



# N.E.W.S. LETTER

The Publication of the North East Weak Signal Group



October 2009

Volume Eighteen

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President: K1WHS, Dave OLean  
Vice President: WZ1V, Ron Klimas

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NEWSLetter Editor: W1FKF, Don Twombly

Secretary: W1GHZ, Paul Wade  
Treasurer: WA1MBA, Tom Williams

## Next Meeting October 3, 2009

1 PM Storrs Library  
Longmeadow MA

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Building Activity on the Bands

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## Don't Forget

**The North East Weak Signal Group  
2 Meter VHF and Above Net  
Every Thursday at 8:30 PM Local 144.250**

MEMBERSHIP in the N.E.W.S Group is \$15 per year. Apply to Tom Williams, WA1MBA.

Email [mw@wa1mba.org](mailto:mw@wa1mba.org) You may download an application from our web page <http://www.newsvhf.com/>

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## The President's Corner

This is the first writing for me, of The President's Corner. I would first like to thank those folks who wished me well for my term as the NEWS Group president. Mike N1JEZ is a tough act to follow for sure, and has provided great leadership over the past years. Mike receives a big "thank you" for a job well done.

We are now in the middle of the VHF DX season for the higher bands. I was hoping to throw the October meeting open to all who would like to share their observations of DX events from late this summer. We all are used to the fireworks on 50 MHz each Es season, but tropo action above 50 MHz has been rather absent from the northeast indeed for a few years. I am not sure if we can blame El Niño, or La Niña, but the tropo opportunities have been fleeting at best, for a few years. Hopefully these next weeks will end that drought! Let's view the next meeting as a big band session for 144 MHz and above. August 24 thru 26 was a red letter day for much of the Midwest and east coast. Be prepared to provide a synopsis of what you worked and what you did not work. It is amazing what a few miles can do, and much insight can be gained by listening to what others were working at the same time. There were a few ES opportunities as well for 144 MHz operators in July, and we can cover those as well.

Conditions in the September Contest were interesting. I heard reports that more western stations had great tropo to the west. I know that Maine was not blessed with much, but possibly southern New England fared better. The days following the September contest event should be watched carefully. Mornings can provide exciting DX. All that is needed is someone calling CQ and someone else to hear and respond. September 2 was a great morning that seemed to be missed entirely by the Hepburn maps for that day. I missed it as well with a diesel generator malfunction. They tend to not start well with water as the primary fuel. Hopefully, there will be more DX for us in the next month or so. We can use the October meeting to discuss the propagation events that will hopefully grace our logs leading up to meeting day. So, bring your logbooks or summaries of stations worked and bands utilized. It does not have to be a polished presentation. Remember that band sessions are pretty laid back! It should be fun. I look forward to hearing all the tales.

Dave K1WHS

## From our Secretary

Minutes of NEWS meeting 11 July 2009 (Picnic)  
at Knights of Columbus, Enfield, CT

President N1JEZ called meeting to order at 1336Z

Next meeting 3 October at the Storrs Library,  
Longmeadow, MA

### Treasurers Report

- Picnic is membership renewal time - pay your dues - current balance \$3004
- 96 paid members plus life members

### ANNOUNCEMENTS

- N2LIV - please support WA5VJB column in DUBUS - send pictures
- KA1OJ - NEWS hats are available \$12
- AF1T and W1MKY thank everyone for making their wedding special

### NEW BUSINESS

- Motion to host Microwave Update in fall of 2011 - passed Unanimously
- volunteered to assist: WA1DMV, WD1V, W1AUV

### ELECTION of OFFICERS:

President: K1WHS

Vice President: WZ1V

Treasurer: WA1MBA

Secretary: W1GHZ

NEWSletter editor: W1FKF

Board of Directors (three year terms): N1JEZ, KA1OJ, N1DPM

All elected Unanimously

Paul W1GHZ

## From our Treasurer

We had a great turnout for the July annual meeting and picnic, and most folks there signed up for another membership year. Membership renewal dues should be paid at the annual meeting. As of this writing, 44 of our members have not paid their 2009/2010 dues. Over 30 of those have email addresses, and I have sent them reminder emails. Three of the address bounced, so I will send a letter to those asking for both a correct email address and dues.

