

N.E.W.S. LETTER

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

January 2018

Volume 27

Issue 1

NEXT MEETING: January 6, 2018 **Meeting Activities**

Small Project Show and Tell Reports

Let Us See What You've Been Doing

Laboratory Test Session

Bring Equipment You Would Like To Test
(see the President's report, pages 2 and 3 for the details)

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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.org>

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 K1PXE Net Control

MEMBERSHIP in the N.E.W.S Group is \$10 per year.

Apply to John Crawford, N2OY. E-mail: n2oy.vhf@gmail.com.

You may download an application from our web page: <http://www.newsvhf.com>

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Send articles by e-mail to George Collins, KC1V at news.kc1v@gmail.com.

President's Report

I hope everyone had a good time with family over the past few weeks. Happy New Year! This year the meeting is still several days after "New Year's Day weekend, so NO EXCUSES. Come to the meeting! It was good to see several NEWS members out at Microwave Update 2017 in the Bay Area in October. A number of the early arrival attendees got a tour of the Stanford Radio Club hilltop station. Very impressive! If we have time at the meeting, I can show some photos I took during the tour.

Several members have mentioned that our test sessions have been useful. Also most of us love hearing about little tips and tricks and new stuff on the market so let's combine the 2 activities like we did last year. The rest of this report is going to look like last year... because it is!

So this meeting let's have some "small project" "Show and Tell" reports... please tell us about something you have been working on in the last several months that you can describe in 5-15 minutes. More than one project is perfectly fine... the more the merrier. Please bring a couple of photos, and/or some presentation "slides" to describe what you have been working on. It doesn't need to be complicated, or high science, just tell us about what you did. Also, bring some show and tell models of the stuff so we can see the finished project if that makes sense.

I know Mike – N1JEZ has some stuff to show and tell last meeting that we didn't get to, so he will be loaded for bear this time. Bring it on, Mike. You always seem to have some neat stuff to share. I also know some others who have been working hard in the last few months... COME!

With regard to the lab test equipment session, what KI2L and I have available is certainly not as impressive as the Rhode & Swartz equipment Greg often brings to our conferences, but it should give a lot of good information nevertheless.

I will bring an HP-8970B noise figure meter for testing preamps or receive converters. The noise figure meter operates up through the 1296 MHz band without a converter in front of it. It would be great if someone could bring a low-ENR noise source.

VERY IMPORTANT NOTE... If you want to test preamps on 2304 MHz or above, please bring a

receive converter or transverter to facilitate testing. Almost any converter will work so long as the IF is on the 1296 MHz band or below. Last year some members were disappointed when we could not measure the noise figure of their uWave preamps.

This year we will have just one vector network analyzer for general-purpose measurements up to 6 GHz. The HP8753B Network Analyzer works up to 3 GHz with an HP S-Parameter test set and also works up to 6 GHz with precision external directional couplers rather than the typical HP S-Parameter Test Set that normally accompanies the unit. Bob will also have a scalar network analyzer that will work up beyond 18 GHz with directional couplers to make magnitude S-Parameter measurements up through the 10 GHz band.

We will also have some older style power meters and spectrum analyzers on hand for trouble shooting some problems your equipment may have up through 10.5 GHz. I will have calibrated stable weak signal sources available up through the 5760 MHz band to trace signals through equipment. We will be able to accurately measure power up to 100 watts at frequencies up to 10.5 GHz.

If you want to test a transmitter with more than 10 watts output, or that runs on a voltage other than 13.8 VDC, plan to bring a power supply to run your equipment. We will have low current bench supplies available for testing small signal circuits. Send me a message if you need a strange power supply voltage and current. I may be able to bring one along.

Partial Test Equipment List

- HP8753B Network Analyzer 300 kHz – 6 GHz with
- HP85046A S-Param. Test Set 300 kHz – 3 GHz
- Home Made N.A Frequency Doubler and External
- Precision Directional Couplers comprising 3-6 GHz Test Set
- HP8756 Scalar Network Analyzer with Sweeper Good to beyond 18 GHz
- HP8555A Spectrum Analyzer to 18 GHz +
- (2) HP8640B Signal Generators One good to 1100 M
- Weak Signal Up Converters for 2G, 3G, 5G

Partial Test Equipment List (cont.)

