

MOUNTAIN SPARK GAPS

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



**Website: <http://www.nparc.org>
Club Calls: N2XJ, W2FMI
Facebook: New Providence Amateur Radio Club
(NPARC)**

VOLUME 54 NO. 5 May 2019

Regular Meetings

**6/10 & 6/24 Monday 7:30
DeCorso Community Center**

Upcoming Events

Field Day 6-22—6-23

Meeting Schedule

Regular Meeting: 7:30—9:00 PM
**2nd & 4th Monday
of each month** at the
NP Senior & Adult Center
15 East Forth Street
New Providence

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 2018

President: W2PTP Paul Wolfmeyer
201-406-6914
Vice President: K2GLS Bob Willis
973-543-2454
Secretary: K2AL: Al Hanzl
908-872-5021
Treasurer: K2YG Dave Barr
908-277-4283
Activities: KA2MPG Brian Lynch
973-738-7322

—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
28,084 — 28,086
Will be using PSK and RTTY
Net control K2YG

Club Internet Address

Website: <http://www.nparc.org>
Webmaster KC2WUF David Bean
Reflector: nparc@mailman.qth.net
Contact K2UI, Jim

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Contributing Editors:
WB2OOQ Rick Anderson
W2PTP Paul Wolfmeyer
K2UI Jim Stekas

Climatological Data for New Providence for April 2019

The following information is provided by
Rick, WB2OOQ, who has been recording daily
weather events at his station for the past
38 years.

TEMPERATURE -

Maximum temperature this April, 78 deg. F
(April 19)
Last April (2018) maximum was 85 deg. F.
Average Maximum temperature this April, 64.3
deg. F
Minimum temperature this April, 30 deg. F
(April 1)
Last April (2018) minimum was 27 deg. F.
Average Minimum temperature this April, 47.5
deg. F
Minimum diurnal temperature range, 6 deg.
(45-39 deg.) 4/5
Maximum diurnal temperature range, 26 deg.
(64-38 deg.) 4/3; (65-39) 4/6

Average temperature this April, 55.9 deg. F
Average temperature last April, 48.2 deg. F

PRECIPITATION -

Total precipitation this April - 4.94" rain
Total precipitation last April - 5.49" rain/
melted snow; 6.0" snow

Maximum one day precip. event this April -

April 20, 1.26" rain
Measurable rain fell on 15 days this April,
11 days last April.
Measurable snow fell on 0 days this April, 1
day last April.

YTD Precipitation - 16.72"
Season to Date Snowfall - 23.3" (11/15/18-
3/31/19)

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Rick Anderson
5/12/19
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

President's Column May 2019

Unfortunately, Ria N2RJ took sick May 13th and lost her voice—so we have postponed her SDR presentation to September 9, our first meeting in the Fall.

Our NPARC “showing” at the Memorial Parade Monday was excellent with 13 marchers! As always Rick WB2QOQ did a stellar job in organizing and coordinating our participation in the parade. Thanks Rick! As I said last month, it is good to be visible in New Providence activities; the NP Rec Dept. does provide our insurance.

Field Day is **June 22 and 23!** Note this is **NOT the last full weekend of June—but rather the fourth full weekend of June** (June has 5 full weekends this year) ... We will be at the Governor Livingston High School back lot as usual. **We have only one meeting--June 10-- to finalize our planning!** We have leaders (and associate leaders!) for the VHF station (K2AL and WB2QOQ), the two HF stations (Near—W2PTP and N2TO; Far—K2GLS and N2JU), the GOTA station (W2IOC), Logging/Reporting (KC2WUF) and Food (KC2OSR). A number of you have stepped up to continue roles done previously...thanks much! We still have more roles to fill so let me know or come to the June 10 meeting...

