MOUNTAIN SPARK GAPS

NPARC—The Radio Club for the Watchung Mountain Area

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

VOLUME 49 NO. 1 January, 2014

UPCOMING EVENTS

Regular Meetings

Mon. 7:30
Jan. 13 & Feb. 10
Salt Brook School Cafeteria

Annual Auction
Feb. 21
New Providence High School
New location—Same rules
Time to clean up the shack!
See website for latest info.

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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WB2QOQ Rick Anderson
WB2EDO Jim Brown

Climatological Data for New Providence for December 2013

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 December, 59 deg. F (December 6)
Last December(2012) maximum was 62 deg. F.
Average Maximum temperature this December, 41.7 deg. F
Minimum temperature for this December, 15 deg. F (December 13)
Last December(2012) minimum was 20 deg. F.
Average Minimum temperature this December, 26.5 deg. F
Minimum diurnal temperature range, 7 deg. (36-29 deg.)12/9;(43-36)12/29
Maximum diurnal temperature range, 25 deg. (50-25 deg.)12/28

Average temperature this December, 34.1 deg. F
Average temperature last December, 38.6 deg. F

PRECIPITATION -
Total precipitation this December - 4.02" rain/melted snow; 8.6" snow.
Total precipitation last December - 5.72" rain/melted snow; 3.4" snow.

Maximum one day precip. event this December; December 14, 3.5" snow.
Measurable rain fell on 6 days this December, 15 days last December.
Measurable snow fell on 4 days this December, 3 days last December.

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Rick Anderson
1/7/13
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

After a break in December to introduce the NPARC 2014 Officers, in this January column I return to discussing antennas and, in particular, the problems of tuning my 10/20 attic fan dipole on 40 meters. Before I begin to talk about the tools that I have used in my exploration, I want to add a footnote to my previous discussion. In November I said that my LDG Z-11 Pro autotuner would tune from 6 to 1000 ohm loads. This is the LDG specification but there are some issues to keep in mind. First: The range may not apply for all complex impedances, although in practice the tuner does surprisingly well. Second: When you approach the edges, where the tuner is matching extreme impedance, it was pointed out to me that you can also develop very high voltages on the internal components. So, even if the tuner does a great job, caution in not pushing the power limit is advised to avoid damage to the tuner. I'm not sure how critical these issues are in practice as I have used the tuner at up to 100 watts, even where the impedances are close to the limits, without smoke. However, be advised!

So what are some useful tools for figuring out what your own antenna system is doing? There are two separate, but mutually supportive, approaches. You can model the antennas you are considering with antenna modeling software. An example of a modeling package is *EZNEC* (http://www.eznec.com/) from W7EL. This is powerful software available for various Windows operating systems. A free version is available, with limited element capabilities, to try the software before paying the price. There is also a special (limited) version included with the ARRL Antenna Handbook that allows modeling with the antennas described in the handbook. The beauty of using modeling tools is that you can 'build' your dream 10-element backyard Yagi, on a 100' tower, in the dead of winter, without freezing to death or causing major issues with your neighbors. If it doesn't work as you want, 'taking it down' and rebuilding is only a few mouse clicks.

Another useful tool is something that can tell you what you have actually built, as opposed to imagined or thought you purchased. Surprise — not all the advertised antennas perform exactly as specified in that attractive advertisement when you put it up in the real world of your backyard, or worse, your attic. Having a good real-world measurement tool can avoid massive confusion when your antenna, that looked great on paper, causes wisps of burning components to rise from your rig.

There are many types of antenna analyzers that can be used for this purpose. None are exactly 'cheap' but moderate priced options exist, for example, in the MFJ line (http://www.mfjenterprises.com), the MFJ 259B HF/VHF Analyzer goes for about $240 (Photo 1). You can purchase a much less expensive device that just measures SWR but, although useful, the ability to compare to theory/models and diagnose causes for differences is more limited. Even the more expensive MFJ devices have some limitations, e.g., in determining the sign of the imaginary part of measured impedance. It is fairly easy to work around this issue but it make use more difficult.