- 12 G Automatic Microwave Frequency Counter
- Several HP432 Power Meters + Attenuators
- 100 Watt Coax load good to 10 GHz
- HP8970B Noise Figure Meter with 18G noise head
- Many directional couplers

With this equipment we can measure virtually all characteristics of any RF device, assembly, or complete transmitter or receiver on frequencies up to 6 GHz and most characteristics up through 10.5 GHz.

We can measure the following:

Gain, Loss, Noise Figure, Receiver Sensitivity, Frequency Response, Selectivity, Power Output, Frequency, Spectrum, Harmonic and Spurious Levels, Input and Output Match, VSWR, etc. If you think you have something unusual to measure, please send me an E-Mail at: rffbauer@gmail.com Maybe I can bring the right equipment to do the test you need.

Finally, remember the January VHF sweepstakes will be here on January 20 - 22, 2018 this year (begins 1900 UTC Saturday, ends 0359 UTC Monday: Ed.). Please get ON THE AIR on as many bands as you can. Be prepared to tell the group what bands you will be active on, and any new bands you will be on for the first time. If you plan to do some roving, tell us about the route you might take. ETC, Etc, etc.

R. L. Frey – WA2AAU
rffbauer@gmail.com

Secretary's Report

- NEWS Meeting 18 November 2017 at Storrs Library, Longmeadow, MA
- Called to Order by President, WA2AAU, at 1330.
- K1MAP: Correction to the minutes from the September meeting: He will contact W1GHZ.

TREASURERS REPORT – N2OY

- Balance \$3909, 124 paid up members
- MOTION by N2OY: To waive dues for 2018: FAILED 15-16.
- MOTION by WZ1V: Reduce dues to \$10 for 2018. APPROVED

Secretary's Report (cont.)

OLD BUSINESS

- None

NEW BUSINESS

- Website: Recently hacked; has been recovered. Current host provides poor support, possibly should move domain. Consensus: - move to new hosting provider. MOTION by K1MAP: WZ1V, N2OY, & W1GHZ to select new host and move domain. APPROVED UNANIMOUSLY.
- Webmaster: Discussion for next meeting.
- MOTION by W1GHZ: to sponsor hospitality at MUD 2017, not to exceed \$400, from Conference account.

ANNOUNCEMENTS

- K1IIG 222.060 beacon power up to 20 watts thanks to amplifier donation by N1JEZ.

ELECTIONS

- President: Nominated: WA2AAU, KA1SUN. WA2AAU re-elected.
- Vice-President: KA1SUN.
- Secretary: W1GHZ.
- Treasurer: N2OY.
- Newsletter Editor: KC1V.
- Board: K1MAP, W1ZC, W1FKF, K12L.

PROGRAM: Presentation by Jeff Millar, WA1HCO

- QUCS - Quite Universal Circuit Simulator
- Wa1hco.blogspot.com
- Open source circuit simulator for DC, AC, S-parameters, transient, harmonic balance.
- Lots of examples.
- Tutorial

Meeting adjourned 1510 EDT

Paul – W1GHZ

Treasurer's Report

Happy holidays to all! Bit of mixed news in this month's treasurer's report. First the bad news: the dues moratorium has expired, so the free membership period has ended. The good news is that at the November meeting, the membership voted to reduce 2018 dues from the usual \$15 to \$10. I will be sending out renewal reminders shortly for those who are due to renew. I will be accepting

Treasurer's Report (cont.)

cash, check, and credit/debit cards at the January meeting for those who wish to renew in person.

73, John – N2OY

NEWS Web Hosting Update from John – N2OY

After the grief and poor customer service that our previous web hosting provider gave us, the NEWS website has been moved to a new hosting company – InMotion Hosting – effective November 28. The transition process went extremely smoothly, with InMotion able to do a full transfer from our previous host.

There was one minor technical glitch in mid-December that was quickly resolved, but aside from that there should be no difference in the operation of the website compared to before. If anything, the site might load more quickly now that it's hosted on servers in the Washington, D.C. area rather than in Utah. Mark K1MAP, Paul W1GHZ, and I are sharing responsibility for updating content on the website for the time being. If someone is willing to take over the responsibilities of webmaster on a proactive basis, please let us know!

Equipment for Sale:

Big Amplifiers!

1 - ICOM PW-1 Solid-State Kilowatt (160-6 meters) in excellent condition; \$3K.

