

N.E.W.S. LETTER

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

March, 2015

Volume 24

Issue 2

NEXT MEETING: March 21st, 2015

Meeting Program

**Getting Ready for the Eastern VHF-UHF-MW Conference In April
Trends in Modern Power Amplifier Design – Steve W1SMS**

**BOARD MEETING - 11:15 AM at Lulu's, 151 Hazard Ave. Enfield, CT
phone: (860) 763-2377
I-91 exit 47 Rt.190E. 1 mile on left.**

**GENERAL MEETING - STORRS LIBRARY - from 1 PM to approximately 3:45 PM.
693 Longmeadow St, Longmeadow, MA 01<http://www.luluspizzeria.com/106>
<http://longmeadowlibrary.wordpress.com/>**

DON'T FORGET

**The North East Weak Signal Group
2 Meter VHF and Above Net
Every Thursday at 8:30 PM local 144.250 MHz.
W1COT, WZ1V or K1PXE Net Control**

MEMBERSHIP in the N.E.W.S Group is \$15 per year. Apply to Tom Williams, WA1MBA. Email [tomw\(at\)wa1mba.org](mailto:tomw(at)wa1mba.org) 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. Articles may be reprinted with proper credit given to the author and the N.E.W.S. LETTER. Send articles to Tom Filecco W1WSO, via email to w1wso.fn31@gmail.com.

N.E.W.S. GROUP OFFICERS

PRESIDENT:

WA2AAU, Dick Frey
7262 Skyline Dr,
Delanson, NY 12053, FN22vs
Home: 518-895-2798
rffbauer@gmail.com
ACTIVE ON: 6, 2, 222, 432, 903, 1296, 2304,
3456, 5760, 10 GHz, 24 GHz.

VICE PRES:

N1JFU, Steve Meuse
80 Walnut St.
West Bridgewater, MA 02379 FN42la
Home: 508-345-3742
smeuse@gmail.com
ACTIVE ON: 6, 2, 222, 432, 10 GHz.

SECRETARY:

W1GHZ, Paul Wade
PO Box 35
Cabot VT 05647, FN34uj
Home: 802-563-2110
Cell: 802-498-4797
w1ghz@arrl.net
ACTIVE ON: 6, 2, 222, 432, 10GHz, more to
come.

TREASURER:

WA1MBA, Tom Williams
POB 28,
Shutesbury, MA 01072, FN32sl
Home: 413-259-1921
tomw@wa1mba.org
ACTIVE ON: 6, 2, 432, 903, 1296, 2304, 3456,
5760, 10, 24, 47 GHz.

EDITOR:

W1WSO/7, Tom Filecco
134 Shady Lane
Pavillion, WY 82523, DN53qe
Cell: 203-364-4225
w1wso.fn31@gmail.com
ACTIVE ON: 6, 2, 10 GHz.

SPECTRUM MGR:

K1MAP, Mark Casey
303 Main Street,
Hampden, MA. 01036, FN3
Home: 413-566-2445
map@mapinternet.com
ACTIVE ON:6, 2, 222, 432, 903, 1296, 2304,
3456, 5760, 10 GHz

BOARD OF DIRECTORS:

(All terms expire 2015)

K1MAP, Mark Casey
303 Main Street
Hampden, MA. 01036, FN32sb
Home: 413-566-2445
map@mapinternet.com
ACTIVE ON: 6, 2, 222, 432, 903, 1296, 2304,
3456, 5760, 10 GHz

K1WHS, Dave Olean
177 Dixon Rd.
Lebanon ME 04027, FN43mj
Home: 207 658 9076
k1whs@metrocast.net
ACTIVE ON: 6, 2, 222, 432, 903, 1296, 2304,
3456, 5760, 10 GHz, 24 GHz.

W1COT, Bob Leiper
47 Diane Dr.
Vernon, CT 06066, FN31st
Home: 860-649-6690
releiper@ix.netcom.com
ACTIVE ON: 6, 2

W1ZC, Dick Wilborg
791 Brookline Rd.
Mason, NH. 03048, FN42dr
Home: 603-878-3680
w1zc@myfairpoint.net
ACTIVE ON: 6, 2, 432, 1296

President's Report

**March Meeting Topics:
Getting Ready for the Eastern VHF-UHF-
MW Conference In April
Presentation Topic – Trends in Modern
Power Amplifier Design
By Steve Simons – W1SMS of Lunar Link
International**

Last year at about this time I wrote, “With all the snow we’ve been getting during this ‘old fashioned winter’ the middle of April seems like a long ways off, but it will be here before we know it!” Who would have thought it would be even worse in 2015 especially in eastern New England! Wow, I hope the members in eastern Massachusetts are doing alright. Hopefully we will have better weather by the time the meeting rolls around on March 21. Not soon enough for us who would like to get outside to work on some antenna projects, but we live in the northeast and the weather will be what it will be. I hope the several really HEAVY snow storms of 2015 didn’t bring down your antennas or collapse any of your roofs!

