a) Steve plans to Install an additional amplifier in the receiver chain. The amp will be in front of the laser diode in the RX chain.
- 5) Modify cavity filter
 - a) Steve will take the output of the cavity filter to the panel to patch back in so we have access
- 6) Install Azimuth stops
 - a) The AZ stops will be set to about 20 deg on either side of north
- 7) Ramp
 - a) Steve will bring more concrete and Dave will work on the wall
- 8) RV Cable burial
 - a) Ed will bring out a trencher on Saturday to bury the power cables for the RV park outlets.
- 9) Rohm 25 tower mount ready to go with Ed's 5 ft section to erect a tower at the bunker.
- 10) Bill will install the elevation synchro wires on the trip.
- 11) Site trip will be Friday thru Sunday. Steve and Paul will be onsite on Friday the 14th. Main crew will go down on Saturday Sept. 15th.
- 12) What about the new control system that Paul proposed? What is our mission statement?
 - a) Need a save function on the tracking systems logs so we have the time stamped position to marry with the data from the receivers
 - b) Bill thinks we need a mission statement saying what we can and can't do with the system.
 - c) No upgrade to specs and capabilities unless it goes through the Operations and Engineering meeting.
- 13) Proposal to do the 1st weekend of every month for the observation trip.
- 14) We got a phone bill but though we have the wire installed we don't have a dial tone. Steve will check with the phone company.
- 15) The Spring SARA conference may be held in Boulder in March.
- 16) We may want to have an open house after the event. Rich will contact Jay Wilson on the possibilities.
- 17) Bob Haggart has a 4x8 1700 lbs. trailer and will give to the group for 5 years of membership. The group isn't sure because we have access to several trailers.
- 18) Bob would like to build the stairs and ramp for the comm trailer.
- 19) John Royo suggests that we have another tier of donations for individuals and corporations that want to do ongoing sponsorship. What can we offer as justification for this?
- 20) Need 24" trencher for a day and deliver back the next day or a 24hour rental for around \$100. Bill will check with Blue Line Rental contact.

Meeting Adjourned

Previous 8-13-18 Meeting Agenda and Notes:

- 1) **Recap of DSES Open House at the Haswell site. 08/9 thru 08/11.**

- a) **Successes:** (Disclaimer: I have added a few items not mentioned in the meeting here for completeness of work done during the weekend. WKM)
- i) There was a lot of work done to prepare for the open house event by many of the members. Please see the open house report for all the prep and progress and details of the open house.
 - ii) Tony Bigbee installed a RASDR 4 system using the Lime SDR HW and the SW that Tony developed. His experiment goal was to replicate results obtained using the NRAO 20 meter dish system and RASDR2 achieved in 2014 as well as compare results with a recent survey involving the Parkes 64 meter dish system to see the hydrogen line energy absorption of an interstellar cloud. The results were stellar! Tony will publish a paper on this observation and his post analysis is included at the bottom of this report. In the experiment the neutral hydrogen frequency absorption could be clearly seen as a V notch in the spectral curve of the background source emission. The Dish was moved to lead the passing object several times and the notch could clearly be seen coming from nothing to maximum and back to nothing over about a 7-degree drift though the field of view each time.



- iii) Bogdan Vacaliuc and David Fields drove out from San Jose on the way back to Tennessee and installed their RASDR2 on the system feed. They were able to receive Ray Uberecken's 1296MHz 10Watt beacon from 80 miles away and was at least 20dB over noise even though the dish feed is designed for 1420MHz. This also allowed us to center the signal by moving the dish back and forth in azimuth and at 0 deg elevation with both system 1 and 2.
- iv) Both system 1 and system 2 pointing systems were found to be within about 2.5 degrees of each other in Azimuth and Elevation with this somewhat crude test. More work to do here on pointing accuracy.
- v) SpectraCyber: Ray brought back the SpectraCyber from repair and it was installed, teeing the dish signal off to the RASDR 2 and SpectraCyber. This setup gave poor results for the RASDR2 experiment. Removed the tee and then adjusted the SpectraCyber DC offset and gain gave terrific results on hydrogen 1420MHz emission. We could see many 1420MHz sources and their doppler shift not only in the galactic plane but also in free space areas. Observations were made Saturday night thru Sunday morning and observing real signals rising and falling in drift scan. Rich noted that naming the SpectraCyber files requires a short name and needs a specific format that the program will allow. It was great that we could show this to all the interested members and visitors and was a very good demonstration.

