

MOUNTAIN SPARK GAPS

**NPARC—The Radio Club for the
Watchung Mountain Area**



**Website: <http://www.nparc.org>
Club Calls: N2XJ, W2FMI**

VOLUME 50 NO.9 September 2015

UPCOMING EVENTS

Regular Meetings

10/12 & 10/26
Monday 7:30
NP Community Center

Meeting Schedule

Regular Meeting: 7:30—9:00 PM
2nd Monday of each month at the
NP Senior & Adult Center
15 East Forth Street
New Providence

Informal Project Meeting: 7:30—9:00 PM

4th Monday of each month
Same location

Everyone is Welcome

If a normal meeting night is a holiday,
we usually meet the following night.
Call one of the contacts below
or check the web site

Club Officers for 2015

President: KC2WUF David Bean
973-747-6116

Vice President: K2UI Jim Stekas
973-377-4180

Secretary: KD2EKN Tim Farrell
908-244-6202

Treasurer: K2YG Dave Barr
908-277-4283

Activities: W2PTP Paul Wolfmeyer
201-404-6914

—On the Air Activities

Club Operating Frequency
145.750 MHz FM Simplex

Sunday Night Phone Net

Murray Hill Repeater (W2LI) at 9:00 PM
Transmit on 147.855 MHz
With PL tone of 141.3 Hz
Receive on 147.255 MHz
Net Control K2AL

Digital Net

First & Third Mondays 9 PM
Details as announced.

Club Internet Address

Website: <http://www.nparc.org>
Webmaster K2MUN David Berkley
Reflector: nparc@mailman.qth.net
Contact K2UI, Jim

MOUNTAIN SPARK GAPS

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WB2QOO Rick Anderson

WB2EDO Jim Brown

Climatological Data for New Providence for August 2015

The following information is provided by
Rick, WB2QOO, who has been recording
daily weather events at his station for the
past 34 years.

TEMPERATURE -

Maximum temperature this August, 95 deg. F
(August 17)

Last August(2014) maximum was 91 deg. F.

Average Maximum temperature this August,
86.1 deg. F

Minimum temperature for this August, 56 deg.
F (August 28)

Last August(2014) minimum was 55 deg. F.

Average Minimum temperature this August,
64.0 deg. F

Minimum diurnal temperature range, 13 deg.
(80-67 deg.) 8/11; (86-73)8/20

Maximum diurnal temperature range, 30 deg.
(87-57 deg.) 8/14

Average temperature this August, 75.1 deg. F

Average temperature last August, 71.6 deg. F

PRECIPITATION -

Total precipitation this August - 5.4" rain

Total precipitation last August - 3.47"

Maximum one day precip. event this August;
August 19, 4.02" rain.

Measurable rain fell on 5 days this August,
7 days last August.

This August there were 7 days with 90 degree
or higher temperatures.

Last August there were 2 days.

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Rick Anderson

9/3/15

243 Mountain Ave.

New Providence, NJ

(908)464-8912

rick243@comcast.net

Lat = 40 degrees, 41.7 minutes North

Long = 74 degrees, 23.4 minutes West

Elevation: 380 ft.

CoCoRaHS Network Station #NJ-UN-10

The Greatest Overlooked Invention

Jim Stekas - K2UI

In the first decades of the 20th century, AT&T was focused increasing the range of telephone circuits to reach from coast to coast. Using loading coils on copper wire a low quality link was established from New York to Denver in 1909. To create a usable link from NY to Calif would require a daisy chain of many vacuum tube repeaters. Since signal distortion was cumulative, highly linear amplifiers were required. Thousands of engineers and technicians would focus on this problem for the next 20+ years.

One of them was Harold Black, a newly minted EE from WPI who joined the Western Electric Engineering Department in 1921. At the time, the state of the art in long distance communication was a three channel transcontinental carrier system using twelve repeaters. In 1923, a four channel system with twenty amplifiers was added and plans for higher capacity systems were in the works.

The limiting factor in performance was intermodulation distortion due nonlinearities in the amplifiers. The bulk of the effort toward solving this problem was directed at designing better vacuum tubes, and Black managed to insert himself into the research with the support of his boss Mervin Kelly. Performance of vacuum tubes steadily improved and by the end of the 1920s they powered radios and movie PA system. But the incremental improvements did not provide a revolutionary breakthrough in solving the problem of long distance communications.

Black stepped back and took a fresh look at the problem. He imagined the amplifier's output as the sum of two signals: (1) an amplified replica of the original signal and (2) distortion. Black figured that if he could create a replica of the distortion, he could use it to cancel the distortion coming out of the amplifier leaving only the undistorted signal. This was the birth of the "feed forward" amplifier which is widely used today. Unfortunately for Black (and AT&T), generating an accurate replica of the distortion using analog circuitry was a hard problem on its own and would have to await for the advent of DSP for it to become practical.

