

N.E.W.S. LETTER

The Official Publication of the North East Weak Signal Group – <http://www.newsvhf.com/>

July 2022

Volume 31

Issue 1

Next Meeting: July 10, 2022 (Sunday)

Picnic

In This Issue

Picnic MDS/ERP Test	page 2
Picnic	page 3
Calendar	page 4
W1GHZ Noise Figure	page 5
Minutes from the last NEWS meeting:	page 9
For sale	page 9
K2CBA SK	page 10
MEMBERSHIP APPLICATION	page 11

BOARD MEETING - 11:00 AM at Lulu's, 151 Hazard Ave. Enfield, CT
Phone: (860) 763-2377 I-91 Exit 47 Rt. 190E 1 Mile on Left
<http://luluspizzeria.com>

GENERAL MEETING - STORRS LIBRARY - from 1 PM to approximately 3:45 PM.
693 Longmeadow St, Longmeadow, MA 01106
<http://longmeadowlibrary.wordpress.com>

DON'T FORGET

The North East Weak Signal Group 2 Meter Net
Every Thursday at 8:30 PM local 144.250 MHz
W1COT, WZ1V, or K1BXC Net Control

MEMBERSHIP in the N.E.W.S Group is \$10 per 2 years.
Apply to George Collins, KC1V. E-mail: news.kc1v@gmail.com.
You may download an application from our web page: <http://www.newsvhf.com>

The N.E.W.S. LETTER is the publication of the North East Weak Signal Group.
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Send articles by e-mail to Don Twombly at donw1fkf-news@yahoo.com.



Picnic MDS and ERP Testing

Minimum Discernable Signal) and ERP testing on 10 GHz, 24 GHz, 47 and 78 GHz (and possibly something for 122GHz). Some call it the "Shoot Out".

To test for MDS, we set up a distant signal source with a keyer. After everyone has a chance to peak up on the signal, the signal level is reduced one dB at a time until you can no longer hear it, then you have found the MDS for your system (compared to others). It's all relative because the equipment and range are not calibrated. You decide how well your reception works, and whether you can hear as well as Dale.

Finally, we also check relative ERP, transmitting one at a time and recording the relative power received at the distant point. We complete one band and then move on to another.

This isn't a competition. It's a chance to check out the gear with friends around to help. Most folks had 10 GHz stations that worked pretty well, while a few will find problems and fix before the 10 GHz & Up contest in August. Not only do we all know that our equipment functions, but also that there will be some other good stations to work.

Tom WA1MBA is preparing and testing his equipment, and hopes to have all the bands running by the time of the picnic. We will see how it goes.

Last year we did the high bands first, and that worked well. If you are bringing 47 GHz or 78 GHz (and maybe 122GHz) radios, please arrive early. We hope to start testing those bands by 11 AM.

We always need some help for setup and to run tests

Tom WA1MBA

tomw@wa1mba.org

\\ **PICNIC NEWSgram**

North East Weak Signal Group, Longmeadow, MA

- > the PICNIC is ON!
- > Sunday July 10, 2021 -- 10am to 4pm
- > N.E.W.S. Group PICNIC-Rain or Shine:
- > Knights of Columbus, Picnic area and Pavilion,
- > 371 Washington Rd., (aka George Washington Road) Enfield, CT 06082
- > (20 mi N of Hartford, 8 miles S of Springfield)
- > Social Gathering!
- > Free Lunch!
- > Swap-Sell-Tailgate!
- > Microwave Bands MDS Testing
- > Meeting (No Elections)
- > Please bring any items of VHF+ interest that you would like to sell, swap, or just show off. There is plenty of room to tailgate in the parking lot or pick a table and bring your items under the pavilion.
- > Your stories and experiences--True or Not-- are all welcome.
- > Show-Off Items with No VHF+ interest, but with Entertainment Value
- > may also be appreciated or ridiculed--take your chances, just keep it clean.
- > Hamburgers & Hot Dogs
- > Ron, WZ1V is returning to the grille this year
- > side dishes, snacks and beverages.
- > Please feel free to bring a side dish, dessert or beverage.
- > All members, spouses, guests, and anyone interested in VHF+ operations, You need not be a NEWS member. You are Welcome to attend.