2 - A pair, 2-M and 70-CM, of LunarLink amplifiers (personally built by K1FO) with their common 3-kV power supply and the relays, etc. required to put them on the air. They easily deliver 1.5-kW output; \$4K for the lot. I prefer to sell the pair together with the power supply, rather than "orphan" one of them without a power supply.

As they are too heavy for me to move into a car, it will be best if anyone interested in them drive up to Concord, MA and view them where they are stored at a local Ham's house. Please contact me, Gordon Pettengill, W1OUN, by e-mail at gpetten@comcast.net for more information.

Good 10 GHz Feedhorns That You Can Buy

Paul Wade W1GHZ ©2017

www.w1ghz.org

It isn't too hard to build a feedhorn for a 10 GHz parabolic dish, but some folks aren't. Perhaps they lack the facilities, or just lack confidence in their skills, but they prefer to buy one. However, there aren't a lot of choices available – some end up using a dual-band feed to operate only on 10 GHz, for lack of alternatives. But I have located two possibilities, one for prime-focus dishes and the other for offset dishes.

Prime-Focus Dish

I recently found an English TV feedhorn which works quite well at 10.368 GHz for a prime-focus dish. The US satellite TV band is 11.7 to 12.2 GHz, and some of the feedhorns don't work very well at 10 GHz. However, the European satellite TV band extends down to 10.7 GHz, so the equipment is designed to operate at the lower frequencies as well, and much of it can be stretched down to 10.368 GHz.

The feedhorn, on the right in Figure 1, is an Invacom ADF-120. There are several sellers on eBay, and at least one will ship to the US at reasonable cost – the feedhorn with shipping was about \$35. The central horn is threaded, so the choke rings screw onto the horn and can be adjusted. The data sheet includes a graph for adjustment for various f/D , from 0.43 down to 0.32. I was able to get some simulations done on the feedhorn to see that it would work at 10.368 GHz. For all but very shallow dishes, the choke ring should be screwed all the way back from the aperture, like Figure 1. In this position, optimum f/D is about 0.42, but performance should be very good for f/D from about 0.35 to 0.5, which covers most available dishes.



Fig. 1 – Chaparral feedhorn for offset dish (left) and Invacom feedhorn for prime-focus dish (right)

For deeper dishes, the ring should be even farther back, but that would take some tricky machining with an odd metric thread. The phase center is about 5 mm inside the aperture at 10.368 GHz.

Offset-fed Dish

The feedhorn shown on the left in Figure 1 is a Chaparral “11/12 GHz Offset Straight Feedhorn.” I simulated this one several years ago, and have cut off the output horn section and used it to improve the 10 GHz performance of my 10 & 24 GHz dual-band feed. This horn works well at 10.368 GHz on common offset-fed dishes – almost all the available dishes use the same feed geometry. It can be purchased direct for \$50 at

<http://www.chaparral.net/feed-horns/offset-straight-feedhorn/>.

The phase center of the offset feedhorn is about 24 mm inside the aperture at 10.368 GHz.

Using the Feedhorns

Both feedhorns can bolt directly to a WR-75 waveguide flange; only two holes line up on the Invacom feed, but the other two can be filed or drilled out to fit. With no attempt at matching, VSWR should be under 2:1 – good enough if you have no test equipment. A single screw should be all that is needed to match them perfectly. You can find the best screw location by putting a ball bearing inside the guide and moving it around with a magnet on the outside.

For a coax connection, surplus WR-75 to coax adapters may be found, or you can easily make your own. See the 2018 *ARRL Handbook* or http://www.w1ghz.org/QEX/Rectangular_Waveguide_to_Coax_Transition_Design.pdf

Simulation is fine, but do they really work? I tried them side-by-side, the Chaparral on an 18” TVRO offset dish and the Invacom on a 22” prime-focus dish with $f/D = 0.39$, receiving the VE2TWO beacon 195 km away, a serious test. Signal levels were comparable, peaking around 20 dB out of the noise. My 24” offset dish is only slightly better. This path has lots of QSB so precise readings aren’t possible, but these feedhorns really do work. **W1GHZ**

Yet Another LDMOS Amplifier

Mike, N1JEZ

For 1296 at my station, I've been using a W6PQL pallet. This is based on a pair of MRF-286 28 volt MOSFET devices. It works well, but does require quite a bit of drive and efficiency is rather low. I use an FT-736R which is being pushed quite hard to drive the amplifier. Typical output approaches 150 watts.

