

Meeting was on March 22nd at the
MCL Cafeteria in Kettering

March
2019

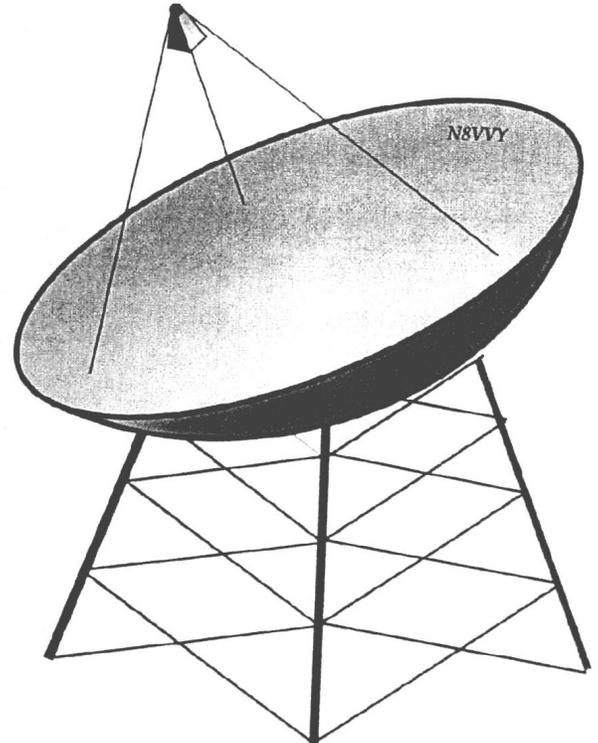
ANOMALOUS PROPAGATION

Newsletter: *The Midwest VHF/UHF Society*

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Annual Society membership is \$12 (or 16 fr print).
Please make checks payable to Joe Muchnij, N8QOD.



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Beacons: 1296.079 **W8KSE** EM79ur Dayton, OH---- 2W to Big Wheel at 800' AGL.

Listen for the **K9AYA Beacons** at EM79qk, 2W @ 10,368.000 MHz
 both are copied by K4TO daily. 1W @ 5,760.000 MHz

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2019 Hamvention: Fr-Sun 17,18,20 May, 2019 Xenia, OH Fairgrounds
Tickets (good fr 3 days) \$22 in Advance, \$27 at the Gate
MVUS Booth as last year

MVUS Officials:

Pres. Tom Holmes, N8ZM,
 Vice Pres. Mike Suhar, W8RKO
 Secretary, Jim Bacher, WB8VSU
 Treasurer, Joe Muchnij N8QOD
 Bulletin Editor, Gerd Schrick, WB8IFM
 Assistant Editor, Steve Coy, K8UD
 Membership: Joe Muchnij, N8QOD
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DE N8ZM: Most of you probably noticed in our last episode that Gerd has decided that at almost 90 years young, he'd like to slow down a little. Given the high level of activity he appears to have maintained for most of his life (at least the part I've witnessed at my tender age), he has earned a break. SO, I'm looking for someone, or several ones, to pick the reins of putting Anom Prop together each month.

The job description would be Editor-In-Chief, as much of the publishing work is moved along by Steve Coy, Joe Muchnij, and Jim Bacher, whose combined efforts take care of the printing and distributing end of things. Thus, the E-I-C job is really just about collecting articles and news, as well as flogging me monthly to get my column written. That last bit, in itself, ought to offer some sort of personal satisfaction. Regardless, MVUS needs to keep the newsletter going, as that is the primary value of membership for many of you. We have about 100 members, although only about 15 – 20 get to the meetings. That confirms that the newsletter is an important reason for being an MVUS member. Contact me soon if you are interested. By the way, Gerd has agreed to stay on as an advisor to help with news gathering and other tasks, so you won't be in this alone. Thank you, whoever you are, for stepping up!