The measurements shown later were done with a Rig Expert (http://www.rigexpertusa.com/) AA-54 HF Antenna Analyzer that goes for about $280 (Photo 2). This is a full vector impedance measurement device that interfaces neatly to a computer to allow saving of measured data and control of the device as well as displaying useful plots of various information on its built-in screen. Finally, you can go for a full Vector Network Analyzer where prices start at about 2x what we have discussing and run up to more than you want to pay! Capabilities are commensurate with the costs but, for amateur use, these can be overkill so consider carefully what you intend to measure, how accurate the measurements have to be, and also what bands you intend to use.

One thing to keep in mind is that these tools are not trivial to use. Learning to use them for simple applications takes some knowledge and a willingness to read the instruction manuals. For more complex uses, expect to spend time learning the details of impedance measurement. Also, in my experience, the user interfaces are hardly ideal. Return on your investment goes up rapidly with understanding. Don't hesitate to ask other club members, or use online tools for help.

Finally, back to my specific situation. That attic antenna is still not doing exactly what I would like, especially on 40 meters. So, I applied the tools I've discussed above and will look at what they tell us, in later columns. To give a little taste of what is coming, I include an annotated screen shot of the RigExpert output, plotted on a Smith Chart (Figure 1). Don't know (or don't understand) what a Smith Chart is? You are certainly not alone. However, of the various ways to summarize performance of an antenna system over a wide bandwidth, there is nothing that can match this elegant display method. One thing is clear: A fan dipole is not a simple system over a wide frequency range and even a quick look at the numbers makes it clear why bad things are happening on 40 meters (and on other bands as well).

Next time I'll talk about the simulation of the fan dipole arrangement, which illustrates some interesting features of EZNEC, and shows how well the results compare with the actual measurements. The object, of course, is to determine how to modify the antennas, so as to improve performance across the bands desired. In the meantime, I encourage you to think about how to better understand your antennas. A little insight can result in great on-air improvements.

As we enter February, I want to remind you that one of our premier events for year, the NPARC Auction, is scheduled for Friday, February 21st (snow date the 28th) in the New Providence High School Cafeteria (new location).