I recently acquired an evaluation board using an NXP BLF6G13L-250P. This 50 volt LDMOS device can produce 250 watts at 50% efficiency with gain around 17 dB (Fig. 1).



Fig. 1 - NXP BLF6G13L-250P Evaluation board

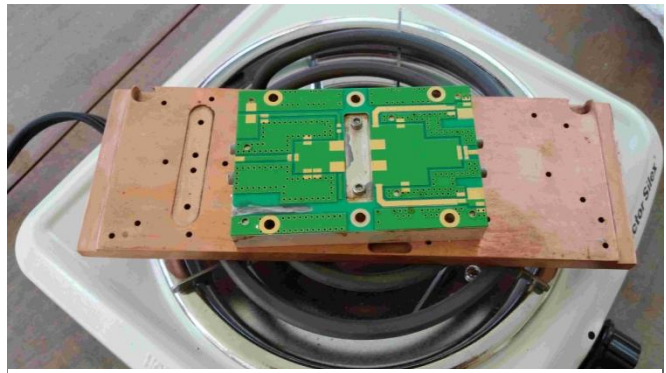


Fig. 2 - Soldering board to heat spreader

The first step was to solder the board to the heat spreader. I dragged out my trusty hot plate and began to heat the spreader. I used a copper plate under the spreader for good heat distribution (Fig. 2).

Once I had the board soldered down, I populated the board and installed the device (Fig. 3). The board is very simple. All the matching is already done.

For a bias supply, I used an LM317AHV regulator. The standard LM317 regulator is designed for a maximum of 37 volts input. The LM317AHV can handle 60 volts input - perfect for use on the 50 volt supplies we typically use on LDMOS devices. Output is adjustable between 1.2 and 57 volts at 1.5 A. I used a small relay to control bias on/off.



Fig. 3 - Populated board – Above

Fig. 4 – Narda Directional Coupler - Right

To measure the output, I used a Narda coupler (Fig. 4). These have been showing up on eBay. Originally designed for 900 MHz at 500 watts, they work well at 1296. They have -30 dB forward and reverse ports with SMA connectors.