Looking forward to Field Day,
73 for now

Wolf
W2PTP
201-404-6914 or W2PTP@arrl.net

New Providence Memorial Day Parade



Enjoying the Pancakes



Starting Out

New Providence Memorial Day Parade



The End is in Site

Pictures and transportation courtesy of Rick, KB2QOQ

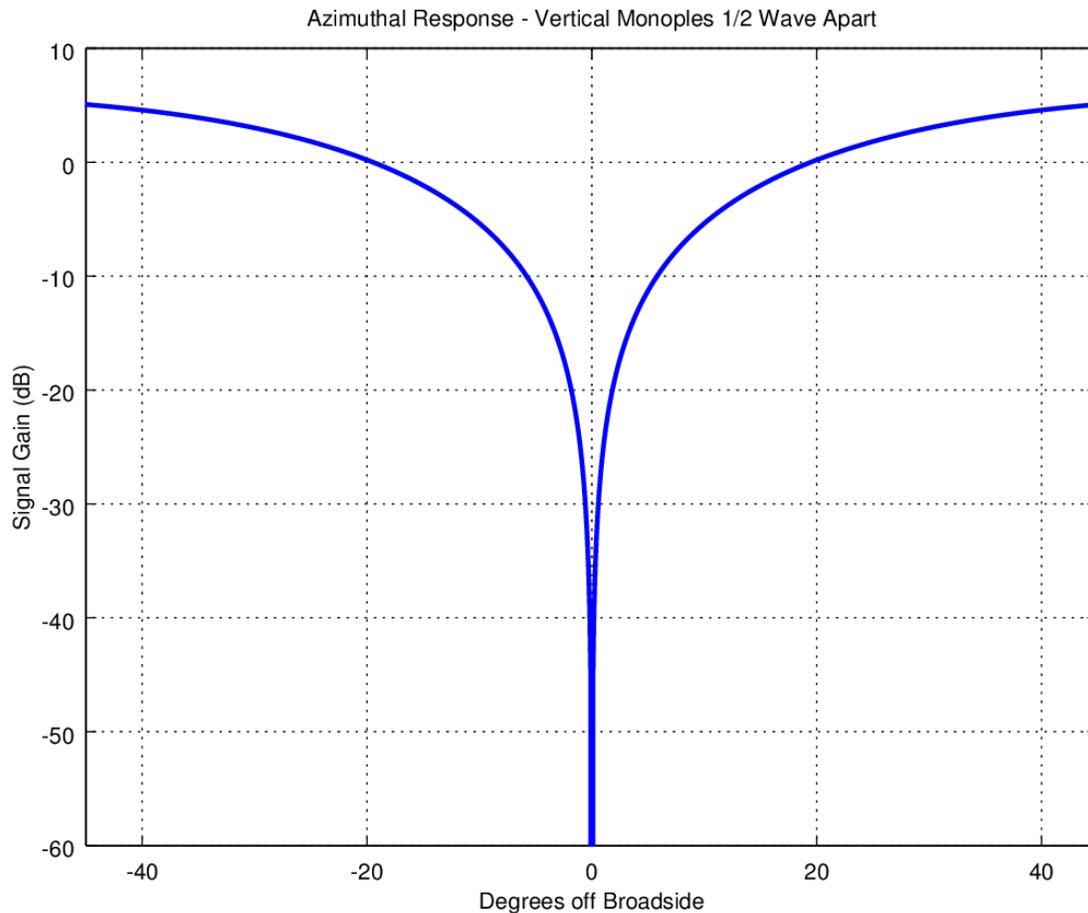
DF Bearing Estimation Accuracy

Jim Stekas - K2UI

Last year around this time NPARC and Tri-County radio clubs held a joint fox hunt. The typical antenna used for a fox hunt is a pair of vertical dipoles spaced $\frac{1}{4}$ wavelength apart and phased to produce a cardioid pattern with a single notch. (A $\frac{1}{2}$ wavelength spacing would have a figure eight pattern and 180 degree bearing ambiguity.)

The beamwidth of a cardioid is very big (about 120 degrees) making it hard to understand how it could possibly be useful in determining the bearing to the fox. In the heat of battle high resolution isn't possible due to topography anyway, so we are usually satisfied with an indication that the fox lies ahead, right, left or behind us.