On Aug 6, 1927 Black boarded the Lackawanna ferry in Hoboken for his morning commute to the West St. laboratory in Manhattan. As the story goes, while riding the ferry, Black had a technical epiphany. If one took a bit of the output of an amplifier and added it to the input out of phase the distortion could be made to cancel itself out. This was "negative" feedback, the exact opposite of the "positive" feedback used in oscillators, reflex receivers, etc. Black was using the amplifier to generate its own "feed forward" signal. (We know the exact date because Black wrote out the equations for negative feedback on a blank page of the New York Times.)

The simple idea of “negative” feedback turned out to be central to the electronic revolution of the 20th century. Thanks to the theoretical work of Nyquist, Bode, and others, it became possible to use negative feedback to design highly linear and stable amplifiers. This would become particularly important with the invention of the transistor at Bell Labs in 1947. (Shepherded through by BL President Mervin Kelly, Black's old boss.) Junction transistors are fundamentally non-linear devices and the way to tame them is to use a large number in a high gain configuration (e.g. an Op amp) and apply negative feedback. As transistors became smaller and cheaper, analog systems used more and more of them and more and more negative feedback to build very linear systems.

Today negative feedback is all around us: stereo amplifiers, disk drives, RF power amplifiers, quad-copters, passenger jets, and on and on ... Pity that Black is so little known by the public who benefit from his innovation every day. Pity too that NYC hasn't seen fit to install a commemorative plaque at the old West St. building to recognize the many great things that happened there.

Progress Report

Hello folks, as some of you may know I have been working on setting up an old aluminum 10 foot mesh TVRO dish to get on 23cm EME. I figured I would send a quick report for the spark gaps along with a few pictures. The concrete was poured for the tower over the summer. Much of the bracket fabrication work for the tower is done. I have everything worked out for elevation movement and I am just waiting on a few things to be machined for azimuth movement. Once the machine work is done I can start bolting stuff together & hooking things up.

The AZ/EL controller has been tested with the computer, actuator, rotor and encoders. With the click of a mouse button I'll be able to make the dish automatically track the moon or move to where I want it. I have stuffed the control boards into a chassis, I just have to properly route the line cord and add a fuse to complete that part of the project.

I recently completed the cable run. I have 30' of 1-5/8" hardline for the TX coax and 30' of 1/2" hardline for the RX coax. There is also a bunch of cables for relays, low noise amp (LNA), encoders, control boards, rotor/actuator cable and power (low voltage). By the end of fall I am hopeful to have the dish tracking the moon on its own. The cavity amp I have will probably put out 300-400 watts. I have a transverter here as well as any of the other electronics I need for 23cm. The only real major item I need to build is a feedhorn. I have plans for a horn I want to build which I will start focusing on once I complete the dish steering work.

I could be on the air as early as late fall/early winter but realistically I am hopeful for springtime.

73,
James KB2FCV

Some of KC2FCV Moon Bounce Equipment



SCIENTIFIC TIDBITS

A Battery Powered Plane

A battery powered plane built by EADS, the parent company of Airbus, is the world's first electric, fully aerobatic, four-engine aircraft. The squat, single-seat aircraft has counter-rotation propellers powered by lithium batteries. Made from composite materials, the plane can perform aerobatic maneuvers and fly for up to 30 minutes between charges. Hopefully, the plane has a large wingspan so its glide time will be long enough for the pilot to find a landing site once the motors stop. Otherwise, it is hoped that the pilot brought a parachute along!

Light Kills Tough Germs

Scientists in Scotland have developed a device that uses a narrow band of the visible light spectrum to kill germs, including certain bacteria that are resistant to antibiotics. The light is harmless to people, unlike ultraviolet light used for similar purposes, meaning it could be used in hospitals to provide continuous disinfection. It works by exciting molecules contained within bacteria, causing them to produce a lethal chemical, in effect inducing bacteria to kill themselves.

Speaking of Bacteria

Certain types of bacteria have been found to produce protein strings that can conduct electricity better than some metals, according to scientist at the University of Massachusetts at Amherst. The protein strings are a byproduct of the digestive process in those bacteria. With their conductive properties, such "living nanowires" could help merge biological systems and electronic devices. Scientists also see them used in biological batteries that are more powerful than chemical ones.

Universal Virus Fighter

A new treatment uses cells' defense systems to kill viruses before they spread. MIT researchers who created the drug say that like antibiotics with bacteria this drug should work against all viruses. Proteins in human cells attach to invading viruses to stop them from replicating. But the virus eventually kills the cell and moves on. The new drug pairs that binding protein with one that causes the cell and the virus to die. In tests, it completely cured mice infected with flu virus. Although these tests are very preliminary, if this drug proves effective in humans, the implications could be enormous.

Jim WB2EDO