> DIRECTIONS:

- > Knights of Columbus, Picnic Area
- > 371 Washington Rd, Enfield, CT 06082
- > 42.016N., 72.559W

> >From the South or North:

- > I-91 exit 48 onto Rt 220 East (Elm St), then 9 lights.
- > Keep Left on Rt. 220 at the light before Walgreens
- > Left At 9th traffic light from exit 48, (GiGi's vegetable stand is on your right)
- > On to 371 Washington Rd., K of C is 1 mile on left.
- >
- > Lost going that way? Try this:
- > I-91 exit 49, go south on Enfield St Rt.5
- > Drive 1/2 mile, take a left on Brainard Rd. (at North Thompsonville Fire Station)
- > Drive 2 miles, take right on Washington Rd.
- > K of C will be less than 1/2 mile on the right.

> George, KC1V is our Treasurer. Dues were reinstated as of Jan1, 2022 and are \$10 for 2 yrs

> The 144.282 W4FWS Coastal Beacon just south of Cape Hatteras, NC is back on.

>> Weekly Calendar

- > Mon. Packrats Nets start at 7:30pm on 6 meters, 8pm on 144.150, etc. Philadelphia area.
- > Tues. Mud Toads Net FM17, Virginia 8pm 144.250
- > Activity Night 7:30pm 222.100 K1WHS+
- > Weds Activity Night 432
- > Thurs. NEWS net, W1COT (K1BXC alternate) 8:30pm 144.250
- > Sat. Chesapeake Net 144.205 W3BFC FM28 9:00
- >> 144.205 Mornings 8:30-9:30 AM -- 144.205 , 144.190, ME, Canada to NC and out to OH, WV

Calendar 2021

- > July 10 Picnic 10am to 4pm
- > July 16-17 CQ Worldwide VHF Contest
- > Aug. 6-7 ARRL 222 contest
- > Aug, 20-21 ARRL 10G & up contest
- > Sept. 10-12 ARRL VHF Contest
- > Sept. 17-18 ARRL 10G & up contest
- > Sept. 23 NEWS Meeting (tentative)
- > October Fall Sprints
- > Nov. 19 NEWS Meeting (tentative)
- > Nov. 24 Thanksgiving

- > Officers:
- >
- > President Dick Frey, WA2AAU, Delanson, NY
- >
- > Vice Pres. Eric Mazur, KA1SUN, Savoy, MA
- >
- > Secretary Paul Wade, W1GHZ, Cabot, VT
- >
- > Treasurer George Collins, KC1V, Somers, CT
- >
- > Board Of Directors:
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- > Dick Wilborg W1ZC, Mason, NH
- >
- > Bob Bownes KI2L, Troy, NY
- >
- > Mark Casey K1MAP, Hampden, MA

Mark K1MAP

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NEWSLetter Editor

North East Weak Signal Group

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**Paul Wade W1GHZ ©2022
w1ghz@arrl.net**

Most of us have taken preamps to a conference to measure noise figure. Sometimes we are disappointed, but most recent devices provide very good measured noise figures. Then when we get home, they don't improve things as much as we had hoped.

Early GaAsFET preamps provided good noise figure with a terrible input match, very critical tuning, and sometimes marginal stability. Connecting a real antenna could produce different results and even oscillations. Modern designs tend toward unconditional stability and better matching, so that real world performance is good.

At VHF and UHF frequencies, MMICs are available with excellent noise figure with no tuning, making broadband preamps possible with minimal effort. Except for EME, there seems to be little need for anything fancier.

What's the problem?

I designed a new 432 MHz transverter¹ in 2018, and was pleased with the performance. The front end was an untuned MMIC, followed by two printed combline filters separated by a second-stage amplifier to provide good bandpass characteristics. It worked very well for a couple of years.

Activity in this area is sporadic, so I leave the rigs monitoring beacons – for 222 and 432 MHz, VE2FUT/b at 195km distant is weak but solid, a good performance monitor. Sometime last year, the 432 beacon became hard to find; perhaps I should have been concerned. Then in the 2022 January VHF contest, I found that the background noise was very high to the east, so that I was unable to make any contacts in that direction. I suspected that a neighbor had gotten a new gadget and I would have to chase it down when the weather got warmer.