Those of you who receive hard-copy of the NEWS Letter will have a colored mark on the address label to alert you to the need to renew. This year, if I don't receive dues by the November meeting, I will remove the record from the database.

As we begin a new year the funds are pretty solid. If we get the typical number of renewals we should be in just about the same shape as last year, perhaps a little bit ahead. I hope everyone had fun in the contests. See you at the October meeting!

Tom WA1MBA

### AUGUST 25 AND 26 TROPO at K1WHS

I caught some nice tropo on August 25 and 26, 2009. I had been looking at the Hepburn tropo maps and things were very good in the Ohio valley and westward on the evening of the 24th. A little listening on 144 indicated that things in my area were not elevated yet. I could hear Ron, WZ1V and Paul, N2GHR feverishly making calls that night, with their beams westward. Ron indicated that he had heard and worked a single station from Missouri on 144 MHz. The good conditions were on our doorstep, but not quite in place yet. I made a point to be QRV the morning of August 25, just in case the good conditions being enjoyed in the heartland would extend eastward.. I was up at the shack at 7 AM. The first signal heard was W9UD on CW!! I worked a few stations in the Chicago area, then went on 222 MHz at 1148 UT, and worked W9GA and N2BJ in EN51 and 53. At that point I discovered that my 432 amp would not key up. so no 432 attempts at that time. Later on I did get it working and worked several in the Chicago area on that band later on. I worked about 35 DX QSOs including almost working W9ZIH on 1296. I faded out at his place before we could exchange reports. I guess we waited too long It was 1305 UT. A few minutes earlier would have been fine. We initially tried 10,368 CW but heard nil, and then started down in frequency until we heard signals on 1296! I sure wish I had checked 1296 earlier that morning.

222 MHz stations worked in the morning:

W9GA FN53 20 watts!! I was running a KW.

N2BJ FN51

K9HMB FN52

N0PB EM39

N9LR EN50

VE3KU FN03

W9RM EN52

K8TVD EN91

K3SIW EN52

W9UD EN53

K8TQK EM89 was solid on 1296 CW.

432 MHz stations worked (after I got the rig working..)

K3SIW EN52

W9OBG heard but QSB

W9RM EN52

W9ZIH EN51 Peaked at 59 +20!!

N0PB EM39

K9HMB EN52

1296 MHz

Heard W9ZIH but no QSO. He lost me in QSB.

On 144 I worked the same type of stuff to similar areas that I worked on 222 and 432 in the morning session. Also noted was N0PB in Missouri saying that he heard me on 1296 when I was calling W9ZIH. We tried later on 1296, but I heard nil. I am really sorry that I did not try 1296 sooner. A lesson learned. I am sure it would have worked earlier!! At 1345 I worked W9RXM on a meteor burst and then he peaked up on tropo three minutes later for a loud and solid tropo contact in EN41!! Very interesting. I quit at 1400 UT to get some work done.

On Tuesday evening August 26 UT the band was still good. I started at 0050 UT and I worked the following:

144 MHz

K9MRI EN70 0050 UT

K8TQK EM89

WB9UWA EN50 Jim running 35 watts

N0IRS EM29 about 1275 miles, my best DX.

VE3KZL FN04

VE3HHT FN03 5 watts

K8MEM EN82 Detroit

N9SS EN50

VE1AHM FN76 Neither VE1 heard much of any DX at this time.

VE1SKY FN74

K8WFN EN90

VA3ST FN03 Niagara

W8TCZ EN81

WA2KBZ/0 EM38 this was about 0223 UT and was my last QSO.