In other news, We WILL have our booth at the Dayton Hamvention again this year, and I am told we will be in the same location in the big tent. Since the plans for a new building fell through, it looks like the big tent is going to be a permanent fixture at the show. Of course, I am always interested in having people and items to be in the booth to welcome guests and attract attention (Hey! I used to have one of those!). So please set aside some time, and some artifacts to be in our booth and play show and tell to attract people to the VHF and up side of ham radio. You'll have a great time, and N8QHV will greatly appreciate the opportunity to see the show and test the plumbing. Again, my thanks!

Finally, we are working on a special event station for this summer to celebrate the 50th anniversary of Neil Armstrong's walk on the moon. We have secured call sign N8A (his initials) and are working to set up, appropriately I think, some 10 GHz EME contacts from the VOA site just north of Cincinnati. The best moon shots look to be about a week early, and possibly on week days, which complicates the arrangements, so stay tuned to see what we can work out. We also hope to arrange for the VOA museum to be open during the event. Watch this space, and QST, for more info.

Finally, I have accomplished the task of reconstructing my noise source ENR calibration program, which was lost several years ago due to a hard drive crash and my failure to back up the code anywhere. I still have to validate the results, but that shouldn't take long. I have several sources to calibrate for the very patient guys who brought them to MUD for me to test, and I will get those out ASAP. Also, we are working on ramping up production of another batch of calibrated noise sources for sale, with Hamvention the target for delivery. If you are interested in one (or you bought one from us earlier and would like to have it checked, contact me at n8zm@mvus.org. I expect the pricing to be similar to our previous offering, \$45 for the 3 GHz version, and \$95 for the 11 GHz version. Let me know if you want one (or more!) so that we can plan our parts orders.

Thanks for the third time in this one column! Possibly a new record.

Since this edition is too late for the March meeting, I'll see you in April, on the 26th. Tom, N8ZM.

This and That 3-19

Happiness: I am more and more convinced that our happiness or unhappiness depends more on the way we meet the events of life than the events themselves. [Alexander von Humboldt]

The Unknown. It is more daring to research something unknown than to doubt something that is known. [Alexander von Humboldt]

Ignorant. I saw with regret, (and all scientific men have shared this feeling) that whilst the number of accurate instruments was daily increasing, we were still ignorant! [Alexander von Humboldt]

QRM. As of May 1939 the US had 51,000 Hams... Small wonder the QRM situation is becoming increasingly acute. [Radio Mag of May 1939, pg. 70]

Generations. Until they become conscious they will never rebel, and until after they have rebelled they cannot become conscious. [George Orwell / 1984]

Impediment. My wife has a (slight) impediment in her speech. Every now and then she stops to breath. [Jimmy Durante]

I Don't Feel Old. I don't feel anything until noon. Then it's time for my nap. [Bob Hope]

Frittered Away. Our life is frittered away by detail. Simplify, simplify! [Henry David Thoreau]

An Important Repeat: Two things are infinite: the universe and the human stupidity; and I'm not sure about the universe. [Albert Einstein]

Mystery. The most beautiful thing we can experience is the mysterious. It is the source of all true art and science. [Albert Einstein]

Software Defined Radio (SDR) - Brief History and Making A Purchase

Joe Burke, WA8OGS

A major trend in ham radio is all about software defined radios – both the related hardware and the software. This technology is gaining more users on HF and VHF/UHF/Microwave bands.

The basic term of “software radio” was first used by a Texas group (now Raytheon) in 1984. The April 2001 QST described a new book *Communications Receivers--DSP, Software Radios, and Design (Rohde and Whitaker)(McGraw-Hill)* and the May 2001 QST had an article titled *Softradio's Progress (Digital Dimension) by WA1LOU*. During previous years there were frequent articles about using PC sound card hardware and software in various publications.

The December 2003 issue of QST had an article titled *Software Defined Transceiver from FlexRadio (SDR-1000)* in the New Products section.

