

# **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. 10 October 2019**

## **Regular Meetings**

**11/11 & 11/25 Monday 7:30  
DeCorso Community Center**

## **Upcoming Events**

**Annual Holiday Luncheon  
Chimney Rock 12/7**

**Kid's Day  
1/4/2020**

**Auction  
2/22/2020**

## 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](mailto:nparc@mailman.qth.net)  
Contact K2UI, Jim

## MOUNTAIN SPARK GAPS

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Editor: K2EZR Frank McAneny  
Contributing Editors:  
WB2OOQ Rick Anderson  
W2PTP Paul Wolfmeyer  
K2UI Jim Stekas

## Climatological Data for New Providence for September 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 September, 84 deg.  
F (September 23)  
Last September (2018) maximum was 89 deg.  
F.  
Average Maximum temperature this September,  
72.2 deg. F  
Minimum temperature this September, 51 deg.  
F (September 19)  
Last September (2018) minimum was 53 deg. F.  
Average Minimum temperature this September,  
60.0 deg. F  
Minimum diurnal temperature range, 6 deg.  
(74-68 deg.) 9/2  
Maximum diurnal temperature range, 19 deg.  
(80-61 deg.) 9/22

Average temperature this September, 66.1  
deg. F  
Average temperature last September, 69.0  
deg. F

### PRECIPITATION -

Total precipitation this September - 1.64"  
rain  
Total precipitation last September - 7.54"  
rain

Maximum one day precip. event this September  
-  
September 2, 1.43" rain  
Measurable rain fell on 9 days this Septem-  
ber, 15 days last September.

YTD Precipitation - 48.63"

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Rick Anderson  
10/21/19  
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.  
CoCoRaHS Network Station #NJ-UN-10

## President's Column October 2019

This month we welcome Francesco KD2SRL to membership in NPARC! At last Monday's meeting, club members indicated a desire to participate in Kid's Day on January 4, 2020. Kevin N2TO will coordinate that activity.

Repeating from last month: The nomination process for club officers for 2020 is underway. We thank Guy Brennert K2EFB for leading the nominating process for a number of years; he has asked to retire. Our new committee is Tim Farrell KD2EKN and David Bean KC2WUF. Please let them know of your interest in an officer position and/or respond to them when asked. Elections will be the second meeting of November.

Thanks to Al K2AL for issuing an updated club roster. And thanks to Barry K2JV for the recent badge order. Hopefully, the badges will be here soon. Your treasurer Dave K2YG is ready to accept your checks for the Holiday banquet at \$30 per head. And he will accept checks for next year's dues at \$20.

Future dates:

December 7—first Saturday in December—our holiday party!

Saturday January 4—Kid's Day.

Saturday February 22—our annual auction.

73 for now

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

## Fun With Ferrite

Jim Stekas - K2UI

Recently, my addiction to antenna experiments put me in the market for some FT240-43 ferrite cores. A bit of Googling turned up many sources offering cores for around \$12, including shipping and handling. Mouser's price was just over \$5 a core, so I put in an order. Filling out my order I noticed that for 10+ cores the price dropped to about \$4 each, so I ordered 10. Total cost, less than \$5 a core delivered. About five days after placing the order, a box from Mouser arrived with my toroids. Despite the fact that 95% of the box's volume was filled with bubble wrap, three of the ten toroids were broken.<sup>1</sup>

I emailed Mouser a picture of the broken cores and they immediately overnighted me three new ones.

Naturally, with ten brand new FT240-43 cores in hand the uppermost thing in the ham radio lobe of my brain was figuring out how to salvage the broken cores. Another trip to Google turned up a vast army of folks explaining their repair techniques, usually involving cyanoacrylate.<sup>2</sup> One fellow explained his technique for fracturing new ferrite cores and gluing them together to produce a high power core that could handle high current without saturating. A fair number of pessimists advised that the proper way to deal with broken ferrite cores was to toss them in the garbage.



Being a “glass half-full” guy, I tried to bind some the most cleanly broken pieces of ferrite together with cyanoacrylate, but it was hopeless. I switched to JB Weld epoxy and had better success. The end result was one core that went together “almost perfectly”, and two cores that were pretty rough. I taped the three cores together hoping to get something usable, but the three core stack ended up producing only 1/3 the inductance of a single core.

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1 The sheet of toroids was laid on the bottom of the box, with the bubble wrap in top.  
2 Sold under many names, including Crazy Glue, Super Glue, etc.



I realized that the least damaged core (figure on the left) had a broken section with only 1/3 of the cross section left intact. (5 o'clock position). So it was likely that my three core stack got most of its inductance from 1/3 of the least damaged core. The rest of the ferrite ( $2\frac{2}{3}$  cores worth) contributed nothing.

The formula for the inductance of a coil wound on a ferrite toroid is:

$$nH = A_L \cdot N_{turns}^2$$

For the FT240-43 core  $A_L = 1075$  and 10 turns should result in a 107.5 uH inductance.

The formula for  $A_L$  is  $A_L \propto \frac{\mu A_{rea}}{l_e}$  where:

- $\mu$  is the ferrite permeability (800 for type 43 ferrite),
- $A_{rea}$  is the cross-sectional area and
- $l_e$  is the effective magnetic path length around the core.

Suppose a toroid was split into two half moons, and glued back together with the glue filling two very small gaps in the ferrite of total length  $l_g$ . What would the  $A_L$  be? To answer the question we use

the fact that reluctance,  $R = \frac{l_e}{\mu A_{rea}}$ , is the magnetic analog of electrical resistance. So the total

effective reluctance is  $R_e = R_{43} + R_{glue}$ , the sum of the reluctance of the type 43 ferrite and the glue,

which gives  $\frac{l_e}{\mu} = \frac{l_e}{\mu_{43}} + \frac{l_g}{\mu_g}$ . Since the glue is non-magnetic<sup>3</sup>  $\mu_g = 1$ , and we have  $\frac{\mu}{l_e} = \frac{\mu_{43}}{l_e + l_g \mu_{43}}$

after factoring in the glue filled gap. When the width of the gap,  $l_g = l_e / \mu_{43}$ , the  $A_L$  will be cut in half. For the FT240-43 this amounts to a gap of only 0.008in.

Very few of us would attempt gluing a shattered ferrite core together. But just about all of us have used clip-on ferrite chokes. These chokes are far smaller than the FT240 core (2.4" O.D.), and a gap of 0.001" between the two ferrite halves can destroy the choke's effectiveness. So it isn't a bad idea to use some cable ties to make sure both halves of the choke fit together tightly.

<sup>3</sup> The permeability of a vacuum, air, wood, plastic, and everything non-magnetic is  $\sim 1$ .