PEAKS & NULLS

MORRIS RADIO CLUB

Volume IV, Issue VIII

August 14, 2014

AUGUST GET-TOGETHER

Our annual August Get-Together will be held this coming Monday August 18th at the Atlanta Bread in Morris Plains (In the shopping center at the corner of Routes 10 and 202). We will meet at 6PM. We hold this family activity in place of an August meeting. It is a pay your own way night and anyone, XYL's, YL's , Harmonics or friends are welcome. We hope to see all of you there.

HOW DO YOU CATCH A 36 YEAR OLD SATELLITE

If any of you have been following the story of ISEE-3, the International Sun-Earth Explorer-3 there is a link to the Morris Radio Club. John Malsbury son of Allen KB2FVG is part of the team trying to repurpose the satellite. Unfortunately as of this writing it looks like one of the prime objectives cannot be accomplished.

ISEE-3 was launched in 1978 along with ISEE-1 and -2 with an original mission to study how activity on the sun affects the Earth. ISEE-1 and -2 have long since returned to and burned up in the Earth's atmosphere upon reentry. In 1982 after completing its original mission ISEE-3 was renamed the International Cometary Explorer (ICE). After a thruster burn it made a series of lunar orbits over the next 15 months using the gravity of the Earth and Moon to make a last pass 74 miles over the Moon's surface and go into a heliocentric orbit in 1984. This new orbit placed it ahead of the Earth and on September 11, 1985 it passed through the tail of Comet Giacobini-Zinner. The first satellite to do so.

In 1988 it passed through the tail of Halley's comet. In 1991 NASA changed the mission to study coronal mass ejections from the Sun. On May 5, 1997 NASA ended its mission leaving only a carrier signal operating. Even though it was still in space, NASA donated it to the Smithsonian Museum. By January of 1990 it was in a 355 day heliocentric orbit. In 1999 NASA made a brief contact to verify the carrier. On September 18, 2008 using the Deep Space Network NASA located ICE and discovered that it had not been powered off after the 1999 contact and that 13 experiments were still functioning and that there was still some propellant left. It has been ahead of us for all these years going around the sun and now it is catching up with us. With the end of the space Shuttle program in 2011 there was no way to recover it. But it passes close enough to the earth on August 10 that if the engines could be fired it could be placed in an orbit between the Earth and the Sun.

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Inside this issue:

All the pictures in this issue are from John Malsbury

UPCOMING MEETINGS

August 18, 2014 August Get-Together at Atlanta Bread in Morris Plains 6PM

September 15, 2014 Regular Business Meeting

October 20, 2014 Regular Business Meeting

SELECTED UPCOMING CONTESTS

All Asian DX Contest, Phone	0000Z, Sep 6 to 2400Z, Sep 7
North American Sprint, CW	0000Z-0400Z, Sep 7
DARC 10-Meter Digital Contest	1100Z-1700Z, Sep 7
WAE DX Contest, SSB	0000Z, Sep 13 to 2359Z, Sep 14
ARRL September VHF Contest	1800Z, Sep 13 to 0300Z, Sep 15
North American Sprint, SSB	0000Z-0400Z, Sep 14
ARRL 10 GHz and Up Contes	t0600 local, Sep 20 to 2400 local, Sep 21
BARTG Sprint 75	1700Z-2100Z, Sep 21
CQ Worldwide DX Contest, RTTY	0000Z, Sep 27 to 2400Z, Sep 28

PREDICTED SUNSPOT NUMBER AND RADIO FLUX FOR SEPTEMBER 2014

SUNSPOT NUMBER			***10.7 RADIO FLUX***		
PREDICTED	**HIGH**	**LOW**	**PREDICTED**	**HIGH**	**LOW**
77.6	87.6	67.6	129.9	138.9	120.9

JULY MEETING MINUTES

There was no meeting held in July.