During the 2022 Spring Sprints, N1JEZ complained of overload from me on 222 MHz. Afterward, we ran some tests; his mast-mounted preamp plus new transverter had too much gain – easily fixed. Then we ran a quick test on 432, and I couldn't hear him. Something was seriously wrong.

After tests confirmed that the problem was the transverter, I opened it up and started tracing signals using a TinySA² spectrum analyzer, probing with a 470 ohm resistor with short leads on an SMA connector, in Figure 1. The resistor minimizes loading on the circuit and only reduces signal level by perhaps 10 dB – not a problem for a sensitive spectrum analyzer. I quickly found that the front-end MMIC was not amplifying. I also noticed the fairly strong digital TV signals in Figure 1 being picked up by the short probe, roughly -80 dBm around 470 and 509 MHz.

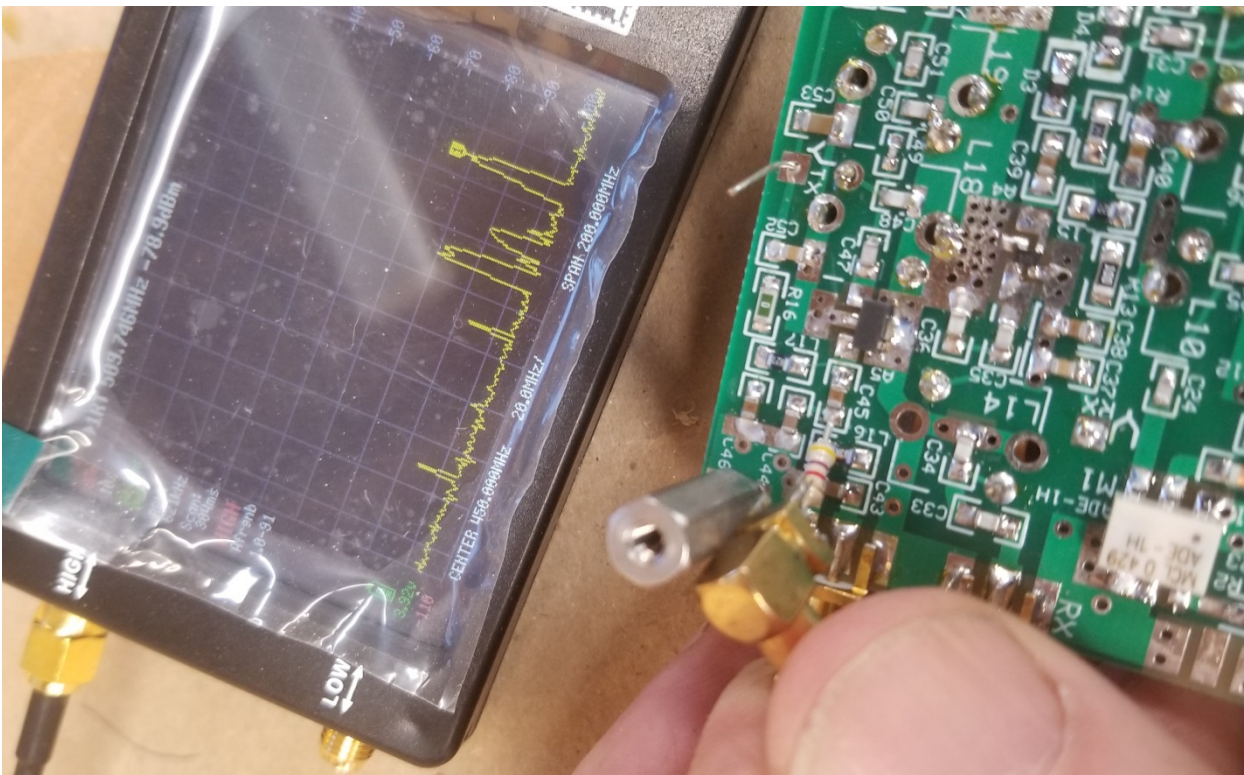


Figure 1 – Probing RF circuit with Spectrum Analyzer thru isolating resistor

The failed front-end MMIC was a Minicircuits PSA4-5043. I replaced it with a PGA-103, which is slightly larger and draws more current, but still has a low noise figure; I thought it might be more robust than the one that failed.