Today you can purchase a SDR on eBay for under \$25. Here is the item description of a typical unit listed on eBay:

This is an RTL-SDR software defined radio receiver with RTL2832U ADC, 1PPM TCXO, SMA F connector, R820T2 tuner and aluminum case with passive cooling. Tunes from 500 kHz to 1.7 GHz with up to 3.2 MHz of instantaneous bandwidth. (HF mode works in direct sampling mode - V3 models and above only). Perfect for use as a computer based radio scanner with free software like SDR#, HDSDR, SDR-radio, Lin, GQRX or SDR Touch on Android. Works on Windows, MacOS, Linux, Android and even embedded Linux computers like the Raspberry Pi.

Great for many applications including general radio scanning, air traffic control, public safety radio, ADS-B aircraft radio, AIS boat radio, ACARS, trunked radio, P25 digital voice, POCSAG, weather balloons, APRS, NOAA APT weather satellites, Meteor M2 satellites, radio astronomy, meteor scatter monitoring, DAB, or for use as a low cost panadapter with a traditional ham radio.

This model has several improvements over other models. It uses the improved R820T2 tuner, comes with a 1PPM TCXO (no drift and accurate tuning with a 2 PPM initial offset and 1 PPM temperature drift), improved component tolerances and an SMA F connector. It also comes with a software selectable bias-tee circuit for powering external devices such as LNA's and active antennas.

Requires a USB 2.0 Port and works on most USB 3.0 ports (note that we cannot guarantee it to work on all USB 3.0 ports, please ensure your PC has a USB 2.0 port just in case). Installation on Windows is simple. Please Google for the free RTL-SDR Quick-start Guide for installation instructions. For custom antennas please note that this dongle uses an SMA F connector.

A recent SDR purchase I made on eBay was:

- RTL-SDR Blog R820T2 RTL2832U 1PPM TCXO SMA Software Defined Radio (Dongle Only) \$19.95 USD
- RTL-SDR Blog SMA Male to SMA M, BNC F, Type N, F, Type F F, UHF F, PAL F RG316 20cm Pigtail Adapters \$18.95
- RTL-SDR Blog SMA Male to SMA M, BNC F, Type N F, Type F F, UHF F, PAL F Straight Adapters \$14.95 USD

Description	Unit price	Qty	Amount
RTL-SDR Blog R820T2 RTL2832U 1PPM TCXO SMA Software Defined Radio (Dongle Only) Item# 2	\$19.95 USD	1	\$19.95 USD
RTL-SDR Blog SMA Male to SMA M, BNC F, Type N F, Type F F, UHF F, PAL F RG316 20cm Pigtail Adapters Bundle Item# 5	\$18.95 USD	1	\$18.95 USD
RTL-SDR Blog SMA Male to SMA M, BNC F, Type N F, Type F F, UHF F, PAL F Straight Adapters Bundle Item# 4	\$14.95 USD	1	\$14.95 USD
	Subtotal		\$53.85 USD
	Total		\$53.85 USD
	Payment		\$53.85 USD

Payment sent to rtlsdrblog@gmail.com

Issues with this transaction?

You have 180 days from the date of the transaction to open a dispute in the Resolution Center.

? Questions? Go to the Help Center at www.paypal.com/help.

You do not need all of these hardware items for the SRD to work, but you will need to connect an antenna (the SDR unit I purchased has a SMA connector). I also purchased a Raspberry Pi Model 3 - a tiny \$40 computer to use with this SDR. But I'll tell you about that some other time.

In the picture of the items, you can see the small size of the SDR that plugs into the USB port of your PC. You'll also need to download free software to use this SDR hardware.



SDRplay Limited recently announced their second SDR product - the SDRplay RSP2 for about \$169. Some of the features include:

- 10 built in front-end pre-selection filters, with substantially enhanced selectivity
- ☐☐ Frequency coverage extended down to 1 KHz
- ☐☐ Software selectable variable gain Low Noise Preamplifier
- ☐☐ 2 x SMA Software Selectable 50Ω RF ports (1.5 MHz - 2 GHz)
- ☐☐ 1 x High Impedance RF port (1 kHz - 30 MHz)
- ☐☐ Built in software selectable MW /FM notch filters
- ☐☐ Highly stable 0.5PPM TCXO (adjustable to 0.01PPM)
- ☐☐ 24MHz Reference clock input / output connections
- ☐☐ 4.7V Bias-T option (on one of the software selectable antenna inputs)
- ☐☐ RF screening within a strong plastic case for the standard RSP2
- ☐☐ A Rugged metal box version - the 'RSP2pro'

Currently the RSP2 requires the use of SDRUno software (provided free), but support for HDSDR, Gnu Radio, and CubicSDR is already planned.