Photo 1

Photo 2

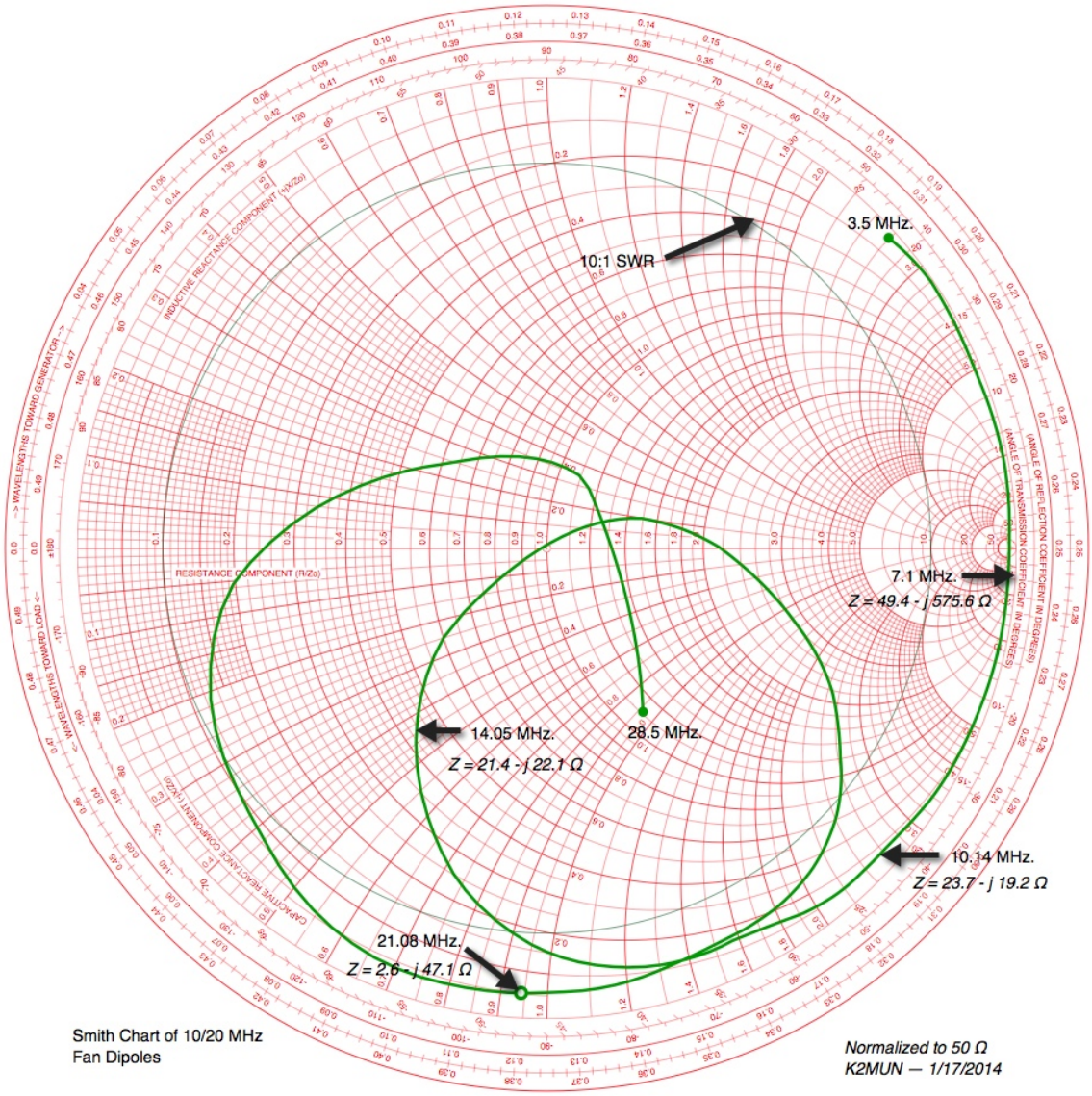

Figure 1. Smith Chart for fan Dipole.

Kids Day was a success although attendance was down from last year. The turn-out from club members was great and all of the Pizza and soda was consumed. Unfortunately there were not as many kids and parents probably due to the frigid weather. When HF antenna was lowered, it was coated with 1/4 inch of ice.

SCIENTIFIC TIDBITS

Follow-up

This tidbit is a follow-up to last month's "Women's Gift" piece and has to do with how gender influences brains. Since I was not lynched after this last article, I am pushing the envelope with this effort.

Men and women are really wired differently. A new gender-based study that involved mapping brains found a striking contrast in neural circuitry that its authors are calling the "hunter vs. gatherer divide." The brain-circuit maps provide a potential neural basis as to why men excel at certain tasks, and women at others. So says Ragini Verma, an associate professor at the Perelman School of Medicine. Researchers looked at the brains of about 950 young people, using an MRI technique. The result was a map of each person's connectome, or brain network, highlighting the fiber pathways that link different regions. In general, male brains were found to have more connection from front to back within one hemisphere, which makes them optimized for coordinating perception with action, such as learning a new sport or following directions to a location. Female brains generally have more connections between the left and right hemispheres, which enables them to integrate emotion, reason, and social cues in responding to situations. But Verma said these gender differences are not hard and fast, varying from individual to individual, and that it is unclear how much influence social conditioning combined with hormonal differences shapes neural connections. "Every individual could have part of both men and women in them," she said.

Sounds like a cop-out to me, but if true, that is pretty scary.

Mankind's Tangled Family Tree

A 400,000 year-old thighbone found in a Spanish cave has yielded the earliest DNA recovered from a human ancestor, and it suggests that our specie's family tree may include some surprises. The bone, found in an icy-cold cave in Spain amid a pile of other fossils, yielded a well-preserved sample of DNA from a time before Homo-sapiens evolved. In that era, several human-like species lived in Africa, Europe, and Asia. Neanderthals are believed to have prevailed throughout Europe, while another human cousin called the Denisovans colonized Siberia. To the surprise of scientists, the DNA of the thighbone found in Spain was very similar to that of the Denisovans, who supposedly lived 4,000 miles away. One possible explanation is that Neanderthals and Denisovans interbred; another is that the two species had a common ancestor that has never been identified. Whatever the explanation, it appears that the species competing for survival 400,000 years ago were not as genetically distinct as anthropologists believed, and that modern humans have some genes from several species. The story of human evolution is not as simple as we would like to think. This also proves that in any science, the more you discover, the more you realize how much you don't know.

Jim WB2EDO