222 MHz

K9MRI EN70 0100

N9LR EN50

W9KXI FN12

N8KOL EN80 0120 UT

432 MHz

N9LR EN50 0108 UT

I was wondering why I could not hear any W5s in the opening. On the 25th, I know that the VE3s and KA2LIM were working Oklahoma stations. I chalked it up to the inversion area being a crooked path. It sure looked crooked on the Hepburn maps for the day. I figured that there was a maximum distance that could be covered, and any further would put you in a straight line out of the ducting area.

North East Weak Signal Group  
Annual Picnic  
July 2009

Test results - 10 and 24 GHz

**10 GHz MDS**

CALL	RIG	lost	back up	10 GHz ERP	
K2AEP	"110mw, 18"" offset"	-98	-95	dB	-21 dB
KA1OJ	"240 mw, 18"" offset"	-102	-98	dB	dB
N1EKV	"300mw, 24"" offset"	-94	-94	dB	-13 dB
N2GZ	"3W, 18"offset (W1GHZ)	-94	-93	dB	-10 dB
W1GHZ	"RX only, 24"" offset"	-98	-98	dB	dB
AF1T	"10W, 24"" prime"	-104	-99	dB	0 (ref) dB
W1FKF	"broken amp, 18" offset-	90	-94	dB	-37 dB
N1JFU	"8W, 24"" offset"	-98	-96	dB	-4 dB
K1IIG	"2W, 24"" prime "	-96	-87	dB	dB
WW1Z	"800mw, 20 dBi horn"	-85	-84	dB	-24 dB
W1EX	"1W, 24"" prime"	-96		dB	dB
WA2IID	"6W, 24"" prime"	-85	-83	dB	-30 dB

**24 GHz MDS**

	lost	24 GHz ERP	
N1JEZ	-91	3	dB
W1FKF	"700 mw, B118"" offset"	-85	dBm 0 (ref) dB
N2GZ	"2W, 18"" offset (W1GHZ)	-90	dBm dB
W1JHR	"400mw, 18"" offset"	-70	dBm -8 dB

**Mike and Ken on 122 GHz**



**Mid Atlantic States  
VHF Conference**

Saturday, September 26, 2009  
East Norriton, PA

An informative and fun filled day of presentations, eyeball  
QSOs with VHF gurus and beginners,  
auctions of good "stuff" and a great door-prize table.

**HAMARAMA**

Sunday, September 27, 2009

**Up Coming Contests**

**2009 Fall Sprints**

- 144 MHz Sept. 21 2009
- 222 MHz Sept. 29 2009
- 432 MHz Oct.. 7 2009
- Microwave Sprint Oct. 17 2009
- 50 MHz Oct. 27 2009

Microwave Update 2009  
October 22-24, 2009  
Dallas, Texas

## Phase Noise and MDS

*Paul Wade W1GHZ 2009*

w1ghz@arrl.net

There has been a lot of noise about phase noise recently, but very little data. We know that older FM rigs with synthesizers sounded terrible on an SSB receiver, but worked fine for FM. It is also generally understood that an LO with phase noise will add noise to signals in the presence of other very strong signals. But what really counts is the effect of phase noise on weak signals – and no one has worked this out mathematically.

The NEWS Group ([www.newsvhf.com](http://www.newsvhf.com)) does MDS (minimum discernable signal) testing on 10 GHz at the annual July picnic. I thought this would be a good opportunity to do some direct comparisons, but I wasn't getting my stuff together in time. Then Steve, N2CEI, called with an offer – he would send some equipment if I would test it. He sent a 10 GHz converter (receive half of a transverter) with two external LO sources: the older MICRO-LO crystal-multiplier source and the new A-32 synthesized source, both at 1136 MHz.

The two LO sources had less than 1 dB difference in output power, so I hooked them up with a coax relay to allow quick switching. They were close to the same frequency, perhaps 15 KHz apart, so that tuning was required when switching. A little tuning is ideal for MDS tests – if you can't find the signal, it is NOT discernable.

I had no idea what to expect, except that I've heard that some good operators are using a synthesized LO with good results. I certainly hoped that there would be no difference, so then I could change all my rigs to synthesized sources, lock all my LO sources to GPS and be right on frequency.