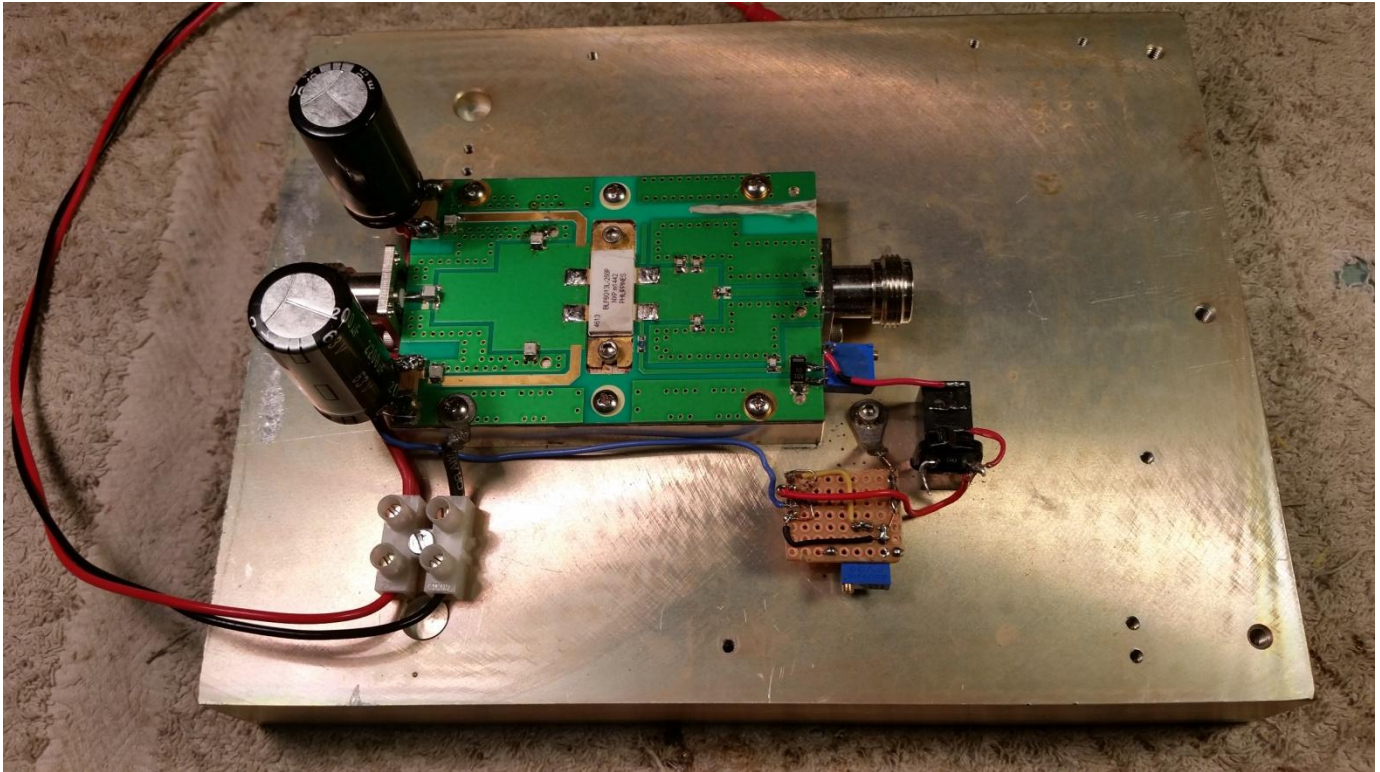


Fig. 5 – Completed NXP BLF6G13L-250P Amplifier

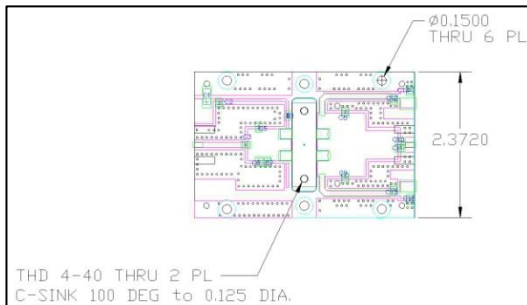


Fig. 6 – PC Board

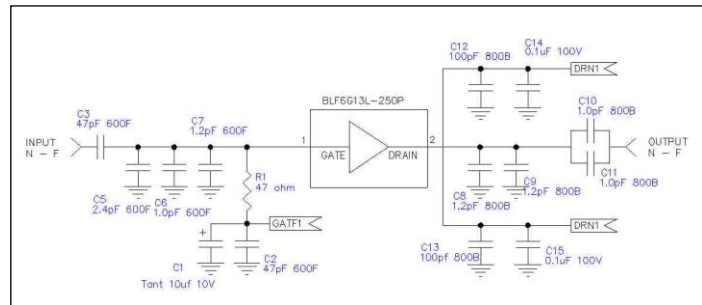


Fig. 7 - Schematic

I've just begun measurements on the board. So far 6 watts in yields an easy 200 watts out. Efficiency is good with current running less than 10A. I hope to have more test results in the next NEWSletter and am looking forward to integrating it in to my station. **N1JEZ**

First Call for Papers - Eastern VHF/UHF/Microwave Conference

The 2018 Eastern VHF/UHF/Microwave Conference is coming up soon - April 20-22, 2018 in Manchester, CT: More details at newsvhf.com after the first of the year.

Now is the time for winter projects - while you are working on them, take some pictures and notes. When you are successful, you might write a paper to share or give a presentation. It doesn't have to be unique and earth shaking - simple ideas are often a great help to the rest of us. Even a paragraph with a picture for the Proceedings CD is good. The CD has room for lots of photos and even videos, so take pictures at events or when you are out roving. If you took some last summer, please send them along.

WORKSHOPS - for the last few years, we have had informal workshops on Friday afternoon. If you have an idea for one, send it along. You don't have to lead the workshop, just tell us what you'd like to hear about and we will try and find an expert (or someone who knows a little more, anyway).