The conference committee has been hard at work getting ready for the April conference. We should recognize and thank the committee members: K1MAP, N1JFU, W1GHZ and WZ1V for their hard work on the conference. If you can help out, you can contact Mark Casey, one of the 2013 VHF Conference Co-Chairs at 413-566-8118 or 413-566-2445. I’m sure he can suggest something for you to do to help out. Paul, W1GHZ is always looking for papers and presentation topics. Please call Paul if you can think of something interesting to talk about.

Like the last 3 years, in early February, I attended the Orlando “Hamcation” hamfest in Florida. This is usually a nice break from the cold winter weather in the northeast. Last year I had to leave early to avoid a serious ice storm in southern Pennsylvania but this year I had to return a day early to avoid an ice storm in North Carolina. Sometimes we get hit coming and/or going! Fortunately the beautiful sunny weather we all think of as normal in Florida in February was on hand, with highs in the mid 60s and lows in the 40s. A wonderful respite from the northeast WX.

At least 3 of us from NEWS made it to Hamcation this year. I bumped into Mark – K1MAP, and Paul – W1GHZ. and a number of the VHF ops from the Florida Weak Signal Society including Steve and Sandra from DownEast. They say: Hi! The new ARRL VHF contest rules were discussed at the FLWSS meeting with most people liking the changes. We will see how the work out during the “Big” contest in June. FLWSS appears to be quite active and growing with goals similar to those of NEWS. You can check out their web site at <http://flwss.net/>.

I did manage to pick up some very nice “fleas” in the flea market including some dual contact high-isolation high-power type N relays good to 1.5 GHz and some more very inexpensive 6-way SMA coax switches that turn out to perform very well up through 6 GHz. The high isolation relays were grubby on the outside but looked great inside in the contact “channel” where it counts. At \$15 each, what’s not to like! Only downside was the dual coils draw more than the typical operating current. A thorough outside cleaning will make them look great all around!

Of course our primary topic during the March meeting will be discussing our conference coming up in April. In addition, I have asked Steve Simons – W1SMS now part of Lunar Link International to discuss the evolution of high power amplifiers. We have all seen more and more very high power VHF amplifiers used in recent years. Steve will help us understand the advantages and disadvantages of the new technology and what we can expect in the future.

Remember, please E-mail me about specific topics or speakers you would like to hear give a presentation at some upcoming NEWS meeting... Even better, if you have a topic YOU would like to speak about, please let me know. More ideas are always better than not enough. Please keep them coming. My E-mail is: r1fbauer@gmail.com Thanks in advance for your help.

Secretary's Report

NEWS Meeting 3 January 2015
at Storrs Library, Longmeadow, MA

Called to Order by President, WA2AAU, at 1312

TREASURERS REPORT

104 paid members plus 13 permanent

Highest membership in 10 years

Balance \$5306

Predicted excess for 2015 \$2100

OLD BUSINESS

W1GHZ - VHF Contest rules comments

from last meeting forwarded to Committee

NEW BUSINESS

K1FO.com is up for renewal -

Does club have a use?

~\$15/year

ANNOUNCEMENTS

- Conference needs someone to ship prizes to.

- Conference Workshop suggested on Antenna modeling

WA2AAU can help

SHORT PRESENTATIONS by:

W1GHZ

W1FKF

K12L

WA2AAU

Adjourned 1433

Treasurer's Report

The treasury and membership are at healthy levels for this time of year. Lyn Glagowski, WB1CCL is in process of taking over the management of the NEWS website, and I have been communicating with her to share the membership database. We are trying to figure out if there is a way to get the website to be more up-to-date with minimum effort. Whether or not we succeed doing that, I intend to reduce work and delays in getting information from the database to those who need it. I still intend to retire as the treasurer at the annual club meeting in July.