Another low-cost SDR product being released soon is the LimeSDR. It is an open source development with funding for development by Crown Source. It covers 100kHz through 3.8GHz, with two receivers and two transmit channels. The price is \$299. More information on the LimeSDR and comparison of features with other SDRs can be found at <https://www.crowdsupply.com/lime-micro/limesdr>

These SDRs are not turn-on and use-it hardware, but require loading software to use them for receiving. Those with transmitters are very low power (typically -10dBm to +10dBm), so will need stages of amplification for commonly used power levels.

Try one of the inexpensive SDR USB dongles, and also watch for all of the new developments in coming months. If you're not quite ready to make that leap, at least read "Why You Should Care About Software Defined Radio" at <http://hackaday.com/2015/02/12/why-you-should-care-about-software-defined-radio/> to see what you'll be missing.

This is on the opposite end of the spectrum from the title of our group. Below is a description of a “ground probe antenna”. I put one together back in February. See the description below. I have attached a drawing of the antenna arrangement. The article follows:

Ground Probe Antenna By Mike Suhar, W8RKO

As long as I have been in Ham Radio the goal of any antenna was to get it as high as possible. I ran across something called a “ground probe antenna” for Extremely Low Frequency (ELF) and Very Low Frequencies (VLF) reception. This antenna is in the ground! That is no place for an antenna to be. Does this really work? I set out to see for myself if they actually work. In February I installed 158 feet of #12 wire (insulated) on the ground. The wire is now about 6” in the ground. An 8-foot ground rod is driven at the end of each wire. The wire is feed approximately in the center via a transformer. Someone indicated the impedance was around 1000 ohms so I wound the transformer for a ratio to give me 75 ohms on the other side. I am feeding it with RG6 coax. Doing a rough measurement of the impedance it would appear the actual impedance is much lower than 1000 ohms. I will make a better measurement and change the transformer when time permits.

I made the transformer from a ferrite core I got at a Hamfest. The core was not marked with any identifiable information. I measured the AL value at 6490 mH / 1000 turns. The material appears to be "P" or "F" ferrite used in switching power supplies running under 1.5 MHz.. Properties are similar to Mag-Inc part # OP44932TC. 1-7/8” OD, 2-3/8” ID and length of 1-1/8”. The transformer, as wound, appears to be good up to around 3 MHz.

