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. 8 August 2021

Regular Meetings

Second & Fourth Mondays
"ZOOM" until we can all
get together again

Upcoming Events

Digital Net Mondays at 9:00 PM
PSK on 80 or10 meters
CW training Net, Thursday at 9:00 PM
Watch for Email announcements.

Meeting Schedule

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

ZOOM until further notice

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 2021

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: 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
Contact K2JV, Barry

MOUNTAIN SPARK GAPS

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WB2QOQ Rick Anderson
W2PTP Paul Wolfmeyer
K2UI Jim Stekas

Climatological Data for New Providence for July 2021

The following information is provided by Rick, WB2QOQ, who has been recording daily weather events at his station for the past 40 years.

TEMPERATURE -
Maximum temperature this July, 93 deg. F (July 6,17)
Last July(2020) maximum was 93 deg. F.
Average Maximum temperature this July, 83.6 deg. F
Minimum temperature this July, 56 deg. F (July 31)
Last July(2020) minimum was 65 deg. F.
Average Minimum temperature this July, 67.3 deg. F
Minimum diurnal temperature range, 7 deg. (76 - 69 deg.)7/13
Maximum diurnal temperature range, 24 deg. (93 - 69 deg.)7/6

Average temperature this July, 75.5 deg. F
Average temperature last July, 78.8 deg. F

PRECIPITATION -
Total precipitation this July- 7.54" rain.
Total precipitation last July- 7.46" rain.

Maximum one day precip. event this July-

July 9, 2.0" rain.
Measurable rain fell on 16 days this July,13 days last July.

YTD Precipitation - 29.69"

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Rick Anderson
8/18/2021
243 Mountain Ave.
New Providence, NJ
(908)464-8911
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 August 2021

The hot, hazy, humid days of summer are hopefully drawing to a close and it's time to return to business. I'll have more on our September 13 business (zoom) meeting later in this column.

First, thanks to Al K2AL for an interesting program on what's he's done with station grounding. The aluminum "flashing" (sheets under the equipment on the equipment shelves) was particularly intriguing and not expensive to implement.

Our second meeting of the month was a "show and tell" sharing meeting. I like to hear what people are doing in the hobby and what they are experiencing. The variety of things to do in our hobby is terrific and we need to embrace its diversity—from building and experimentation to traffic handling and operating--hf, vhf, FT4 and 8, RTTY, CW and phone.

While some of us talked about recent "contest" experience, it caused me to reflect that "contesting" can be intimidating—I prefer to think of it as just "getting on the air". If I feel frustrated not getting through a pileup or getting a response to my call, I just walk away and come back to it a bit later. That was my approach to the recent NAQP (North American QSO SSB Party); I hadn't been on phone for a while and I'm not really a "ragchewer" so the NAQP got me going and working on my SSB skills. Contributing to one of Al's teams was also a motivator.

On to "business"—

We talked in our June business meeting about the need to add a "dissolution" bylaw to our Constitution and Bylaws. While none of us want to plan for the club terminating, we should have a simple bylaw to handle any remaining funds so that the state doesn't make a distribution for us. Their distribution might not be consistent with our mission as an amateur radio club.

So your Executive Committee will be introducing at our September 13 meeting the following dissolution bylaw:

"On dissolution of this organization, remaining funds would be distributed to a 501(c)(3) Amateur Radio organization or organizations as determined by the Executive Committee."

Once introduced and seconded, we would, according to our Bylaw amendment requirements in our NPARC Constitution, vote on it at our next (October) business meeting.

Also at September's business meeting I will be reviewing the Executive Committee developed and approved NPARC budget for the 2022 Fiscal Year (which began August 1). Your Executive Committee wants to plan for 2022 to be a "normal year"—time will tell what we can actually do in 2022.

Enough for now…

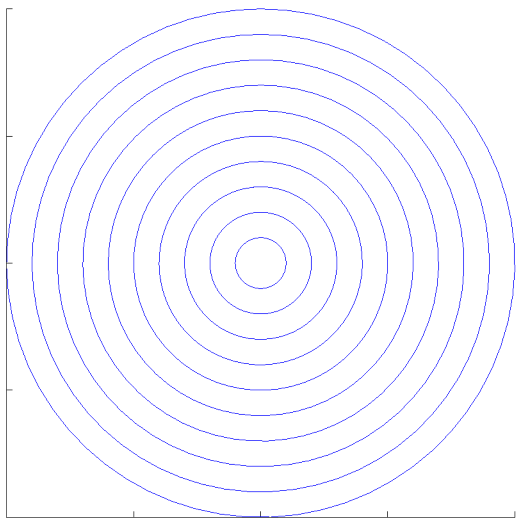
Don't forget the nets, Sunday phone, Monday digital, and Thursday CW!

