

Deep Space Exploration Society

2016 Highlights

The Deep Space Exploration Society (DSES) had a banner year in 2016!

It was a year of technical innovation, infrastructure development and numerous technical challenges. But more importantly, it was a year of super comrades and friendships!

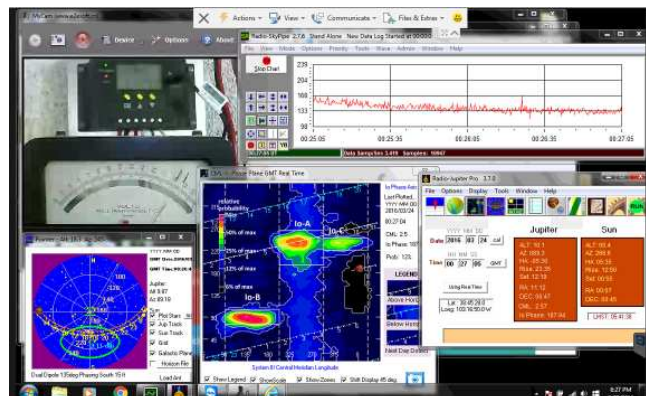
The year started with the team upgrading the power generation and distribution systems. The generator was upgraded with a propane tank and numerous other improvements. The regulator was the favorite challenge of the electrical system! Ed rebuilt the regulator (multiple times) and finally got it running like a top.

Solar panel and battery systems were upgraded. A battery room was towed over to the communications trailer, installed with batteries and inverters. Solar panels were installed and continuously added to including a generous donation from member Steve Plock.

The communications trailer was cleaned out and became the hub for radio astronomy and our new club station (K0PRT). A laptop was installed that became the principle system for both science and communication with Plishner.

- Radio Jove system installed
- Camera (using Ed's granddaughter's camera)
- Remote control of laptop using TeamViewer and Myron's Wi-Fi card
- Remote power switching system using ham radio frequencies
- Remote monitoring of solar cell power generation and battery status
- Network connectivity between the pedestal, bunker, generator shack and communications trailer

A screen shot of the laptop output is shown below:



DSES established the operator certificate program. Ed has run most of the membership through the propane generator operator certification. More certifications will be built including 60 ft. dish operations and science systems operations.

DSES had an excellent year in community outreach.

- 2016-07-30 DSES EADs Bash and Work Party
 - https://www.dropbox.com/sh/0blcu6ifd5ynyg2/AAD_B_HkrOIWkyNr7ZmylHAgA?dl=0
- 2016-08-12 DSES Science Expedition and Open House
 - <https://www.dropbox.com/sh/rw3gznuu882lpcj/AACTXXDgG6P7bXDAdbf3zyFpa?dl=0>
- Gary (WA2JQZ) enjoyed representing DSES at the Haswell Bazaar



2016 Board Members were elected:

- Michael Lowe, Board Member, President
- Rich Russel, Board Member, Vice President
- Myron Babcock, Board Member, Treasurer
- Ray Uberecken, Board Member
- Steve Plock, Board Member
- Michael Hoffert, Board Member
- Lauren Libby, Board Member
- Bill Miller, Secretary

Dish upgrades provided a significant enhancement in DSES science capabilities.

- Dave Molter and Glenn Davis developed an Azimuth/Elevation encoder readout system – this was designed using a raspberry pi computer and was calibrated using the Haswell grain elevator as a data point
- Ray built a multi-band feed that provided neutral hydrogen (1420.406 MHz), 1296 MHz, 432 MHz, and 144 MHz. This feed will be the basis for radio astronomy, moon bounce and tropospheric communications for the next couple of years. The

Multi-band feed installation

<https://www.dropbox.com/sh/e3mwvfz7vda458b/AAApTkvwmudSkEIk9JN9stuga?dl=0>

- Remote operation of the dish from the communications trailer

Education Outreach included coordination with District 20 and Eads school districts. DSES coordinated with Stanford University to provide free SuperSIDS solar radio telescopes to both school systems.

A new DSES website was built by Dan Martin <http://dses.science/>

Science updates: The DSES team has been experimenting with multiple radio telescopes. Each uses different science to detect radio astronomy data.

- Radio Jove – uses 20 MHz to detect Jupiter’s electromagnetic radio signal due to its magnetic field interacting with its moon Io
- SuperSID – uses low frequency reflections off of the ionosphere to detect solar flares
- Meteor Scatter- uses reflections off of the ionosphere caused by meteorite debris to detect and count meteors.
- Itty Bitty Telescope – uses direct TV dishes and LNAs to demonstrate thermal noise measurements
- Hydrogen I measurements – Established a 9 ft. dish and feed system with the SpectraCyber system.

Radio Astronomy Observer program: Rich received the highest Gold level award by using the above DSES radio telescopes. The science team members are all in line to qualify for this award in 2017.



Technical Papers and Presentations:

- Ray and Myron Babcock attended the national Micro Update Conference in St. Louis <http://www.ullmann.us/MUD2016/> on Thursday October 1^{3th} and presented a paper and presentation on the Plishner Site, DSES organization and Multiband Antenna Feed that Ray built for the antenna.