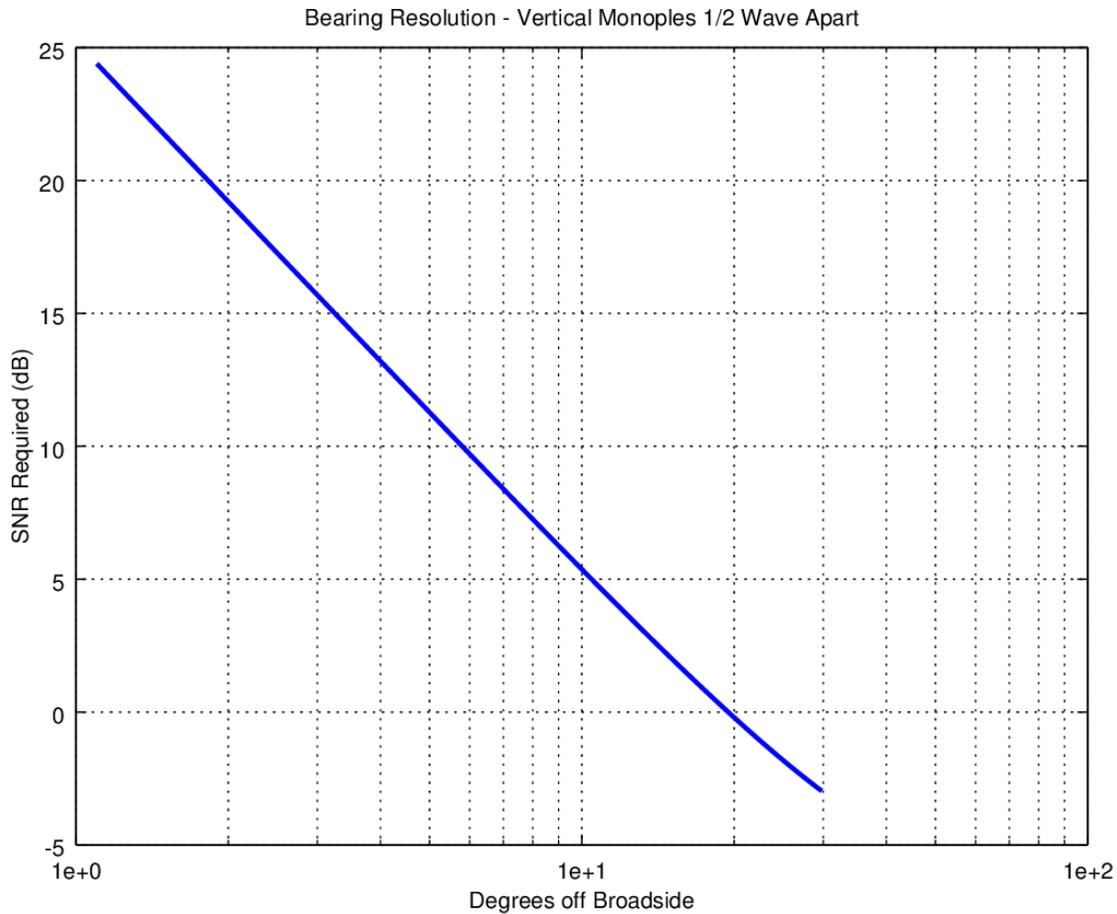
Any directional antenna is capable of giving bearing measurements much accurate to much better than a beamwidth. The easiest way to see this is to consider the deep narrow notch in the pattern.



The figure above shows the shape of the notch in the pattern of a pair of vertical antennas separated by $\frac{1}{2}$ wavelength. At -60 dB down the width of the notch is much less than 1 degree!

The plot above is theoretical. Unfortunately, building an antenna and phasing system with a pattern well controlled over 60 dB is very difficult and beyond the capabilities of most homebrewers, and it probably wouldn't be that useful anyway. To null a signal by 60 dB, we need to start with a signal that is more than 60 dB above the noise (SNR > 60 dB), which means $S_9+10\text{dB}$ or higher.

Building an phased antenna balanced to 20 dB (1 part in 100) is something that *is* doable, and for signals with SNR > 20 dB we can get bearing resolutions of 2 degrees. The plot below shows the bearing resolution ($\frac{1}{2}$ notch width) that can be achieved for signals of various SNR levels.



Mathematically, it is possible to get equally good bearing estimates by steering the main lobe as it is through steering the notch. This involves using signal measurements to fit the shape of the main lobe. This is what we do manually by rotating the antenna left and right and estimating the peak signal direction as the signal varies due to fading and changes in antenna orientation.

A better approach is to feed the signals of both antennas into an SDR and cross-correlate them. SDR allows the antenna to be “rotated” virtually by shifting the relative phases and measuring the response at many different beam directions from a single data capture (eliminating errors due to fading between measurements.)