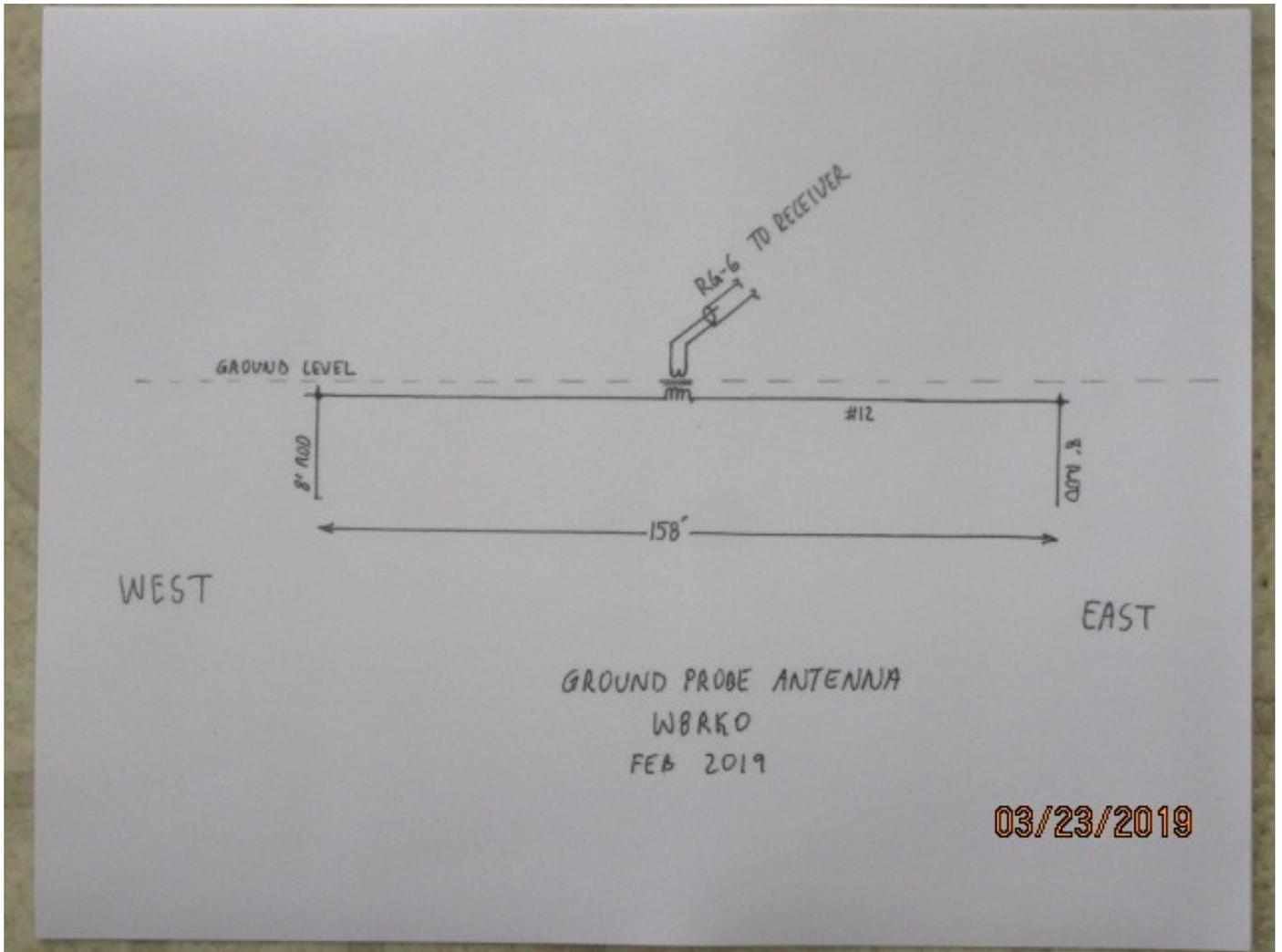
Reception in the broadcast band is best in the lower half. With the wire in the ground performance appears to drop off above 1 MHz. Putting the wire in the ground 6” dropped the carrier level of nearby WING (1410 KHz) by 10 DB. The level of a None Directional Aircraft beacon (NDB) on 407 KHz did not change. The first night I tested the antenna looking for NDBs with the wire laying on the ground I copied 29 beacons. More than I have ever heard before. The farthest was a 1KW NDB in Puerto Rico.

Dropping down to 24 KHz I could hear NAA and two other similar transmissions near 24 KHz. WWVB was also observed at 60 KHz. Below 100 KHz there is a lot of 60 hertz harmonics.

Going to the 630 meter ham band (474 KHz) I ran into a problem. A loud buzzing noise from 400 to about 550 KHz. The noise abruptly stopped around 23:15 local time. I fear this is a device in a neighbor's house. Something was turned off about bed time. The noise is not present during the day. Once the noise was gone I received many WSPR transmissions on 474.2 KHz. Some nights I even decoded WSPR stations in California and British Columbia, Canada. There is one station in Hawaii that I have decoded several times.