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That's when Keith Cowing and Dennis Wingo KD4ETA started things rolling. In the same abandoned McDonald's at NASA Ames Research Center in Mountain View, CA where they had previously recovered 40 year old pictures of the Moon's surface, they put together a team that included Matt Ettus N2MJI of Ettus Research. Ettus Research is owned by National Instruments and Allen's son John was a SDR (Software Defined Receiver) designer with Ettus. They then raised over 150 thousand dollars in contributions using crowd-funding to fund the project. Most of the contributions were $10 to $50. After finally receiving permission from NASA to try and reactivate the Satellite they had to figure out how. NASA had no way to talk to the Satellite. They had long ago dismantled and scrapped the transmitters at the Deep Space Network and didn't remember the Satellite command structure. Working from old manuals and contacting people that had worked on the original project they figured out how to do it in software. The next hurdle was finding a way to transmit their commands. It turns out that the commands are sent by a method that is still in use today. It is very similar to the I2C (Inter-IC) protocol that is a two wire means of sending data between IC's. In fact it is probably being used in your car. I use it all the time at work. With I2C one wire carries the clock signal and the other carries the data pulses. Well, how do you do it by radio? AM with FM. The signal is AM modulated with the clock signal and the data is sent by FM modulating the signal at the same time. The 305 Meter Dish at the Arecibo Observatory in Puerto Rico is now run by the National Science Foundation and groups like this can book time on the radio telescope. One other problem, the Arecibo dish has a pair of 1 Megawatt S Band Klystron transmitters that along with the 75 dB gain of the dish generate an EIRP (Equivalent Isotropically Radiated Power) of 2 Terawatts but it is out of the frequency range needed to talk to ISEE-3. Dirk Fisher DK2FD to the rescue. In Germany he designed and built on short order a 450 watt amplifier that interfaced with the SDR system and the Dish. With the gain of the Dish the team had a 14 Gigawatt (14000000000 watts) EIRP signal to work with. Because of the short time frame, hardware could not be built to do the transmit – receive switching, so it had to be

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MORRIS RADIO CLUB

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THE MORRIS RADIO CLUB IS AN ORGANIZATION OF AMATEUR RADIO OPERATORS WHICH HAS BEEN IN EXISTENCE FOR OVER SIXTY FIVE YEARS. AS A HOBBY, AMATEUR RADIO SERVES AS A PUBLIC RESOURCE FOR COMMUNICATIONS AS WELL AS AN EDUCATIONAL EXPERIENCE.

ALTHOUGH MANY WHO BECOME INTERESTED IN AMATEUR RADIO ARE INVOLVED IN AN ELECTRONICS RELATED FIELD, THE HOBBY APPEALS TO A WIDE VARIETY OF INDIVIDUALS.

THE MEMBERSHIP OF THE MORRIS RADIO CLUB IS A DIVERSE GROUP MADE UP OF MEDICAL, BUSINESS, EDUCATION, AND LAW ENFORCEMENT PROFESSIONALS, AMONG OTHERS, WHOSE COMMON INTERESTS ARE COMMUNICATION, EDUCATION, AND PUBLIC SERVICE.

HAMFEST CALENDAR

Ramapo Mountain ARC Hamfest

08/23/2014

Location: Camp Veritans
225 Pompton Road
Haledon, NJ 07508
Website: http://qsl.net/rmarc

Gloucester County ARC Hamfest

09/14/2014

Location: Gloucester County 4-H Fairgrounds
240 Bridgeton Pike (Route 77)
Mullica Hill, NJ 08062
Website: http://w2mmd.org