K0PRT Club Station

- Steve Plock did the paperwork with the FCC to get the K0PRT DSES club call sig

- Gary Agranat conducted over a hundred contacts from the club station at Plishner.
- Kammie Russel (Rich's daughter) designed and produced DSES QSL cards.

Plishner Open House and Science Observation Overnighter

DSES conducted its first open house on Friday, August 12, in conjunction with the Perseid Meteor Shower. We had 11 DSES members and over 20 guests spend the evening looking at Saturn, Jupiter, Mars and the Moon through telescopes while watching for meteors at the Plishner Radio Astronomy and Space Science Center in Haswell, CO.

We had five optical telescopes on site for viewing of the skies as well as lectures from 2 Pikes Peak Community College astronomy instructors who provided instruction on the use of the various telescopes present.

We had a few glitches such as the mice eating the wiring in the generator controller which shut down the main source of power for the site. However, thanks to some quick calls, Dave and Bill were able to get a generator shipped down to the site. This generator powered the site for the next two days while Ed worked out how to fix the primary generator regulator.

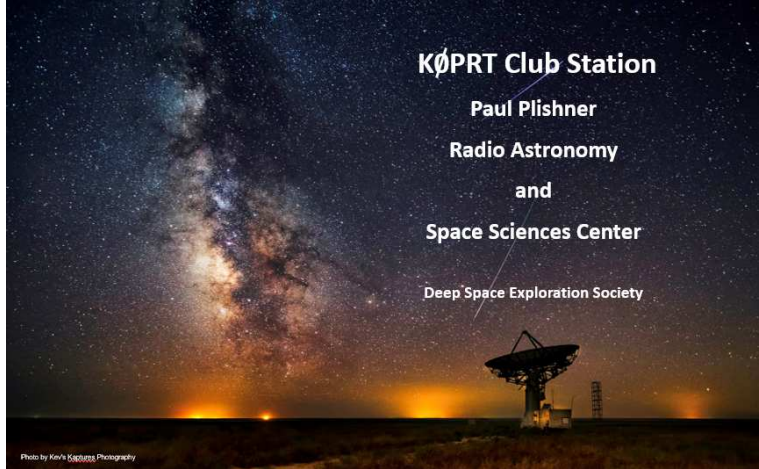
Special recognition for Don and Adam who traveled 4 hours to attend the event. They also spent many hours clearing the bunker ramp of tumbleweeds.

We had four or five optical telescopes set up for everyone's viewing pleasure and some of the local community came out for an impromptu star party. Everyone had an educational and great social time together.

Kevin Ahrens and several other photographers came down and shot some amazing photos and time-lapse videos of the storms rolling in.



Gary Agranat organized and manned a special events Ham station and collected 86 contacts on several different bands during the event. This was the first major use of the DSES new Club Station call sign, k0prt (prt stands for Plishner Radio Telescope). New QSL cards were made by Kammie Russel, the daughter of a DSES member.



Much progress was made in outfitting the dish and getting control set up.



Many members stayed overnight at Diane's Park which is under the 60 foot dish.





Ray and Floyd prepared a 6 meter antenna for the meteor detection radio telescope. The communications van was outfitted with extra antennas for 6 meter ham radio plus UHF and VHF amateur satellite communications. The van also has a 6 meter to 180 meter dipole for HF communications.



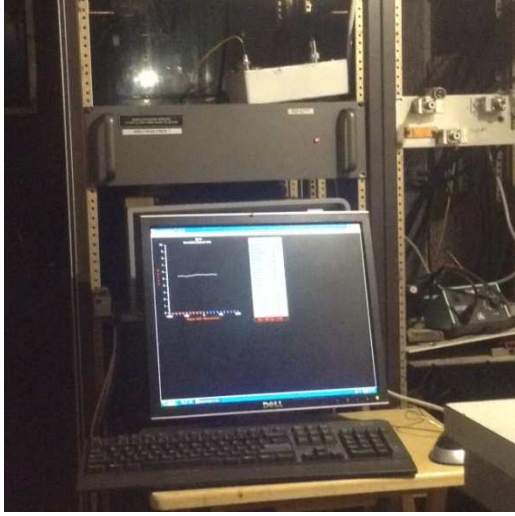
Bob counted sunspots and solar prominences using the solar telescope lent to DSES for this event by Pikes Peak Community College. A star party with multiple optical telescopes was a big hit while watching for meteors.



Myron set up an AMSAT communications system in the communications van.



The neutral hydrogen experiment was installed using the SpectraCyber system. The dish was moved to accommodate the new advanced feed built by Ray. The feed will be permanently mounted on the dish in the next couple of week. This will allow for UHF, VHF, 1296 MHz Earth-Moon-Earth (moon-bounce) and 1420 MHz neutral Hydrogen radio astronomy.





DSES has had a very successful 2016.

DSES members have overcome technical challenges and have learned a significant amount on their road to become successful radio astronomers and long range communicators.

73

Rich

AC0UB