I will be watching the Red Sox in Spring Training at Ft. Myers Florida during the March NEWS meeting. I wish you great weather. Heaven knows, by then it sure would be nice to put these dreadfully cold days and deep snow behind us!

Tom WA1MBA

FOR SALE:

TS-790A: 144/432/1296 module, 45/25/10W, CW/SSB/FM. Meant for satellite work, but great for contesting: listen on one band and transmit on another at the same time. Original box and all accessories. Must sell. \$800

FT-817A: With 500 Hz CW filter; original box and all accessories. Rarely used. \$600

Six-meter 600W amplifier: Converted Henry 1KD. Probably has power supply problem. Have extra 3-500z. Will to sell all just for the two tubes. \$250

Make offers. Can deliver to the April conference.

Emil W3EP 860-642-7271 W3EP@ARRL.net

2015 Calendar

March 21, 1PM - 4PM - [N.E.W.S. Group Meeting](#)
April 13, 1900-2300 Local - [144 MHz Spring Sprint](#)
April 17-19 - [Eastern VHF-UHF Conference](#)
April 21, 1900-2300 Local - [222 MHz Spring Sprint](#)
April 22 - Lyrids meteor shower
April 25-26 - [Southeastern VHF Society Conference](#)
April 29, 1900-2300 Local - [432 MHz Spring Sprint](#)
May 1-2 - [New England Amateur Radio Festival - Deerfield, NH](#)
May 2, 0800-1300 Local - [Microwave Spring Sprint](#)
May 9-10, 2300-0300Z - [50 MHz Spring Sprint](#)
May 15-17 - [Dayton Hamfest](#)
June 13-15, 1800Z-0300Z - [ARRL June VHF QSO Party](#)
July 11, 11AM - 4PM - [N.E.W.S. Group Picnic](#)
July 18-19, 1800Z - 2100Z - [CQ Worldwide VHF Contest](#)
August 1-2, 1800Z - 1800Z - [ARRL UHF Contest](#)
August 12-13 - Perseids meteor shower
August 15-16, 6AM - 11:59:59PM - [ARRL 10-GHz & up Cumulative Contest](#)
September 5 (tentative), 1PM - 4PM - [N.E.W.S. Group Meeting](#)
September 12-14, 1800Z-0300Z - [ARRL September VHF QSO Party](#)
September 19-20, 6AM - 11:59:59PM - [ARRL 10-GHz & up Cumulative Contest](#)
September 21, 1900-2300 Local - [144 MHz Fall Sprint](#)
September 29, 1900-2300 Local - [222 MHz Fall Sprint](#)
October 2-4 - [Mid-Atlantic States VHF Conference](#)
October 7, 1900-2300 Local - [432 MHz Fall Sprint](#)
October 9-10 - [New England Amateur Radio Festival - Deerfield, NH](#)
October 11, 8AM-2PM - [Nutmeg Hamfest & ARRL CT State Convention](#)
October 17, 0600-1300 Local - [Microwave Fall Sprint](#)
November 17 - Leonids meteor shower
November 21, 1PM - 4PM - [N.E.W.S. Group Meeting](#)
December 14 - Geminids meteor shower

41st ANNUAL EASTERN VHF/UHF/MICROWAVE CONFERENCE

Fri./Sat./Sun. April 17-18-19 2015

BAYMONT INN & SUITES,

20 Taylor St., Manchester, CT 06042

(just a few miles northeast of Hartford, CT off I-84, at Exit 63)

Registration \$30 (includes Super Hospitality Room, & Saturday Lunch)

Registration \$25 before April 1 makes the Saturday Lunch Free.

Banquet \$28. Must order banquet before April 10.

Our Registration web page at

<http://www.newsvhf.com/vhfconf.html>

is on-line NOW!

The Discounted Room Rate is in effect again this year!

\$69 for 2 double beds or 1 king, \$109 for a suite,

You CAN Reserve Now

Call the Baymont Inn: 860-643-5645

Tell them "VHF Conference" to get the discounted rate

Discount is available Thurs, Fri, Sat, & Sun nights

There are a limited amount of rooms available for the discounted rate which

expires March 17.

Speakers and Papers needed

details at <http://www.newsvhf.com/vhfconf.html>

Talks and papers, both long and short, are needed.

Please tell us about what you have been working on.

Operating, contesting, construction, homebrewing, mi-

crowaves, whatever.

Please let Paul Wade know if you are considering something, with a deadline of 18 March.