After things were back together, I connected the antenna and still couldn't hear the beacon. The noise floor seemed high and rose much higher with the antenna to the east. Maybe that TV signal was adding noise.

I dug out a combline filter³ that I built several years ago to see if it would help. It has about 2 dB loss, but 470 MHz is 52 dB down. Putting it in front of the transverter reduced the noise floor by 20 dB and eliminated the additional noise to the east. And the beacon popped right up in the panadapter.

What is going on?

Obviously, the problem is caused by out-of-band signals that the filter attenuates enough. My QTH is line-of-sight to all the TV broadcast transmitters – I can see the towers, 42km away, out the shack window. I connected the TinySA spectrum analyzer to a WA5VJB⁴ log-periodic antenna for 400 to 1000 MHz, took it outside, and pointed it at the towers (283 degrees). The 470-476 MHz TV channel peaked at -32 dBm, with additional channels at 482-488 MHz and 506-512 MHz nearly as strong. The TinySA display in Figure 2 shows the DTV signals filling the 6 MHz channels.

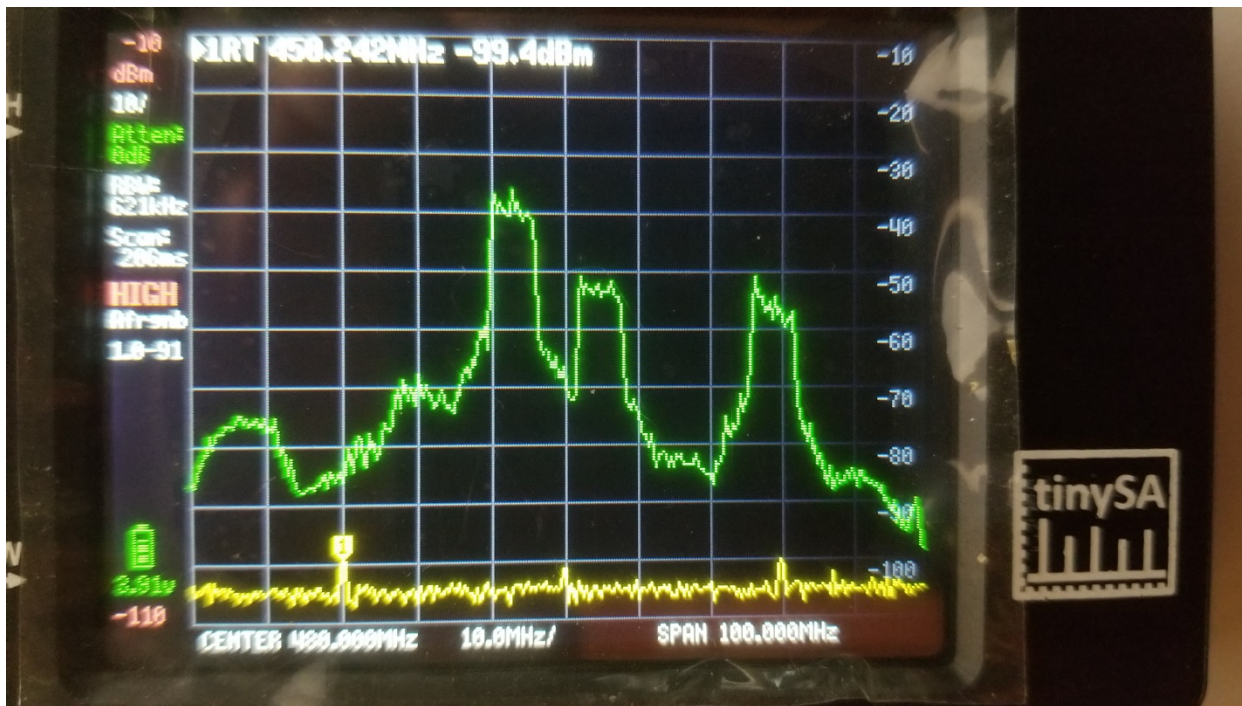


Figure 2 – DTV signals received on log-periodic antenna

How much of this power gets into the 432 MHz yagi?

