MOUNTAIN SPARK GAPS

NPARC—The Radio Club for the Watchung Mountain Area

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

VOLUME 49 NO. 3 MAch, 2014

UPCOMING EVENTS

Regular Meetings

Mon. 7:30
4/14 NP Senior Citizen Center
NOTE DIFFERENT LOCATION
15 East Forth Street
East Forth is off of Livingston Ave.

4/28 Salt Brook School Cafeteria

FIELD DAY 2014

June 28 –29
It is not too early to start planning

Meeting Schedule

Regular Meeting: 7:30—9:00 PM
2nd Monday of each month at the
Salt Brook School Cafeteria
Springfield Ave. and Maple St.
New Providence

Informal Project Meeting: 7:30—9:00 PM
4th Monday of each month at the
Salt Brook School Cafeteria
Springfield Ave. and Maple St.
New Providence

Everyone is Welcome
If a normal meeting night is a holiday, we usually meet the following night.
Call the contacts below.
When Schools are closed,
Meetings are held in the Recreation Department Meeting Room in Borough Hall

Club Officers for 2013

President: K2MUN David Berkley
908-500-9740
Vice President:KC2WUF David Bean
973-747-6116
Secretary: KD2EKN Tim Farrell
908-244-6202
Treasure: 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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Editor: K2EZR Frank McAneny
Contributing Editors:
WB2QOQ Rick Anderson
WB2EDO Jim Brown

Climatological Data for New Providence for February 2014

The following information is provided by Rick, WB2QOQ, who has been recording daily weather events at his station for the past 33 years.

TEMPERATURE -

Maximum temperature this February, 56 deg. F (February 2)
Last February(2013) maximum was 53 deg. F.
Average Maximum temperature this February, 38.1 deg. F
Minimum temperature for this February, 4 deg. F (February 28)
Last February(2013) minimum was 11 deg. F.
Average Minimum temperature this February, 19.3 deg. F
Minimum diurnal temperature range, 6 deg. (34-28 deg.)
Maximum diurnal temperature range, 29 deg. (56-27 deg.) 2/2;(36-7) 2/27
Average temperature this February, 28.7 deg. F
Average temperature last February, 31.9 deg. F
Number of days this February with daily minimum temperatures of
20 deg. or lower - 15; last February - 9.
4 days this February saw temperatures in the single digits; last Feb.,0 days.
5 days this February saw maximum temperatures below 32 degs.; last Feb.,0 days.

PRECIPITATION -

Total precipitation this February - 30.5" snow; 5.99" rain/melted snow.
Total precipitation last February - 10.4" snow; 2.9" rain/melted snow.
Maximum one day precip. event this February; February 13, 12.5" snow.
Measurable rain fell on 5 days this February, 6 days last February.
Measurable snow/sleet fell on 8 days this February.

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Rick Anderson
3/7/14
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

PRESIDENTS COLUMN
By K2MUN

This month I'd like to return to a discussion of antennas. The focus for this month will be introducing antenna modeling using EZNEC, created and sold by W7EL (http://www.eznec.com/). There are a number of other modeling programs, many also based on NEC base modeling, which is the case for EZNEC. NEC2 is based on the original NEC program written in the early 1980's at Lawrence Livermore Labs (http://www.nec2.org/other/nec2prt1.pdf). The basic program is free but is quite difficult to use for Amateur modeling purposes. Suffice it to say that the use of some form of simple interface, as provided by EZNEC, is essential for our purposes. There is a limited version of EZNEC available free for simple experimentation but serious design work will require the paid program ($89). EZNEC is also the referenced and used in the ARRL Antenna Book (http://www.arrl.org/shop/ARRL-Antenna-Book-22nd-Edition/) which includes a special version of the program that works with the illustrations in the book ($49.95).

I used the free version of EZNEC to design my first modern antenna: An off-center fed dipole. This is a variant of what is sometimes called a Windom antenna.

Let's take a look at what was needed. First I need a description of the antenna. This includes the feed point, the approximate lengths, an estimate of the mounting height over ground (this antenna was for an attic) and the type of ground model to be used. Since the design was for 40 meters, I started with a standard guess at 66 feet in length. Based on the literature, I also guessed that the feed point should be 1/3 of the way from one end to give me multi band coverage. After fiddling with the program for a while, I determined that the proper length for my purposes (e.g. CW) was 68.5 feet with the feed point at about 40% from one end

This information is entered into forms in EZNEC that describe the antenna 'wires'. In this case (as for a simple dipole) there is only one wire — which is why the free version of the program can be used. In order to calculate the antenna behavior, the wires must be divided into segments since NEC does calculations on each segment and pieces together the result. Required segment length estimation is something of an art. However, the program will warn you if insufficient segments are used.