Please contact Paul Wade, W1GHZ, Conference Co-Chairman

w1ghz@arrl.net

Check out this link to see who is coming!

<http://www.newsvhf.com/whoscoming.html>

Check: www.newsvhf.com for updates

SCHEDULE:

FRIDAY----7am--FREE Continental BREAKFAST for those staying at the Baymont Hotel

Noon – Lunch-- on your own

2:30pm-5pm –WORKSHOP Session

Antenna Modeling - WA2AAU

Making the VHF and up Contest changes work to our activity advantage - K3TUF

6pm to 10pm-- SUPER HOSPITALITY ROOM & INDOOR SWAP & VENDORS

SATURDAY----7am--FREE Continental BREAKFAST for

those staying at the Baymont Hotel

8am to 5pm -- Presentations 8am to 5pm -- Indoor Vendors

Speaker List to Date--MORE to come!:

N6NB Working Hawaii on VHF, 1957-2014

N6NB VHF Adventures Coast to Coast, a 58-year odyssey

N1ZN Parabolic Dish Manufacture

K3TUF A Radio Server for VHF+ Contesting and Weak Signal Work

N1JEZ 241 GHz

W1GHZ 6-Meter stuff

K3TUF VHF+ Contesting; it's a whole new ballgame

KI2L Experiences building the W6PQL 220 and 1.2GHz SSPAs

VE2DFO 500 Watts on 1296 Solid-State

W3SZ OpenHPSDR Applied to VHF/UHF/Micro-wave Operations

and The Great 2015 Crash of the Internet Aircraft Servers

Noon*****NEW*****

**PIZZA & SUBS LUNCH INCLUDED with registration!

6pm -- Pre-Banquet Hospitality

7pm -- BANQUET BUFFET, Tom Kirby Award Presentation,

Banquet Speaker, Trivia Quiz, Door Prizes

SUNDAY--7am--FREE Continental BREAKFAST for those staying at the Baymont Hotel

8-11am -- SWAP/TAILGATE in Parking Lot

Sponsored by: North East Weak Signal Group (NEWS)

QUESTIONS?

Please Contact one of the 3 Conference Co-Chairmen:

Paul, W1GHZ, (presentations, proceedings)

w1ghz@arrl.net

Ron, WZ1V, (registration, website, test session)

wz1v@arrl.net

Mark K1MAP, (hospitality, hotel, swaps/vendors)

map1@mapinternet.com

413-222-9292

Simple Frequency Doublers with High Performance

Paul Wade W1GHZ ©2014
w1ghz@arrl.net

Doubler: 5 MHz to 10 MHz

The recent availability of Lucent/Symmetricon GPS units with good 5 MHz oscillators has sparked a need for a frequency multiplier to provide a 10 MHz frequency standard. Mike, N1JEZ, located an article¹ by K6IQL describing a frequency multiplier for this application. However, I thought the circuit seemed a bit complex for a simple function.

The K6IQL circuit does frequency multiplication by mixing two copies of the 5 MHz signal in a mixer. Driving the mixer with two signals in quadrature eliminates a DC term and significantly reduces the fundamental frequency output and the undesired harmonics. K6IQL used a power splitter to with one leg driving a 5 MHz phase shift network to generate the quadrature signals.

I recalled seeing hybrid transformers which provide quadrature signals over a wider bandwidth. A quick search of the Minicircuits website² found several candidates, but they cost more than a mixer or a power splitter, which is basically a small RF transformer just like the ones in a mixer. Then it occurred to me that it should be possible to replace the transformer in a mixer with a hybrid transformer and make a frequency doubler. Has Minicircuits already done this? Another search found frequency doublers with low conversion loss and good suppression of fundamental frequency and undesired harmonics. Even better, these were priced in the same ballpark as a mixer.

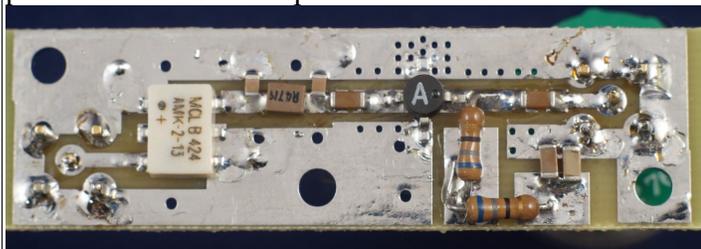


Figure 1 – Simple Frequency Doubler 5 MHz to 10 MHz

I ordered some AMK-2-13+ frequency multipliers, specified for 10 to 1000 MHz input, because I was thinking 10 MHz rather than 5 MHz. Then I did a simple PC board layout for the multiplier with an MMIC amplifier. A photo of the assembled prototype

is shown in Figure 1 and the schematic diagram is shown in Figure 2.