HEADING	308°	270°	90°	103°(back of Yagi)	
470-476	-52	-54	-48	-44 dBm	WCAX ch3
482-488	-64	-62	-52	-51	WFFF ch44
506-512	-50	-53	-42	-40	WPTZ ch5
578-584	-64				WETK ch33
174-180	-66			-72	WVNY

The highest power into the Yagi is off the back. This is not surprising – at frequencies above the operating frequency, the directors on the Yagi act as multiple reflectors, while to the rear there is only one reflector.

A year or so ago, the FCC reshuffled the DTV channels, moving several of them closer to 432 MHz. I had to rescan the TV set, but hadn't noticed any immediate effect on 432 – I wasn't paying close enough attention.

Intermod

A DTV signal is spread out over the entire 6 MHz channel, as seen in Figure 2. To a narrowband receiver, it is 6 MHz noise source. If we just consider the fundamental signals, the sum and difference frequencies cover the range of 6 to 42 MHz; if the DTV signals get into the mixer, any common IF frequency would suffer.

If the third-order intermodulation products⁴, $2F1 - F2$ and $2F2 - F1$, are considered, the result is even worse. The combination of the strongest channel 506-512 MHz with either 470-476 MHz or 578-584 MHz results in IM products from 428 to 446 MHz, effectively wiping out the entire 70cm band. The untuned front end of my transverter adds another 20 dB or so to the signal levels in the table above, enough to cause intermod in almost

any semiconductor device. For a device with a high IP3 (third order intercept point), the calculated intermod level might be 100 dB down, but that is still above the noise floor.

Solution

Clearly, the solution is to keep the DTV signals out of the front end. The comb-line filter² has about 2 dB loss, increasing system noise figure by 2 dB, but it is 52 dB down at 470 MHz, with rejection increasing at higher frequencies. With the filter, the noise floor dropped by roughly 20 dB, and is low in all directions. The beacon popped right up at the expected level, so the filter has cured the problem without significantly affecting sensitivity. Better to lose a small amount than not to hear anything.

I had previously noticed the need for a filter on 222 MHz, after a DTV station was moved to Channel 13 (210-216 MHz). The filter here reduced the noise floor by at least 6 dB. I haven't checked recently, but the table above shows nothing on Channel 13. The station that had been there is now on 482-488 MHz. The new station on 174-180 MHz has a signal level of -51 dBm on the 222 MHz antenna.

Having a filter before the front end should be adequate for anything but EME. Some EME stations use cavity preamps – a good one should keep the DTV noise down and have excellent noise figure.

Summary

All sorts of new electronics devices are generating increased RF noise. Broadcast signals were pretty stable for 50+ years, so they could be dealt with once, but today things are shifting around. Whatever the source, it pays to keep track of your noise floor. Monitoring the noise floor and the signal level of beacons on a panadapter makes accurate comparisons possible. Don't trust your ears – noise increases are often small and insidious.

The morning after I finished the first draft of this paper, I noticed that the noise floor on 222 MHz had increased by 5 or 6 dB, not noticeable by ear. Since the beacon level can vary by 30 dB from day to day, that is a poor indicator. Swinging the antenna around found that the increase was mainly in the direction of the TV towers; something had changed. It appears to have gone back down after a day or two.

But that evening, the noise floor on 432 jumped about 15 dB, with dirty signals wandering through the passband. Rotating the antenna made no difference, so I suspect it is some new gadget in the house. This one went away after a bit, so I'll have to chase it down.

So keep an eye on your noise floor. If you wait for a contest or opening, like I did, you might get an unpleasant surprise and miss some QSOs.