- vi) Skip Crilly hooked up the system to the racked spectrum analyzer and commented about the relatively low signal to noise ratio. Steve Plock said he was going to install or modify some aspect of the on-dish amplification and said the current 1420MHz feed is followed by 37.5 dB preamps and then with the analog fiber optic attachment to the comm. trailer giving very good signal amplitude that works with all the systems.
- vii) Gary operated the Site Ham Station, KØPRT from the “Underground” and got over 150 contacts. Over 60 contacts were on 20 meter phone. The rest were on 10, 15, 20, and 40 meter FT8. Gary advertised the special event station in the August QST, and at ARRL.org since May. Plus, while on the air the event was spotted on the DX cluster. All those brought in contacts. The ham station worked very well, and Gary demonstrated its use to visitors to the “Underground”. Since installation 2 years ago Gary and the club have made over 600 radio contacts from the site. Gary had some technical issues with the MFJ auto-tuner using the FT-897, but this can probably be resolved with some careful setup. Gary had many phone contacts in a short time. He suggests in the future more of the members take a turn at the ham station. We could get many more contacts with more hours and operators and spread the load. And other hams would have a chance to talk with more of us and learn more about the various aspects of what we do. In the future we could have 1 to 2-hour time slots scheduled for active members to share the responsibility
- viii) We did a lot on visual astronomy. Rich, Bill, Myron, Floyd and several of the guests brought out mid-sized optical telescopes and shared viewing with all that were interested. The “seeing” for optical observation with no moon was very good except for the wild fire smoke on the horizon. We didn’t see too many meteors in the Perseids Meteor Shower. This may be because the peak viewing occurred in early AM hours.
- ix) Skip Crilly gave a slide show presentation in the “Underground” on the use of the Haswell 60 ft. dish in conjunction with the Green Bank 10-meter dish for SETI observations. This was a very good presentation of how the two-site system works and what he is looking for. There were about 25 people in the underground to hear the presentation. They ranged from completely new to Astronomy to veteran members deeply involved in these subjects.
- b) Food and Drink: We did a good job of keeping everyone fed and caffeinated.
 - i) On Saturday and Sunday mornings Bill provided continuous coffee service.
 - ii) On Saturday Myron provided grilled hot dogs, fixings, potato and macaroni salads with chips and drinks for lunch.
 - iii) Saturday evening Steve Plock provided his home-made Brunswick stew and corn bread in the underground prior to Skip’s presentation. Everyone loved the stew.
 - iv) On Sunday, Dave and Myron put on a grilled egg, sausage, hash browns and pancake breakfast that really hit the spot.

2) Things to Fix

- a) Need to get the hot spot hooked up to the LAN. John Royo suggests that we put the receiver in the driest location, probably the comm trailer and the Wi-Fi underground in the bunker may not interfere with the radio Astronomy.
- b) System 1 still has a pointing bit error in the elevation parallel to serial channel. Possible noise from the switching power supply.
- c) The Radio Jove receiver did not operate after static electricity damage in a storm.