### **MDS Results**

For the NEWS MDS testing, a transmitted signal is reduced in power by one dB at a time. Each listener indicates the level at which he can no longer hear the signal – the MDS is the previous level, 1 dB higher. This is the weakest signal you can detect, probably several dB less than needed to copy CW.

The transmitter is several hundred feet from the receive locations – far enough that leakage from the equipment will not be heard. Attempts to do MDS testing with just attenuators are usually foiled by generator leakage. We also eliminate the possibility of IF leakage by using oddball LO and IF frequencies to generate 10.368 GHz.

I connected the new 10 GHz receiver, with a nominal 1.5 dB NF, to a 24" offset dish. The IF rig was a Yaesu FT-817. At each power level, I switched back and forth between the two LO sources, detecting the signal by ear only, using decent headphones. I'm pretty good at finding very weak signals by ear – the nice waterfall displays are not easily transported to mountaintops, so I still dig them out with headphones. The MDS was comparable to similar

systems, so performance was pretty good. The MDS with the crystal LO source was 2 dB better than with the synthesized source.

One further note: at the start of the MDS run, with the signal perhaps 45 dB out of the noise, the synthesized source had multiple responses several KHz apart on each side of the carrier, with level decreasing with distance from the carrier. The crystal source only had a pure CW note.

### **Further Tests**

The following week, I discussed the results with Steve. He suggested that the internal oscillator he had provided in the A-32 source provided an inadequate drive level at 10 MHz, resulting in higher phase noise. I looked at it with my spectrum analyzer, an old HP 141T, and saw close-in noise only about 28 dB down. I then swapped out the internal oscillator for a good TCXO providing +13 dBm at 10 MHz – the noise was reduced to about 50 dB down. A second A-32 of an earlier vintage produced comparable results.

I then set up my own MDS range (since I provide the equipment anyway) and repeated the test. Results were the same: the crystal source was 2 dB better than the synthesized source. The multiple responses to strong signals were still present with the synthesized source.

### IF Transceiver

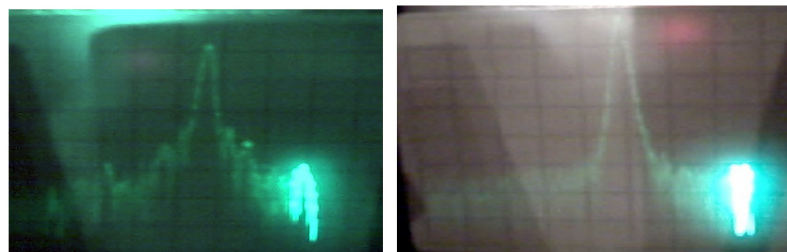
I also did experiments with the IF rig. Dale, AF1T, uses an IC-202, and he usually does better at MDS than most of us with more modern rigs. The IC-202 is known to have particularly good phase noise, since it uses a VCXO for tuning. So I dug out my old IC-202S for the second MDS test. The MDS using the IC-202s with either source was 2 dB worse than the FT-817 with SSB filter.

Another experiment was IF bandwidth. My FT-817 has the optional CW filter, which seems to help when copying very weak CW signals, if they are stable enough. The MDS with the CW filter was about 1 dB better than with the SSB filter.

### Phase noise plots

Actual phase noise data might help understand what is happening. Greg, WA1VUG, has been kind enough to bring nice Rohde & Schwarz ([www.rohde-schwarz.com](http://www.rohde-schwarz.com)) test equipment to the Eastern VHF/UHF Conference, so I have some data. However, these are not the same local oscillators used for MDS testing, and not at the same frequency, so we are probably comparing apples and oranges and maybe bananas. But they are included here for what they are worth. There are also phase noise plots of the A-32 on the Down East Microwave ([www.downeastmicrowave.com](http://www.downeastmicrowave.com)) web site at both 1136 and 10224 MHz.