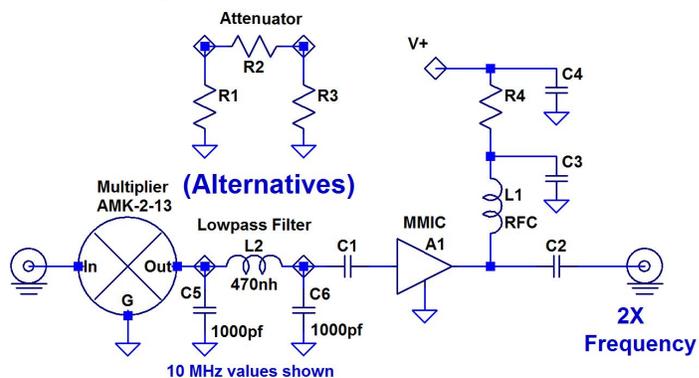


Figure 2 – Simple Frequency Doubler Schematic

I first tested the prototype unit with the frequency multiplier alone, then added an MAV-11 MMIC for the amplifier connected directly to the mixer through a blocking capacitor, without the optional attenuator or filter. It works just fine at 5 MHz – test results are shown in Figure 3. Conversion loss is about 12 dB, and both the 5 MHz fundamental and the 15 MHz third harmonic are down more than 40 dB. The 20 MHz fourth harmonic is only about 20 dB down, but is far enough away to be easily filtered out if necessary.

Frequency Doubler -- 5 to 10 MHz

5 MHz Power in ->	AMK-2-13+ Alone			with MAV-11 Amplifier			dBm
	5	10	13	5	10	13	
Output							
5 MHz	-52	-48	-44	44	-38	-35	dBm
10 MHz	-6	-2	0	4	8	10	dBm
15 MHz	-60	-48	-44	-48	-37	-30	dBm
20 MHz	-20	-20	-24	-12	-12	-21	dBm
25 MHz			noise				

Figure 3 – Frequency Doubler 5 to 10 MHz Test Data without Low-Pass Filter

I then added the simple low-pass filter shown in Figure 2, with the results shown in Figure 4. The 20 MHz fourth harmonic is significantly reduced, so that all undesired frequencies are now at least 40 dB down. The low-pass filter is also shown in the Figure 1 photo.

5 MHz with Low-Pass Filter between AMK2-13+ and MAV-11

Filter = 1000pf capacitor, 470nh inductor, 1000 pf capacitor

Power in ->	<u>5</u>	<u>10</u>	<u>13</u>	<u>5</u>	<u>10</u>	<u>13</u>	<u>dBm</u>
5 MHz				-44	-39	-34	dBm
10 MHz				2	7	8	dBm
15 MHz				noise	-52	-46	dBm
20 MHz				-37	-33	-36	dBm

Figure 4 - Frequency Doubler 5 to 10 MHz Test Data with Low-Pass Filter

Since these are wideband parts, I tried the prototype at a higher frequency, with an 80 MHz input frequency. Performance was similar, but with about 10 dB less suppression of fundamental and third harmonic. This is still an excellent multiplier and I can see some other uses.

Higher Frequency Doubler

Since these Minicircuits multipliers are wideband parts, rated up to 1000 MHz, I tried the prototype at a higher frequency, with an 80 MHz input frequency. Performance was similar, but with about 10 dB less suppression of fundamental and third harmonic, as shown in Figure 4. This is still an excellent multiplier and I can see some other uses.

