MOUNTAIN SPARK GAPS

NPARC—The Radio Club for the Watchung Mountain Area

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

VOLUME 48 NO. 11 November 2013

UPCOMING EVENTS

Regular Meeting

Mon. 7:30
12/9
Salt Brook School Cafeteria

Holiday Luncheon
Saturday 12/7
11:30 AM —
Chimney Rock Inn
Valley Road, Gillette

Kids Day
Sunday 1/5/14 2—5 PM
Berkeley Heights Rec. Center

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: KC2HLA Hillary Zaenchik
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 October 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 October, 83 deg. F (October 4)
Last October(2012) maximum was 77 deg. F.
Average Maximum temperature this October, 65.6 deg. F
Minimum temperature for this October, 32 deg. F (October 26)
Last October(2012) minimum was 31 deg. F.
Average Minimum temperature this October, 47.3 deg. F
Minimum diurnal temperature range, 5 deg. (69-64 deg.) 10/6
Maximum diurnal temperature range, 26 deg. (78-52 deg.)10/1

Average temperature this October, 56.5 deg. F
Average temperature last October, 56.2 deg. F

PRECIPITATION -
Total precipitation this October - 0.74" rain
Total precipitation last October - 3.94" rain

Maximum one day precip. event this October; October 7, 0.40" rain.
Measurable rain fell on 8 days this October, 13 days last October.
This months rainfall is the least amount of rain received at this station in October, for at least the past 27 years.
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Rick Anderson
11/9/13
243 Mountain Ave.
New Providence, NJ
(908)464-8912

PRESIDENTS COLUMN
By K2MUN

Last month I got distracted by Software Defined Radio (SDR), a worthy topic. However, what's an HF radio of any kind without an antenna? A couple of months ago I mentioned my 'wonky' antenna and said I would discuss the issues in a future column. The future has arrived!

Before we get to the technical definition of 'wonky', I'd like to deal with a more basic issue: What is an antenna? Of course all the readers of this column know what an antenna is. Right? Well, we all know it is some metallic thing that, under the proper conditions, radiates or receives radio frequency energy. I'm going to concentrate on transmission and limit my discussion to the HF bands (say from 80 meters up to 10 meters, in this case).

Okay 'metallic thing' covers a wide range of ills. Let's assume we want to create a 'good' antenna. That is, one that radiates most of the power that is produced by the rig in our shack. Even better, one that radiates most of the power in the direction(s) we want. We all also know what a 'good' antenna consists of: A rotating beam mounted on a tall tower — preferably on the top of a mountain. If you have seen W1AW, you have seen a nice antenna farm.

Most of us don't have the luxury of even dreaming of such antenna riches. For me, an antenna is a wire(s) in my attic. Not even a 'bent coat hanger' outside! So, if you have only a bone, make soup.

Let's go back to the basic theory. Everyone knows that it is best if an antenna is resonant. Hmmm. Well, not necessarily. What is really needed? In order to have the antenna radiate most of a rig's power output all we have to do is make sure that the power isn't absorbed by something else. After all, it is a well-known adage that the power has to go somewhere. Where can it go? It can be wasted in the transmission line or go to heating your shack. It can be absorbed by some poor connections or badly designed gear between the rig and the radiator — or it can be radiated, which is what we want.

This is why conventional wisdom suggests a 'resonant' antenna. Properly designed, such an antenna will present a mostly resistive load, of the proper magnitude, to 'match' the feed line and, thus, waste as little power as theoretically possible. The power is generated by the rig, transferred with minimal loss through the transmission line to the antenna and mostly radiated into the ether.

The neat thing about an attic antenna (which can be replicated in the outdoors with more difficulty) is that it is possible to tune the antenna right at the radiating element instead of at the rig. That is, put a tuner (an autotuner, since you probably can't reach, or easily control it, from your rig) right at the antenna. This means that over quite a large range of impedance almost all the power from the rig can traverse the transmission line, tuned to near 1:1 SWR, so little power is lost in transmission up the line, to the tuner and thence smoothly into the antenna. A resonant antenna is not necessary in this case!

In the real world, not all antenna impedances are equal since there is a limit to the range of antenna impedance a practical (inexpensive) autotuner can match. However, even the relatively reasonable LDG Electronics, Z-11Pro tuner I am using (less than $200) can handle 125 watts and tune from 6 to 1000 ohm loads. That's quite a range and with an external transformer (Balun) the range can be moved higher or lower as desired.