The primary limitation of the free program is total number of segments which is limited to 20. Even with this limitation, the program can do a respectable job of analyzing a simple Yagi, phased array or quad. A great deal can be learned from the free version but, beware, once you start designing antennas you will soon hit the limit and have to buy the full program.

Once the antenna 'wire description' is entered, you have to decide how to feed the 'antenna' I.e. you need to decide what type of feed to use. The choice is current or voltage — although it is also possible to model the full feed line system, if you wish, especially if it is an active part of the antenna (e.g. a G5RV). In my case I used a current feed with a 4:1 balun (e.g. looking at the antenna with a 200 ohm, rather than 50 ohm load, simulating my RG8X feed). After determining the feed, the rest is simply setting 'test' parameters. E.g. the frequency range for a sweep test of the antenna. That's when the real magic starts. The model that is generated is quite complete (including near-field effects), so you can read out many different types of results from the model. These include a sweep of SWR vs. frequency as well as various information on the antenna radiation patterns.

Below are figures showing SWR for my model antenna (Fig. 1) a few elevation plots (Fig. 2a at 7 MHz and 2b at 21 MHz) and also a figure showing the radiation pattern (3-D image at 21 MHz in this case, although other projections are available). As you can see this specific off-center-fed dipole shows a reasonable SWR on a number of bands but the radiation pattern is complex at higher frequencies. I also modeled the case when the antenna didn't quite fit in the attic and the ends had to be 'bent' in various ways to accommodate. In fact, the change in results was reassuringly small.

This antenna served me well, fed with an inexpensive MFJ 4:1 Current Balun, for years. It worked quite well without a tuner but, adding a tuner, it would run easily on all ham bands above 40 meters. There are some odd radiation patterns determined by modeling, but, nonetheless providing a large number of worldwide QSO's. It was even possible to tune on 80 meters but this was pushing the limits of the LDG Autotuner.

As discussed in previous columns my current attic doesn't accommodate this design so I moved to designing a fan dipole. This is much harder to model and I will continue with the discussion in the months to come.

In the meantime, Winter seems to have returned for a few days at the end of March but I'm sure Spring will soon arrive in earnest. Get ready to trim you lawns and spruce up you antennas. We have some interesting meeting programs coming up and, of course, soon we will being serious planning for Field Day. Mark your calendars for that great weekend: June 28 - 29!

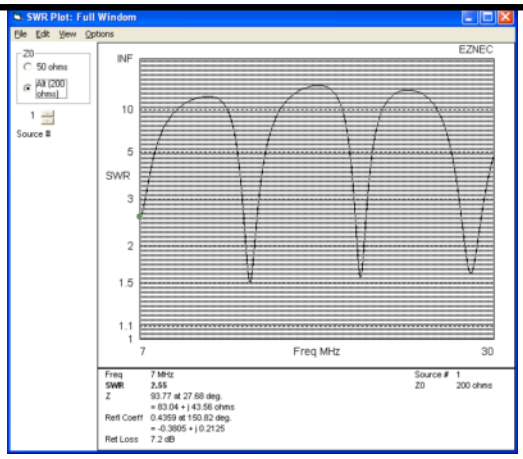

Fig. 1: SWR plot of Off-Center-Fed Dipole (68.5' long, 30' high) above simulated 'real' ground plane. The antenna uses #12 wire and is simulated with 19 segments.