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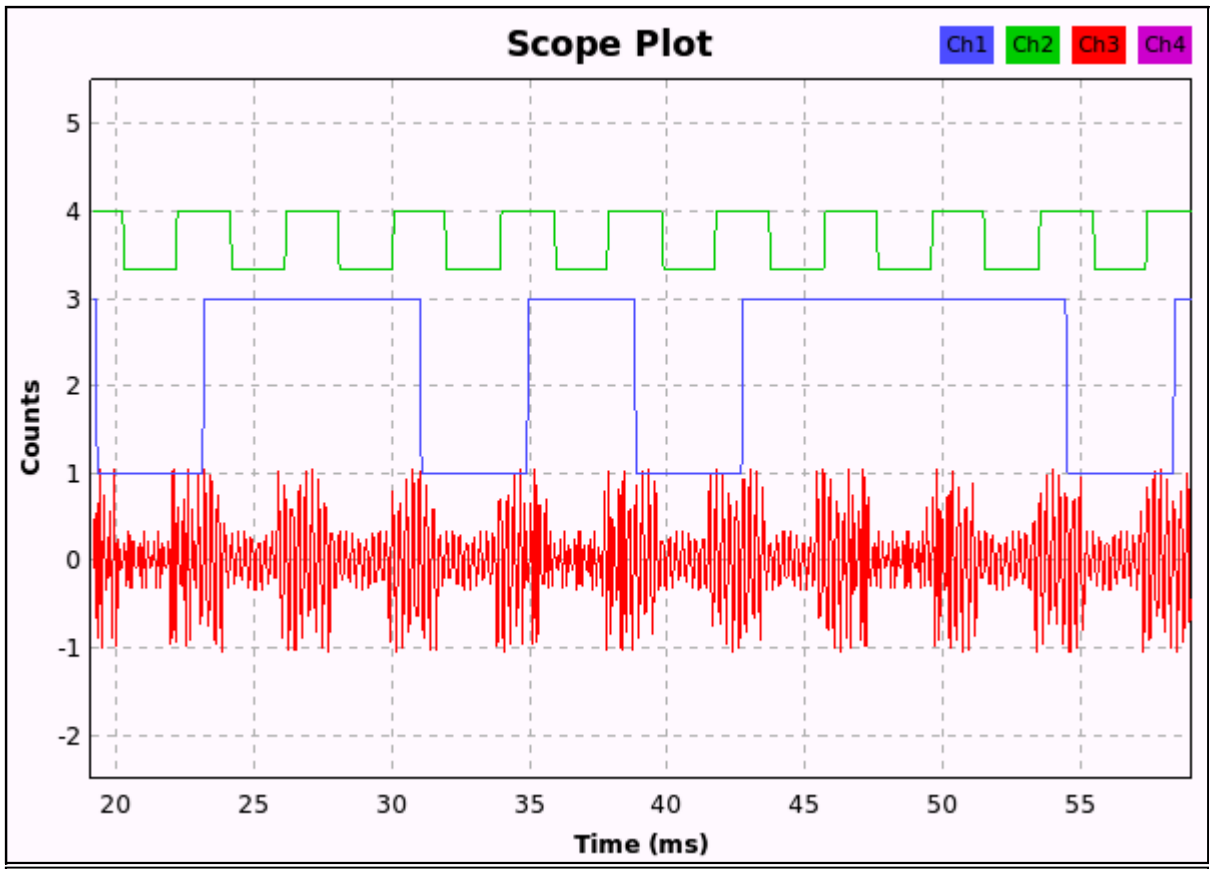
done by hand with one person in the receiver bay and one person in the transmitter bay 500 feet above the Dish.

In late May, Dennis Wingo, KD4ETA, reported that using the Arecibo Radio Telescope the team was able to command one of the spacecraft's transponders on 2.042 GHz by radio. John Malsbury was part of the team at the Observatory. It turns out that the spacecraft is in much better shape than even NASA expected and, there was still fuel in the tanks.

They were able to do a short thruster burn to get the spin rate up but later attempts to fire the engines to put it in an Earth orbit failed. They know that the valves operated but the engines did not fire. It is believed that the spacecraft is out of Nitrogen that is used to pressurize the propulsion system.
Now that they can't put the spacecraft into a stable point in space between the Earth and the Sun, it will loop past the Moon and enter an orbit around the sun almost identical to the Earth.
They have shut down systems that are no longer needed and reconfigured it to maximize the science operations. They are also implementing plans that will allow them to listen to its science data wherever it goes. Its new mission will start on August 10.

Thirty-Six years and more than 30 billion miles. They don't build them like they used to. Congratulations to John, Dennis, Matt, Keith, Dirk and the rest of the team.



Oscilloscope plot showing the clock signal (Green), the data signal (Blue) and the resulting RF Carrier signal

John Malsbury at Arecibo

The 305 Meter Dish at Arecibo Puerto Rico

John Malsbury returning from the Transmitter - Receiver Dome

John Malsbury (L) with ISEE-3 Reboot Project Lead Engineer Austin Epps (R)