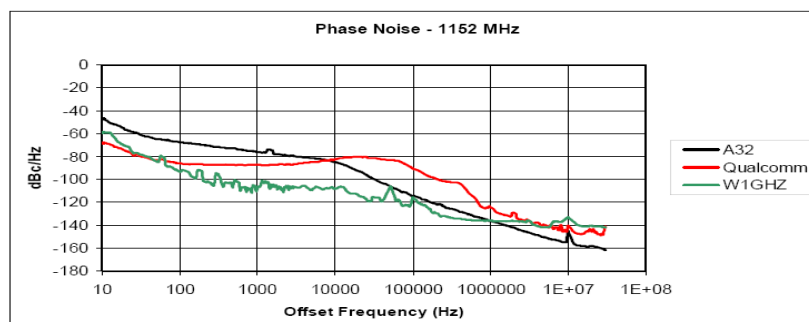
First are the two spectrum analyzer plots of the A-32 source at 1136 MHz in Figure 1, with the internal 10 MHz oscillator at about +4 dBm, and with an external 10 MHz TCXO at about +13 dBm. Vertical scale is 10 dB/division and horizontal is 2 KHz/division, with a 300 Hz IF filter. The traces are faint because the storage function no longer works on my old HP 141T. Both of these violate my rule for oscillators: if you can see anything other than carrier on a spectrum analyzer, it's not good enough.



Internal Oscillator

External Oscillator

The other plots are measured with an R&S FSUP phase noise tester and signal analyzer. Figure 2 shows three different oscillators at 1152 MHz: a different A-32 unit at 1152.022 MHz, referenced to the 10 MHz TCXO, a Qualcomm synthesizer board (rectangular version) at 1152 MHz, and the 1152 MHz LO board from my "Simple Multiband Rover Transverter," which multiplies up from an 64 MHz computer oscillator.



## Discussion

The MDS testing is somewhat subjective, but didn't know the answer beforehand, and I heard a consistent 2 dB difference. I don't know whether this would make any difference in copying a very weak CW signal.

How important is 2 dB? A final step in our NEWS MDS tests is to move the frequency slightly, less than 10 KHz, then increase the level in 1 dB steps to see when folks can actually find the signal. For most operators, this is 2 to 5 dB higher than the MDS with decreasing levels on the starting frequency. In other words, knowing the frequency is typically worth 2 to 5 dB. Therefore, if both stations are frequency-locked to GPS or rubidium standards so they are likely to be on the same frequency, the synthesized source is probably just as good as a crystal that is not right on frequency (i.e., all crystals).

The narrow IF filter also made a slight improvement, so frequency accuracy good enough to use the narrow filter would be an advantage. Note that the improvement was only 1 dB even though the difference in bandwidth is roughly 7 dB. Al, K2UYH, has been telling us for years that the human ear can be trained to be a very good filter. I guess my ears provide about 6 dB of filtering. I'll bet some of the EME operators can do even better.

Are these sources good enough for mountaintop operation in New England? There may be strong-signal problems – signals from nearby sites are frequently more than 45 dB above the noise, even with the dish pointed in another direction, and are typically only separated by perhaps 20 KHz. But I have seen good results with synthesized LO sources – W1FKF uses one and hears very well. Operating side-by-side, he often hears better than I do.

In other areas with no strong signals, knowing what frequency the weak ones might be on is distinct advantage.

An alternative would be to use the synthesized source as a frequency reference marker and a crystal source for the LO. Some of us have been doing this with older, dirty synthesizers – the distinctive note differentiates the marker from a birdie.

At other frequencies, results may be different. We know that phase noise increases with multiplication – see the phase noise plots on the Down East Microwave website. What we don't know yet is whether the lower phase noise on lower bands will affect MDS, or whether the effect will be worse at higher bands

## Summary

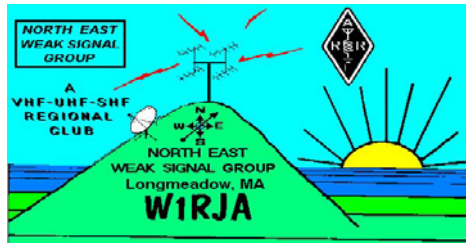
More testing is needed before we reach any conclusions. Synthesizers have been getting better, and I think more improvement is possible. Other choices, like the REFLOCK units, also need to be evaluated.