My receiver is an HP 8635C Selective Level Meter. The audio feeds a PC running WSJT-X and Spectrum Labs software.

So far I have been impressed with the results. Additional testing is required.



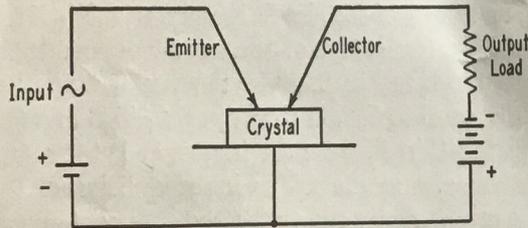
Mike Suhar, W8RKO

Brisbane about Tesla

“When Mr. Tesla talks about the electrical problems upon which he is really working he becomes a most fascinating person. Not a single word that he says can be understood. He divides time up into billionths of seconds and supplies power enough from nothing apparently to do all the work in the United States. He believes that electricity will solve the labor problem. That is something for Mr. [Eugene] Debs [the imprisoned Labor Leader] to ponder while he languishes in his dungeon. It is certain, according to Mr. Tesla’s theories, that the hard work of the future will be the pressing of electric buttons.” [Arthur Brisbane / New York World / July22-1894]

The "Transistor" – an Amplifying Crystal

THERE was a time in the early days of radio when the "oscillating crystal" could be catalogued with sky hooks, left-handed monkey wrenches and striped paint, because no one knew how to amplify a signal with a galena, silicon or other crystal. All this is changed by the recent Bell Telephone Laboratories' announcement of the "Transistor," a small germanium-crystal unit that can amplify signals, and hence be made to oscillate.



Housed in a small metal tube less than one inch long and less than a quarter inch in diameter, the Transistor has no filament, no vacuum, and no glass envelope, and is made up only of cold solid substances. Two "catwhisker"-point contacts are made to a surface of the small germanium crystal, spaced approximately 0.002 inch apart.

The Transistor shown is connected as an amplifier in the accompanying sketch. The contact on the input side is called the "emitter" and the output contact is called the "collector" by the Bell Labs. A small positive bias of less than one volt is required on the emitter, and the output circuit consists of a negative bias of 20 to 30 volts and a suitable load. The input impedance is low

(100 ohms or so), and the output impedance runs around 10,000 ohms.

In operation, a small static current flows in both input and output circuit. A small current change in the emitter circuit causes a current change of about the same magnitude in the collector circuit. However, since the collector (output) circuit is a much higher-impedance circuit, a power gain is realized. Measuring this gain shows it to be on the order of 100, or 20 db., up through the television video range (5 Mc. or so). The present upper-frequency limit is said to be around 10 Mc., where transit-time effects limit the operation.

The Bell Labs have demonstrated complete broadcast-range superhet receivers using only Transistors for oscillator and amplifier functions (with a 1N34 second detector and selenium power rectifiers). An audio output of 25 milliwatts was obtained by using two Transistors in a push-pull connection. However, it seems likely that in the near future Transistors will find their maximum application in telephone amplifiers and large-scale computers, although their small size and zero warm-up time may make them very useful in hearing aids and other compact amplifiers.

It doesn't appear that there will be much use made of Transistors in amateur work, unless it is in portable and/or compact audio amplifiers. The noise figure is said to be poor, compared to that obtainable with vacuum tubes, and this fact may limit the usefulness in some amateur applications. These clever little devices are well worth keeping an eye on. — B. G.

Joe, N8QOD, found this in the Oct. Issue of QST from 1948

Some interesting facts about our Sun.

The sun's diameter is about 110 times that of earth's. The ultra violet radiation, wavelengths from 10 nm to 400nm constitute ca 10% of the solar radiation.

It must be noted that since the sun is made of gaseous plasma and it is not a solid body, it does not rotate at the same speed at all places. Specifically at the pole it is once in 35 days, while at its equator it takes only 25 days. This is called differential rotation. This process leads to stretching and stressing of the sun's magnetic field, which does cause solar storms.