Notes

1. Paul Wade, W1GHZ, "432 MHz Transverter for an SDR."
http://www.w1ghz.org/xvtr/432MHz_Transverter_for_an_SDR.pdf
2. www.tinysa.org
3. Paul Wade, W1GHZ, "Comblines Filters for VHF and UHF."
http://www.w1ghz.org/filter/Comblines_Filters_for_VHF_and_UHF.pdf
4. www.wa5vjb.com
5. <https://www.everythingrf.com/community/what-is-intermodulation-distortion>

NEWS Meeting 21 May 2022
at Storrs Library, Longmeadow, MA and by ZOOM

Called to Order by Secretary W1GHZ at 1310

TREASURERS REPORT -

Balance \$4080
52 paid members
3 life members

OLD BUSINESS

NEWSletter has not been published recently
Don, W1FKF volunteered take over NEWSletter

NEW BUSINESS

ARRL contest rule changes:
Single op can be SSB/CW only

ANNOUNCEMENTS

- Mt Washington beacon - no good access anymore, so it is unlikely that the beacon can be restored. WZ1V will remove it from the beacon list.
- Discussion - Move the beacon to FN44rc hosted by KV1J. With a 90 degree wide sectoral horn, it can cover all of New England. GPS 10 MHz and internet are available at the site. APPROVED by Consensus

SHOW & TELL

- N1JEZ showed a 3456 DEMI Transverter converted to 3400 MHz.
Adding Kapton tape over the filters was enough retuning.
- W1FKF showed an ebay 1-watt amplifier good to 3 GHz. A 5 GHz
- W1FKF showed a LiPO battery - lightweight for portable use. 15 amp
- KC0IYP and W1FKF showed 122 GHz rigs.
- KI2L showed a switchable LO for 900 to 10 GHz with display and GPS lock. It uses an ADF4350 Synthesizer and two Arduinos with low noise regulators.
- KV1J digital power meter to 6GHz using an AD8318 detector board from SV1AFN driving an Arduino and display.

Adjourned 1402

•

* For Sale:

RF Coaxial Switch --JAPAN NAIS-ARD62024 M01:
DC-18GHz 24V - have 2 - \$15 ea shipped

Tnx -- Jay NY2NY

ayb1943@optonline.net



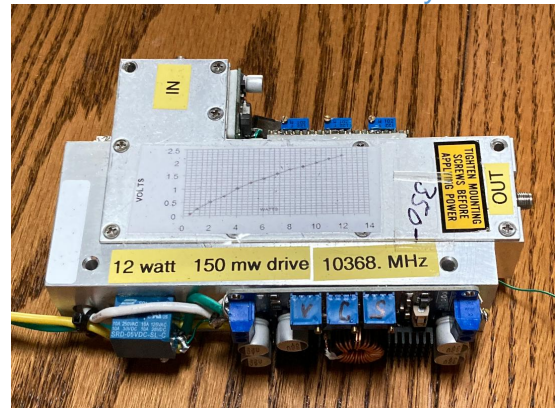
Modified ALCATEL-LUCENT MDR-8000

12 watt 10 .368 GHz amplifier

(150 mw drive 3 stage)

\$350. shipped (More Info email)