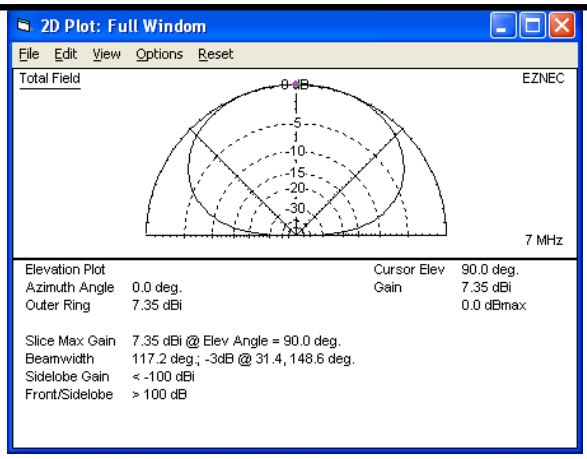

Fig. 2a: 7 MHz. Elevation plot of the antenna

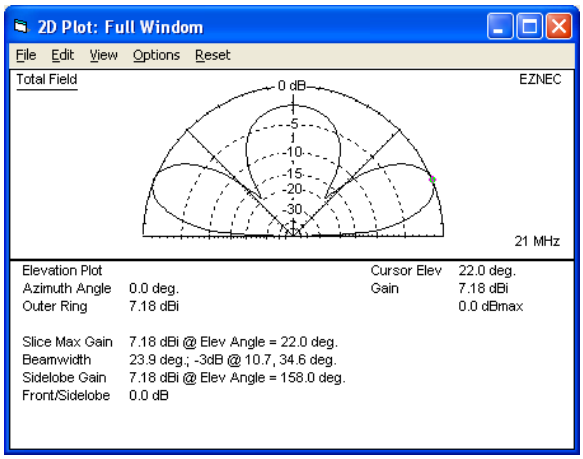

Fig. 2b: 21 MHz. Elevation plot showing the pattern distortions but still a reasonable takeoff angle.

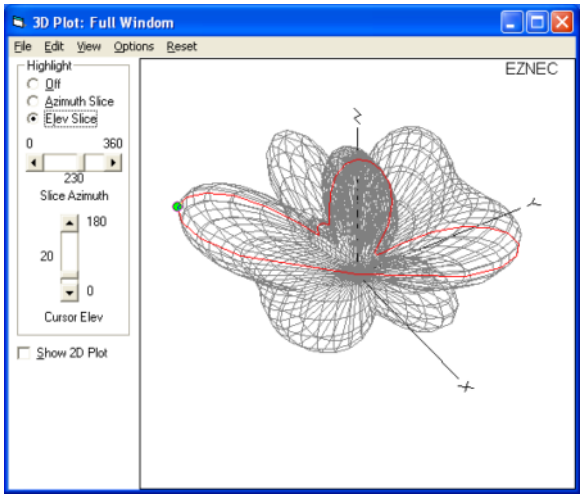

Fig. 3: 3D plot at 21 MHz showing that the simple picture of Fig. 2b is actually much more complex. A similar elevation slice is shown in red.

SCIENTIFIC TIDBITS

Fresh Water under the Ocean

Vast reserves of freshwater have been discovered beneath the seabed of continental shelves off Australia, China, North America and South Africa. This is a potentially valuable resource for coastal cities needing to alleviate water shortages or combat drought. The finding comes from a new analysis of seafloor water studies conducted for oil and gas exploration purposes. The total volume of these untapped reserves is estimated at 120,000 cubic miles. To put this into perspective, the total volume is a hundred times greater than the amount we have extracted from the earth's subsurface in the past century since 1900. The reserves were formed hundreds of thousands of years ago, when sea levels were much lower and much of the ocean floor was dry land. Rainwater seeped into the ground and filled up the water table, which was later sealed off by protective layers of clay and sediment and covered as the oceans rose. Scientists say that the water could be tapped by drilling and that its salinity is low enough that it could be converted readily into potable water. By 2025 two thirds of the world's population will no longer have a secure water supply, according to the United Nations. We are already seeing water shortages worldwide. This can only get worse as populations increase and the demand balloons. The water industry here in the U.S. is seeing demand increases and supplies fall short. The costs of securing safe water are beginning to move rapidly upward as the need to rebuild very old infrastructure and to secure new water sources become paramount. Maybe we should look for great-grandfather's old hand pump and start digging?

When Mars had a Life-friendly Lake

NASA scientists have discovered evidence that a large freshwater lake existed on Mars billions of years ago, further strengthening the case that Earth's neighbor once harbored life. The lake was part of a network of waterways that could have lasted thousands or even millions of years. This time frame would have been long enough for simple organisms to take hold there. Those conclusions come from an analysis of two mudstones drilled by the Curiosity rover during its exploration of the 96-mile-wide Gale Crater. The analysis dates the lake's existence to about 3.5 billion years ago, which is roughly the same time life emerged on Earth, when Mars was worm and wet rather than the cold and arid place it is today. The mudstones contained clay minerals, which form in waters with neutral pH, along with carbon, hydrogen, oxygen, sulfur, nitrogen, and phosphorus. These are all elements critical to life as we know it. They also contained iron and sulfur minerals that could have been food for microbes like chemolithoautotrophs, which live on Earth deep underground and in caves and hydrothermal vents. All the essential ingredients for life were present and the whole environment seemed extremely Earth-like. Maybe there were "men from Mars back then?"

Jim WB2EDO