The antenna can be practically anything and the tuner can transform it into a match for the 50 ohm transmission line (RG-8X in my case) from the rig. This means that I can put practically anything into my attic and make it radiate HF energy efficiently.

However, I mentioned another condition — we want the radiation to go somewhere useful. Usually not straight up or down but at an angle and in a direction desired. I have worked with basically horizontal wires and have found that making them near-resonant dipoles tends to make design easiest and matching most reliable. Dipoles have well-understood properties in terms of radiation directions. Depending on height above ground a half-wave dipole radiates at a reasonable vertical angle and even provides some gain in its broadside direction — at the expense of no sensitivity end-on.

What I have actually built is a simple two band 'fan' dipole tuned roughly on 20 meters and 10 meters (which is what I have space for). This is nothing but two near-parallel dipoles cut for their respective bands and simply connected in parallel. With this simple arrangement, the tuner can achieve better than 1.5:1 SWR on all ham bands from 30 meters through 10 meters with even some parts of 40 meters accessible. The antennas are fed with RG-8X, into the LDG tuner and thence into a 1:1 current balun, assuring minimum unbalanced currents on the coax to minimize feedback of RF into my shack.

The main 'wonky' part is that 40 meters cannot be tuned reliably and an attempt to add a third fan element have, so far, proved to make things worse. What I will do next time I visit this issue, is to describe the measurements made and the modeling done to understand what is going on and how to fix it. In the meantime, I encourage you to try this at home. However, there is one important warning — the exact architecture of my antenna system leads to a lot of tradeoffs (e.g. having the tuner at the antenna makes it possible to handle extreme SWR that would cause high losses in another design). Next time I'll try to give you tools to experiment with. In the meantime, enjoy adding to your technical understanding by focus on how your antenna(s) work.

Another reminder: make sure our NPARC Holiday Luncheon is on your calendars. This year the Luncheon will be held at Chimney Rock in Gillette, as it was last year, on Saturday, December 7. The cost is also as it was last year, $28, payable by check made out to NPARC and delivered by some means to Dave Barr, our club treasurer: Mail; at the next meeting or even at the door; all work. The menu and detailed information has been posted on the club e-mail reflector. Come celebrate the Holidays: Good food; good company; installation of our 2014 officers, plus various well-deserved awards.

NPARC Members Assist at the New York Marathon

Bill, WA2CG, Front row left
Bryan, KC2ZSZ, Rear row left

SCIENTIFIC TIDBITS

Watching the Tubes

For a couple of decades, universities and research labs have been touting the wonders of carbon nanotubes, but it has seemed like nothing practical ever emerges from the technology. Indeed, "Carbon nanotubes have largely been laboratory curiosities as far as microelectronic applications are concerned," note a researcher at IBM Labs (www.research.ibm.com). However, IBM recently announced a breakthrough that defines a serviceable manufacturing process for carbon semiconductors that are cheaper and faster than silicon-based devices.

A carbon nanotube is just a one-atom-thick sheet of carbon that has been rolled up to form a tube. The tube can be used to form the core of a transistor, with the advantage that it takes up less than 10 nm of space (half the size of the most advanced silicon devices) and yet offers between five and ten times better performance. They come with two basic problems, though. First, when you generate the things (via arc discharge, laser ablation, or other methods), they come in a mix of metallic and semiconducting versions. You have to somehow separate the two, as only the semiconducting ones are useful for electronic devices. Second, you have to precisely control the alignment and placement of them on a device substrate, which is not exactly something you can do with a magnifying glass and a pair of tweezers. It has been reported in various journals that the two types can be separated fairly easily by various chemical processes, so that does not seem to be the fly in the ointment. To overcome the second hurdle, IBM has developed a unique method based on ion-exchange chemistry that allows precise and controlled placement of aligned carbon nanotubes on a substrate at a high density.

The bottom line is that researchers have succeeded in depositing more that 10,000 of them on a single chip using readily-available mainstream manufacturing processes. They are still not looking at commercial devices in the immediate future. However, as this new placement technique can be readily implemented involving common chemicals and existing semiconductor fabrication, it will allow the industry to work with carbon nanotubes at a greater scale and deliver further innovation for carbon electronics.

Jim WB2EDO