80 MHz Power in ->	AMK-2-13+ Alone			with MAV-11 Amplifier			
	<u>5</u>	<u>10</u>	<u>13</u>	<u>5</u>	<u>10</u>	<u>13</u>	<u>dBm</u>
80 MHz	-42	-35	-32	-33	-27	-23	dBm
160 MHz	-6	-2	0	4	8	10	dBm
240 MHz	-42	-34	-26	-32	-24	-17	dBm
320 MHz	-22	-23	-33	-11	-16	-16	dBm

Figure 5 - Frequency Doubler 80 to 160 MHz Test Data without Low-Pass Filter

One immediate application is to multiply the output of my 200 MHz locked VCXO³ to 400 MHz for the LO of a 432 MHz transverter – with an SDR, the IF doesn't have to be in a ham band. I assembled another PC board, this time with a GVA-84 MMIC amplifier to get a bit more power to drive a high-level mixer. The board is shown in Figure 6, with a jumper wire in place of the low-pass filter. The RF choke, L1, is 150 nH, good for 400 MHz but not 10 MHz. My initial test was with 80 MHz input so I could see the output on a spectrum analyzer with a 350 MHz maximum frequency. Performance in Figure 7 shows higher power output than the unit in Figure 5, but with simi-

lar suppression of unwanted frequencies.

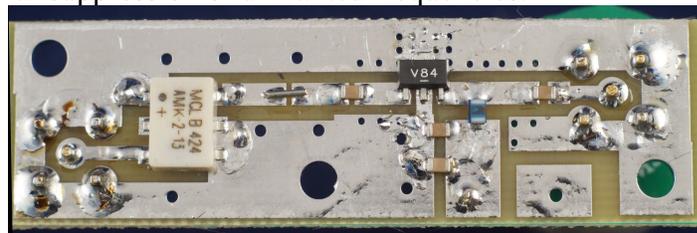


Figure 6 – Frequency Doubler for higher frequencies

Frequency Doubler - high frequency version

80 MHz Power in ->	<u>0</u>	<u>5</u>	<u>10</u>	<u>13</u>	<u>dBm</u>
80 MHz	-27	-19	-13		dBm
160 MHz	11	17	20	21	dBm
240 MHz	-30	-19	-13		dBm
320 MHz	-7	0	-5		dBm

Figure 7 – Performance of Frequency Doubler for higher frequencies, 80 to 160 MHz

At higher frequencies, I was only able to measure total power output, shown in Figure 8, but the power at undesired frequencies should be small. The output power at 400 MHz is excellent. I tried it at higher frequencies as well and found only a small rolloff at 1000 MHz. I pushed it up to 1296 MHz, where the output is a few dB down, but still very usable. To be certain that the output is at 1296 MHz and not just fundamental feedthrough, I put a good interdigital filter on the output – the output power was only a hair lower, so the

		AMK-2-13+ with GVA-84 Amplifier				
Power in ->		<u>0</u>	<u>5</u>	<u>10</u>	<u>13</u>	<u>dBm</u>
<u>Freq IN</u>	<u>Freq OUT</u>					
200 MHz	400 MHz	10.5	17	21.5	21.3	dBm
400 MHz	800 MHz	10.2	15.5	18.8	20	dBm
500 MHz	1000 MHz	9.2	14.3	17.5	18.8	dBm
576 MHz	1152 MHz	7.7	12.4	15	17.2	dBm
648 MHz	1296 MHz	6.8	11.5	14.6	16	dBm

multiplier is still working fine.

Figure 8 - Performance of Frequency Doubler at higher frequencies

Summary

The performance of this simple frequency doubler is quite impressive, and adequate for many applications with no additional filtering. It is a simpler and much less expensive solution than other frequency multipliers I have used, which usually must be followed by a helical or printed filter to clean up the output. Mini-circuits also offers higher-order multipliers, with some well into the microwave region – further investigation is in order.

References

1. John C. Roos, K6IQL, "Converging a Vintage 5 MHz Frequency Standard to 10 MHz with a Low Spurious Frequency Doubler," *QEX*, March/April 2011, pp. 19-35.
2. www.minicircuits.com
3. Paul Wade, W1GHZ, "Locked VCXOs for Stable Microwave Local Oscillators with Low Phase Noise," *Proceedings of Microwave Update 2013*, ARRL, 2013, pp. 121-143.

Central States VHF Conference

The Central States VHF Society is calling for the submission of papers, presentations and posters for the upcoming 49th Annual Central States VHF Society Conference to be held in Denver, Colorado on July 23-26th, 2015. Registration is online now at <http://www.csvhfs.org>.

Papers, presentations and posters are solicited on both the technical and operational aspects of VHF, UHF and Microwave weak signal amateur radio.