73, Wolf W2PTP, 201-404-6914, W2ptp@arrl.net

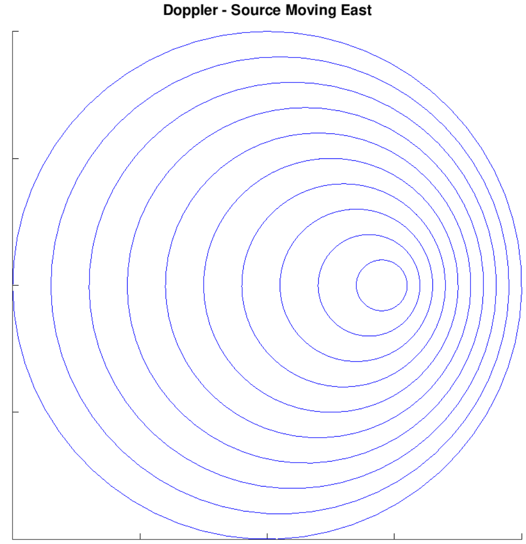
Doppler Effect – Friend or Foe?

Jim Stekas - K2UI

A train passing a railroad crossing will sound its horn to warn of its approach. Someone waiting at the crossing will hear the pitch of the horn drop drop sharply as the train passes. This frequency shift is something we have all experienced, and it is a consequence of the Doppler effect.



The Doppler effect is a general wave phenomenon that occurs when the distance between source and receiver is changing. The figure at left shows waves from a stationary source propagating outward. The wave crests form circles that expand with time at the wave velocity, C. The received and transmitted frequencies are the same.



The figure at right shows the waves emanating from a source moving East (right). Wave crests are still expanding circles, but each has a center a bit further East than the previous one. A receiver in the East observes crests passing by at speed C, but they are closer together[1] than in the case above. As a result the frequency received is higher than the transmitted frequency. In the West, crest spacing is increased and the frequency received is lower than the transmitted frequency.

The formula for Doppler shift is $f_{RX} - f_{TX} = -\frac{v_R}{C}$ where $v_R = \frac{\Delta R}{\Delta T}$ is the rate of change in range. When a source is approaching, the range is decreasing, the range change is negative, and the Doppler shift is positive.

The first time the ham community had to deal with Doppler was receiving telemetry signals from Sputnik in 1957. Sputnik traveled at 8 km/s and transmitted on 20 and 40 MHz. The maximum Doppler shift at 40 MHz was: $\delta f = \frac{8\,x\,10^3}{3\,x\,10^8} 40\,x\,10^6 = 1067\,Hz$. On a flyover, the total frequency change would be 2133 Hz. Hams and SWLs plotted the frequency versus time to estimate the orbital parameters of the spacecraft.[2]

1 A shorter wavelength.

2 Check out AMSAT if you are interested in orbital parameters and how the are measured. It goes far beyond fitting the parameters of an ellipse.

The Doppler shift increases with TX frequency and relative RX/TX speed. Consider 60 MPH[3] operation at 1296 MHz, where $\delta f = \frac{30}{3\,x\,10^8} 1296\,x\,10^6 = 130\,Hz$. This represents the worst case situation for mobile ham communications, but it is similar in tolerance to a typical 10 MHz reference oscillator. So Doppler isn't an issue for the mobile ham.

For 440 MHz satellite operation Doppler shifts are in the $\pm 9\,kHz$ range, which is a large error even for FM. For narrowband FM an error of 1 kHz is tolerable, so we need satellite tracking software that can predict Doppler shifts to with 1 kHz and tune the receiver. For SSB signals the receiver should be tuned to within 100 Hz of transmitted signal, which is 10X tighter than required for FM.

The microwave bands of 5G are in the 25-50 GHz range and the 5G signal has been designed to be tolerant of 15 kHz Doppler shifts experienced by users on 200 MPH bullet trains. This is accomplished by Orthogonal Frequency Division Multiplex (OFDM) which can be used toe create a 400 MHz wide signal from 1666 individual 240 kHz subcarriers. A 15 kHz shift of a 240 kHz carrier is comparable in magnitude to a 1 kHz shift of a 2m FM signal, that is to say ”smallish”. It's close enough that channel compensation algorithms can reduce the “smallish” distortion of a 15 kHz Doppler shift to near zero, enabling teenagers to play real time video games on the bus to school.

Doppler isn’t always a problem. It can be the key to system performance. Police speed measurement radars operate at about 25 GHz. Since the radar pulses make a round trip between the radar and auto, a 1 m change in range results in a 2 m change in signal path length. Therefore the Doppler shift in radar is a factor of 2X higher than for point-to-point links. For a 60 MPH vehicle the radar sees a Doppler shift of 5 kHz. Mixing the received signal with the transmitted signal gives and audio signal that is fed to frequency counter for precise Doppler shift, and hence speed, measurement. Accuracy is about 1 MPH for police radars.

The traditional radar we see in WW2 movies sweeps the sky with a series of powerful pulses from a rotating directional antenna. CW pulses are good for measuring Doppler frequency shift but poor at resolving range (round trip delay) because it repeats every cycle. In contrast, broadband noise pulses are good for measuring range, but not good for Doppler because a small shift in noise spectrum is hard to detect. But by clever pulse design (e.g. a changing frequency chirp) the radar can measure both range and Doppler. For weather applications Doppler radar gives a 3D picture of cloud reflectivity and wind speed. Doppler allow the radar to see through the slow moving clouds at the perimeter of a storm and image the rapidly rotating core. In defense applications, Doppler radar is used to distinguish between background clutter and rapidly closing targets.

3 60 MPH ~ 30 m/s