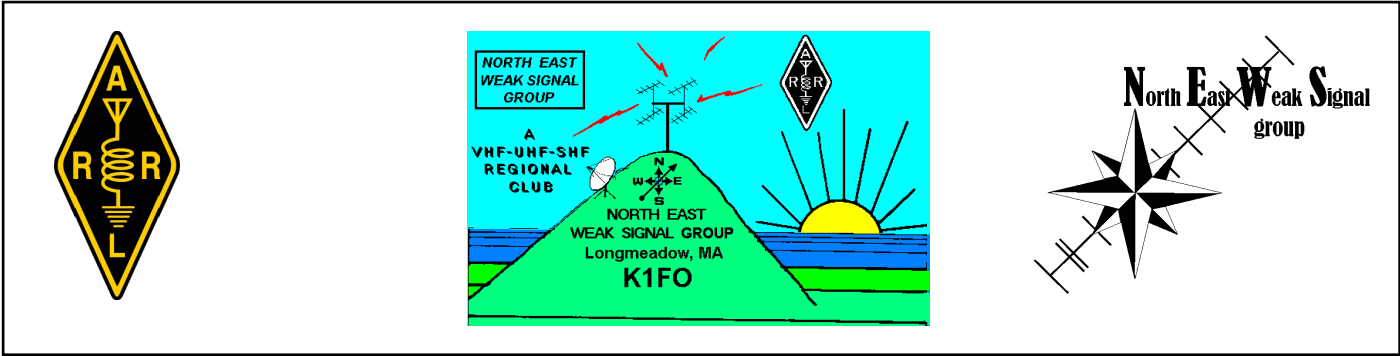
73 and Happy Holidays **Paul, W1GHZ**

Calendar of Upcoming Events 2018

(*Tentative)

| | |
|-------------|---|
| Jan 6 | NEWS Lunch and Board Meeting - Lulu's, Enfield, CT - 11:15am |
| Jan 6 | NEWS General Meeting, Storrs Library, Longmeadow, MA, 1pm |
| Jan 20-22 | ARRL VHF Contest |
| Feb 8-11 | Hamcation, Central Florida Fairgrounds, Orlando, FL |
| Mar 24 | NEWS Lunch and Board Meeting, Lulu's, Enfield, CT, 11:15am |
| Mar 24 | NEWS General Meeting, Storrs Library, Longmeadow, MA, 1pm |
| Apr 9 | Spring Sprint - 144MHz, Mon 7-11pm local |
| Apr 17 | Spring Sprint - 222MHz, Tues 7-11pm local |
| Apr 20-22 | Eastern VHF Conference |
| Apr 21 | NEWS General Meeting, at Conference. |
| Apr 25 | Spring Sprint - 432MHz, Weds 7-11pm local |
| May 4-5* | NEAR-fest - Deerfield, NH |
| May 5* | SBMS 2.3 GHz & up contest |
| May 5 | Spring Sprint 902MHz & Up, Sat 7-11pm local |
| May 12-13 | Spring Sprint 50MHz, Sat 2300Z – Sun 0300Z |
| May 18-20 | ARRL Hamvention, Xenia, Ohio |
| May 28 | Memorial Day |
| June 9-11 | ARRL June VHF Contest |
| June 23-24 | ARRL Field Day |
| July 14 | NEWS Picnic and Meeting, K of C, Washington Rd, Enfield, CT, 11am |
| July* | CQ WW VHF Contest |
| July* | Central States VHF Society Conference |
| Aug* | EME Conference |
| Aug 4-5 | ARRL 222MHz & Up Distance Contest |
| Aug 18-19 | ARRL 10 GHz & Up Contest Weekend #1 |
| Sept 8-10 | ARRL Sept. VHF Contest |
| Sept 15-16 | ARRL 10 GHz & Up Contest Weekend #2 |
| Sept 29 | NEWS Lunch and Board Meeting, Lulu's, Enfield, CT, 11:15am |
| Sept 29 | NEWS General Meeting, Storrs Library, Longmeadow, MA, 1pm |
| Sept 29-30 | ARRL EME Weekend #1, 2.3 GHz & Up |
| Oct 12-13* | NEAR-fest - Deerfield, NH |
| Oct 27-28 | ARRL EME Weekend #2, 50-1296 MHz |
| Oct* | Microwave Update |
| Nov 24-25 | ARRL EME Weekend #3, 50-1296 MHz |
| Nov 17 | NEWS Lunch and Board Meeting, Lulu's, Enfield, CT, 11:15am |
| Nov 17 | NEWS General Meeting, Storrs Library, Longmeadow, MA, 1pm |
| Nov 30-Dec2 | ARRL 160-Meter Contest |

Dates will be added as they become available



MEMBERSHIP APPLICATION

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 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: George Collins, KC1V by e-mail to kc1v@arrl.net. Dues are \$10/year. Remember, this group is formed by VHF'ers for VHF'ers.

Mail to:

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Check your membership
Expiration date on your mailing label!