Suggestions are listed below, but are not limited to:

- -Propagation (Sporadic E, Meteor Scatter, Troposphere Ducting, etc.)
- -Amateur Satellites
- -Regulatory Topics
- -Antennas including Modeling/Design, Arrays, and Control
- -Test Equipment including Homebrew, Using, and making measurements
- -Construction of stations equipment, such as

Transmitters, Receivers, and Transverters

- -Operating including Contesting, Roving, and DXpeditions
- -RF power amps including Single and Multi-band Vacuum Tube and solid-state
- -Pre-amplifiers (low noise)
- -Digital Modes WSJT, JT65, etc.
- -Regulatory topics
- -EME
- -Software-defined Radio (SDR)
- -Digital Signal Processing (DSP)

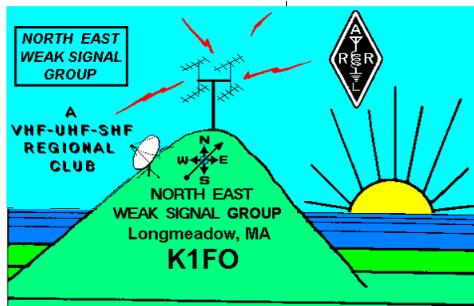
Non-weak signal topics, such as FM, Repeaters, packet radio, etc., are generally not considered acceptable. However, there are always exceptions.

Please contact our Proceedings Chair below if you have any questions about the suitability of a topic.

Strong editorial preference will be given to those papers that are written and formatted specifically for publication, rather than as visual presentation aids.

For more specific information, please see the "Guidance Documents" section on the Conference website at <http://www.csvhfs.org>.

Our conference Proceedings and Speakers chair is John Maxwell, W0VG and he can be contacted at w0vg@arrl.net or from the convention website!



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 6 meetings per year, held at a centrally located facility, and provide a "NEWSLETTER" that is distributed 2 weeks prior to each meeting. Any contributions to this publication are appreciated and can be sent to: Tom Filecco, W1WSO via email – w1wso@comcast.net. Dues are \$15/year. Remember, this group is formed by VHF'ers for VHF'ers.

Mail to:

North East Weak Signal Group
c/o WA1MBA Tom Williams PO Box 28
Shutesbury, MA 01072

We Have Everything for Your Station!



We will beat the competitor's prices!

Call us for details.

Call: 800-777-0703 to order a Spring/Summer catalogue".

W2PED

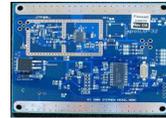
Specializing in 24 GHz.
and above.

pdrexler@hotmail.com

Home	Products	Support	Buy	Contact Us	
West Mountain Radio 1020 Spring City Drive Waukesha, WI 53186 Phone: 1-262-522-6503 Fax: 262-522-6504 Email: info@westmountainradio.com		Products for DC Power, Amateur Radio and R/C Hobbies <ul style="list-style-type: none">Robustness and reliability required by public safety agencies and emergency response teamsPrecision battery analysis suitable for battery pack manufacturers, facilities managers and aircraft ownersLow pricing attractive to amateur radio and R/C hobbyists. http://www.westmountainradio.com/index.php			
RIGblasters 	Radio Products 	RIGrunners 	DC Power 	DSP Filtered Sound 	Battery Testers 



DOWN EAST MICR WAVE



LIVE OAK, FLORIDA

VHF/UHF/SHF EQUIPMENT AND PARTS 50 to 10,368 MHz

Microwave Loop Yagis, VHF/UHF Yagis	No-Tune Linear Transverters
Linear Power Amps	Low Noise Preamps
Coax Relays	Coax Cable Connectors
Chip Components	MMIC's, Transistors
RF Modules	Crystals

Steve Kostro, N2CEI 19519 78th Ter. Live Oak, FL 32060 Tel. 386-364-5529

<http://www.downeastmicrowave.com>

<http://www.flexradio.com/>

Lunar-Link International

VHF & UHF amplifiers
for demanding modes

50 - 144 - 222 - 432 MHz

EME - Digital - Contesting



www.lunarlink.com

W1QJ - W1SMS info@lunarlink.com
33 Ball Pond Road Danbury, CT 06811



SSB Electronic USA
manufactures and distributes
HF, VHF, UHF and SHF
equipment covering 10 MHz to
47 GHz

124 Cherrywood Drive,
Mountaintop, PA 18707 USA
Phone 570-868-5643 FAX
570-868-6917

[http://www.ssbusa.com/
ham.html](http://www.ssbusa.com/ham.html)

North East Weak Signal Group

c/o WA1MBA Tom Williams, PO Box 28, Shutesbury, MA 01072

Check your membership
expiration date on your mailing label!