

# **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 55 No. 10 Sept. 2022**

## **Regular Meetings**

**Second & Fourth Mondays**

**10/11 and 10/14**

**Note: 10/10 is a Holiday**

## **Upcoming Events**

**Digital Net Mondays at 9:00 PM**

**PSK on 80 or 10 meters**

**CW training Net, Thursdays at 9:00 PM**

## Meeting Schedule

**Regular Meeting: 7:30—9:00 PM**  
**2nd & 4th Monday**  
**of each month**  
Watch for Emails

**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 2022

President: W2PTP Paul Wolfmeyer  
201-406-6914  
Vice President: W2EMC Brian DeLuca  
973-543-2454  
Secretary: K2AL: Al Hanzl  
908-872-5021  
Treasurer: K2YG Dave Barr  
908-277-4283  
Activities: KC2OSR: Sam Sealy  
973-462-2014

## —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  
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](mailto:nparc@mailman.qth.net)  
Contact K2JV, Barry

## MOUNTAIN SPARK GAPS

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W2PTP Paul Wolfmeyer  
K2UI Jim Stekas

## Climatological Data for New Providence for August 2022

The following information is provided by Rick, WB2OOO, who has been recording daily weather events at his station for the past 41 years.

### TEMPERATURE -

Maximum temperature this August, 96 deg. F (August 9)  
Last August (2021) maximum was 90 deg. F.  
Average Maximum temperature this August, 86.4 deg. F  
Minimum temperature this August, 60 deg. F (August 14)  
Last August (2021) minimum was 59 deg. F.  
Average Minimum temperature this August, 68.8 deg. F  
Minimum diurnal temperature [range, 7 deg. \(75 - 68 deg.\)](#) 8/1  
Maximum diurnal temperature range, [29 deg. \(90 - 71 deg.\)](#) 8/6

Average temperature this August, 77.6 deg. F  
Average temperature last August, 75.5 deg. F  
Number of days of Max. temperature, 90 degs. or higher - 10  
Number of days of minimum temps. of 70 deg. or higher - 13  
Number of consecutive days of 90 deg. or higher temps. - 8 (8/2 - 9)

### PRECIPITATION -

Total precipitation this August- 2.97" rain  
Total precipitation last August- 6.46" rain

Maximum one day precip. event this August-

[August 22, 1.67" rain.](#)

Measurable rain fell on 6 days this August, 11 days last August.

YTD Precipitation - [28.53"](#)

=====  
Rick Anderson 9/20/2022

243 Mountain Ave.  
New Providence, NJ  
(908) 464-8911  
[rick243@comcast.net](mailto:rick243@comcast.net)

Lat = 40 degrees, 41.7 minutes North  
Long = 74 degrees, 23.4 minutes West  
Elevation: 380 ft.

## President's Column September 2022

We are back at Salt Brook School for our first meeting of the month. In October (due to a school holiday) our first meeting will be **October 11<sup>th</sup> TUESDAY** at Salt Brook. The door to use is the door to the right side as you stand in the blacktopped sports area facing the school. (This was also the primary door for bringing in equipment at the last auction.) We do plan a hybrid setup also.

Our second meeting of September was a real highlight with “contester” Vice Admiral Scott Redd K0DQ. His Navy career took him to over 30 QTHs, but he managed to find ways and stations to operate. He won “grand slams” at contests. He had 283 countries worked before he went to the Naval Academy, starting from a crystal set for listening and then a Hallicrafters 40B and Globe Scout transmitter as a Novice. Since DX required operating from within a 150 mile radius, he moved on to contesting and really made his mark! Scott also had a time with a high-tech firm and then a distinguished government career. His talk was recorded and the recording info distributed on the reflector; it will stay posted for about a month. Thanks to Heather KD2VZA for arranging this program! We were also pleased to have several guest attendees.

We will soon be electing officers for next year. I urge you to consider running or nominating someone. It takes leadership to keep the club running. I have not found it difficult as club members step up to the tasks; this is a hallmark of this club. **But leadership is required. Let Tim Farrell KD2EKN know of your willingness to be an officer.**

**Keep the weekly nets in mind and join in them!!**

73 for now, Wolf W2PTP, 201-404-6914, [w2ptp@arrl.net](mailto:w2ptp@arrl.net)

## Optimum Signal Combining

Jim Stekas - K2UI

One of the more irritating radio phenomena is fading, or QSB. What could be worse for a ham about to break through a pileup than to have the DX station signal drop 2 S-units into the noise.

Back in the early days of radio (1920s) experiments showed that signal fading for widely spaced antennas was independent. If one plotted the S-meters of two ham stations several miles apart receiving W1AW they would look like two independent random signals. Each would show deep fades, but they would occur randomly at different times. If one could listen to both receivers at the same time, the signal would very rarely fall below the noise on both receivers at the same time. This is the advantage of diversity reception.

In 1938, Hallicrafters introduced the DD-1 dual diversity receiver (below), essentially two receivers in the same box. The signals from both receive paths could be combined in the operators head, or AVC<sup>1</sup> could be used to select the stronger signal.



Antennas spaced only 10+ wavelengths apart are certainly “widely spaced” enough for independent fading, but spacing of 1-2 wavelengths is often enough to give significant degree of independent fading. Cellular systems get diversity from multiple antennas separated by multiple wavelengths each transmitting both vertically and horizontally polarized signals. Your smartphone will typically see at least 4 signals from the tower, each fading independently from the others.

Since bits are \$\$\$ to the cellular providers, much research has gone into optimally combining the multiple signals to squeeze every last bit out of the radio link. Since bit rate is limited by the signal-to-noise ratio<sup>2</sup> (SNR), combining is all about maximizing SNR.

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1 Automatic Volume Control, now called AGC, which is the signal that controls gain and drives the S-meter.  
2 Shannon’s theorem.

So what is the optimal way to combine the signals from two widely spaced identical antennas? What relative gains should we apply to the two signal paths?

First, assume our two antennas provide input RMS signal levels of  $V_1$  and  $V_2$  and produce equal RMS noise voltages of  $V_N$ . If we apply voltage gains of  $g_1$  and  $g_2$  and combine, we will get an output signal power of  $P_{OUT} = R(g_1 V_1 + g_2 V_2)^2$ . Doubling the gains will give a greater output but won't change the SNR since the signal and noise will together. So let's confine ourselves to gain values that give a constant output noise level:  $g_2^2 + g_1^2 = 1$ . With this constraint, the values of gain that maximize output power (while leaving the noise unchanged) will maximize SNR. This occurs when the following condition is satisfied:

$$\frac{V_1}{V_2} = \frac{g_1}{g_2} \quad \text{or} \quad \frac{SNR_1}{SNR_2} = \frac{g_1^2}{g_2^2}$$

If SNR is the same for both antennas we combine with equal gains and  $SNR_{OUT} = SNR_{IN} + 3dB$ , which is no surprise. The equations allow optimum gains to be derived for any combination of SNRs. What is surprising is that even when the SNR of two antennas differ by 20 dB, it is still better to combine a bit of the weaker signal than exclude it. While it is proven mathematically that a good signal can be improved by adding in a bit of a poor signal, it certainly isn't intuitive.

## References

1. Read about the DD-1 at [http://hadmernok.hu/2013\\_1\\_kovacs\\_2.pdf](http://hadmernok.hu/2013_1_kovacs_2.pdf)