3) Things to improve

- a) Need an educational take-away brochure and map handout as people come in at the gate.
 - b) Need a way to automatically make the pointing systems and the receiver systems all log with the same time. Synchronizing the data with pointing and time.
 - c) Data should be taken with the NRAO Guppy data base format. Tony Bigbee sent an email that may deal with these last two items to the core team.
 - d) Pointing system 2, was missing the minus sign on declinations below 0 and reports an incorrect elevation above 90 deg.
 - e) The pointing systems need a countdown timer to determine when the object will pass if set up in a leading position and waiting for earth rotation to bring them in.
 - f) The wire wrap in the pedestal crow's nest above the control deck needs fixing.
 - i) Paul will complete the limit switch system
 - ii) We need to make a set park position optimum for driving azimuth back and forth while minimizing cable wrap. Current preferred park is at 317 deg for maintenance access to the upper deck. Dave suggested we park at 180 on the meridian so most observation would be left or right of that center point and would minimize the cable wrapping and wear.
 - iii) We need to attach all wires to the hard lines and wrap the bundle into a wire chase or basket. Currently the wires are all over the place and may wrap too tight or bind with each other or the structure and cause damage.
 - g) NRAO has some tools and methodologies to scan and do raster scanning that we should consider. Tony sent a later email on these to the core team.
 - h) Need a better stairway with handrail for the comm. trailer and possible wheel chair ramp.
 - i) The new outhouse was great, but a few people didn't understand the flush mechanism on the chemical toilets. Need a sign or label on the toilets to explain it.
- 4) Additional Notes:
- a) Jay Wilson (online in TeamViewer) says that there will be a presentation at the www.starkids.org, Little Thompson Observatory ½ way between the Longmont and Loveland on Thursday night with an engineer from Ball Aerospace on spacecraft antenna. Jay has made a \$300 donation to DSES via PayPal and we thank him.
- 5) Myron's Reports

- a) Myron received three new memberships and an additional renewal.
 - b) We have 60 members now which is a new record.
 - c) Reporting on the food at open house; we had 35 people for lunch on Saturday, 25 for dinner in the bunker Saturday night and 15 for breakfast Sunday morning.
 - d) We had a donation jar out and the donations covered a large portion of the food cost.
- 6) After the event the SpectraCyber will be set up on Ray's dish and connected on line for user data collection. The members should make full use of this for drift scan data collection and analysis. A thought here is we should also devise an educational program around this.
- 7) Upcoming SETI data collection
- a) Steve is going back to the site on Tuesday, Aug. 14th and will use System 1 for pointing. He will work the SETI data collection with Skip who will travel back to the Green Bank Observatory. Their observation data will be correlated, and findings analyzed and reported.
 - b) Skip did a lot of work on the TM4 GPS time base to get the system to work with the data protocol and installed the TM4 on a UPS, so it will not go down and require recalibration.
 - c) Ed suggests that we should have all critical receiver and data collection systems on the UPS considering the reliability of the rural utility.
- 8) The Radio Jove is indeed broken from the storm generated static that Bill and Paul observed a month ago. Dave has a second Jove kit but little time to build and test it. Side note here; Bill is willing to build this and try to fix the original Radio Jove in the process.
- 9) General Capabilities
- a) The phone company ran the telephone line to the comm trailer, but it isn't hooked up yet. Telephone will be about \$30 per month, Internet about \$50 per month
- 10) Next Site trip and agenda
- a) Next trip will be Aug. 25 to allow some home time to the open house team.
 - b) Dave will work on the wall
 - c) Ed will work on the receiver pit, sump hoses and getting the phone installed.
 - d) Rich wants to get Tony to bring the RASDR 4 down or get the SpectraCyber from Ray for 1420 sources observations and cal.
 - e) Paul will come down on Sept 15.
 - f) System 1 needs the bit error fixed, start by replacing the PS.
 - g) Need to make the system computer passwords simple and set to not time out.

Bob Haggart wanted to come down to see the site for some time and after the open house was impressed more with the operating in the comm. trailer than with the dish itself.

Additional Post Meeting Research and Notes:

From Tony Bigbee

Following up on three topics raised during Monday's engineering meeting.

1. The NRAO 20 Meter system at Greenbank is part of a global network of optical and radio astronomy telescopes called Skynet. While the public cannot control these telescopes (you can join the consortium or take a course to submit collection tasks), NRAO exposes current ops, data collected, past collection, etc.

For this group, I think a system like this is aspirational and inspiring.

For example, see:

<http://www.gb.nrao.edu/20m/peak/latest/>

2. Data formats

I looked around NRAO's main science site and saw there are different formats that I am not sure are suitable for us. But, going back to the 20 M site, there is this explanation of their data output format(s):

<http://www.gb.nrao.edu/20m/textexplanation.html>

http://www.gb.nrao.edu/20m/projdocs20m/q20_2014_06_Skyfits_writeup_June2014.pdf

3. Scan patterns

The NRAO 20M telescope has 2 or 3 scan patterns that should interest us and influence our future scan approach at Plishner:

http://www.gb.nrao.edu/20m/map20m_advice.html