The MDS testing, while subjective, gives a realistic comparison so what most weak signal operators care about, hearing weak signals. It's not that hard to set up a test range, so give it a try when improving your equipment. At least you will be confident that it's an improvement.



### **Road to mountain summit of Mt Wachusett will close for two years**

Motorists wanting to enjoy the views of central Massachusetts and Boston from the top of Wachusett Mountain should plan to drive to the summit before the road closes this fall. Once closed, it won't reopen until September of 2011. The project involves rehabbing the roadway system to promote public safety. It will involve the reclamation and overlay of roughly five miles of roads and improved signage, while protecting the area's natural, cultural and historic resources.



**N.E.W.S. Group**

**Membership Application**

Name: \_\_\_\_\_ Call sign: \_\_\_\_\_ Grid: \_\_\_\_\_

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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: Don Twombly, W 1FKF 23 Maura Dr. Woburn, MA 01801 Email: donw1fkf-news (at) yahoo (dot) com. Dues are \$15/year. Remember, this group is formed by VHF'ers for VHF'ers.

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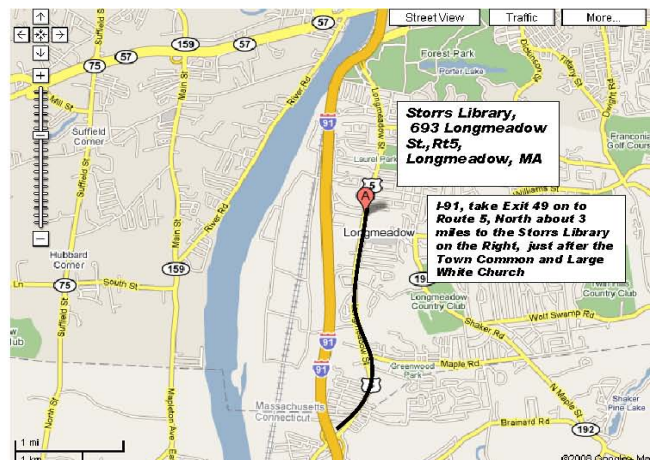
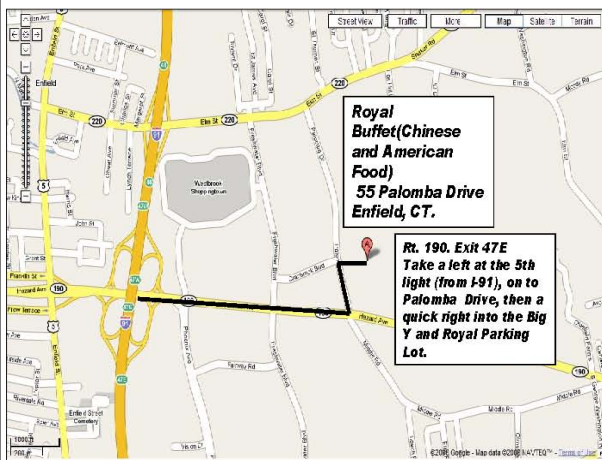
**North East Weak Signal Group**

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**Next Meeting October 3, 2009**

**Discussion on  
Building Activity on the Bands**

**1 PM at the Storrs Library  
693 Longmeadow Street, RT 5  
Longmeadow, MA**

**N.E.W.S Hats will be available at the next meeting!  
\$12 each - cash (bring some singles please) or check.  
See Mark, KA1OJ**

*Don't Forget*  
**The North East Weak Signal Group  
2 Meter VHF and Above Net  
Every Thursday at 8:30 PM Local 144.250  
W1COT, WZ1V or K1PXE Net Control**

**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!