Don W1FKF donw1fkf-news@yahoo.com

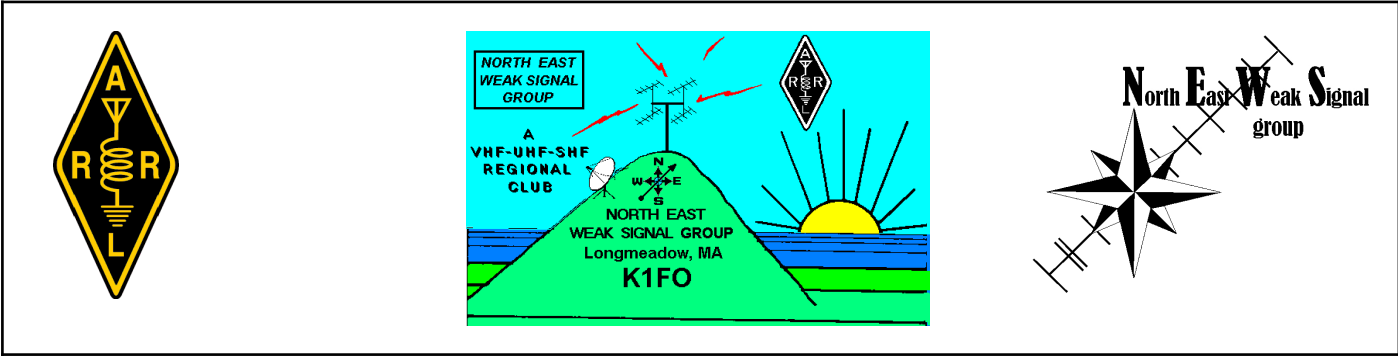




Paul Judson Snyder Jr K2CBA SK

Grafton-Paul Judson Snyder Jr, (K2CBA) otherwise known as “Jud” to friends and associates passed on 2 May 2022 at in Troy NY. He was a resident of Grafton NY since 1966, formerly of Troy and Defreestville NY. Jud was born on 18 June 1931 to Paul J Snyder Sr, and Lydia McCoy Snyder. Jud was a remarkable character, having shown a propensity for all things mechanical and electrical from an early age. He attended school in Troy and Albany Academy before joining the US Navy in 1951. He served as a ET3 radio maintenance technician at one of the Navy’s large MF/HF receiving facilities in Maryland during the Korea War era. He attended RPI in Troy, worked for local radio station WSNY, and ultimately was employed as a Electronic Technician for the Rensselaer Gaerttner Linear

Accelerator at RPI. In his later years he ran a small business installing and maintaining satellite TV installations for private customers. Jud first became known at the age of 16 for building a working television receiver in the back seat of his father’s car, which was documented in the local paper and was a curiosity among his family and friends. Jud had a lifelong interest in the technology of radio electronics and television, and leveraged his training and education into the construction of his own amateur radio equipment and antennas. He developed a reputation for creating large antenna arrays, rotating towers on the order of 190 ft in height and high-power amplifiers, which he operated extensively on VHF, UHF and Microwave frequencies. His reputation in this area caused him to be widely respected as a subject matter expert. He had many friends and colleagues with whom he shared his knowledge. He was a long-time member of the Northern Berkshire Amateur Radio Club, the North East Weak Signal Group, and was the prime instigator of the Whopping Foghole VHF and Moonbounce Society, a loose organization of like-minded individuals. He loved dogs and facilitated many litters of Great Dane puppies. In 1970 he obtained an extra-ordinarily large 8.4 meter dish antenna left over from the cold war era, which he improvised into operating amateur “moonbounce” (Earth-Moon-Earth) communications on various amateur frequency bands when the technology was still only known to a few experimenters. He used this to communicate by moon reflection with similarly equipped stations in Puerto Rico, Continental US, and Western Europe. Family and friends are invited to the Gerald B.H. Solomon Saratoga National Cemetery, Schuylerville on Wednesday, June 1, 2022 at 1:00 pm for a funeral service with military honors. Those with memories of Jud are encouraged to leave a memorial anecdote, as they will be collected and disseminated. Special thanks for Jud’s care should go to the kind nurses, doctors and staff of Collar City Rehabilitation (Diamond Hill) and Samaritan Hospital. Please visit www.mcloughlinmason.com.



MEMBERSHIP APPLICATION

Date: _____

Name: _____

Call sign: _____ Grid: _____

Street: _____

City: _____ State: _____ Zip: ____ - _____

Phone (home) _____ Optional (work) _____ - _____

Email _____

ARRL member: Y N

Electronic Newsletter Delivery: Y N

Operational Bands (circle) 50 MHz 144 MHz 222 MHz 432 MHz 903 MHz 1.2 GHz 2.3 GHz
 3.4 GHz 5.6 GHz 10 GHz 24 GHz 47 GHz 76 GHz Light
 Other (list)

The North East Weak Signal [N.E.W.S.] Group is being established to form a camaraderie among fellow VHF-UHF-SHF enthusiasts and support a convenient means to exchange technical information. We currently have six meetings per year, held at a centrally located facility and provide a "NEWSLETTER" that is distributed two weeks prior to each meeting. Any contributions to this publication are appreciated and can be sent to: Don Twombly, W1FKF by e-mail to donw1fkf-news@yahoo.com. Dues are \$10/2 years. Remember, this group is formed by VHF'ers for VHF'ers.

Dues: Mail to:

North East Weak Signal Group
 c/o George Collins
 105 Ninth District Road
 Somers, CT 06071