

N.E.W.S. LETTER

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

January, 2014

Volume 23

Issue 1

☺40th Eastern VHF/UHF/Microwave Conference☺

↑↑↑April 11th – 13th, 2014↑↑↑

→Next Meeting: January 4th←

👉Group Show & Tell – Quick Talks - Duc Tape Auction👈

**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.

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

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

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2014 NEWS CALENDAR:

January 2 - Quadrantids meteor shower
January 4, 1PM - 4PM - [N.E.W.S. Group Meeting](#)
January 18-20, 1900Z-0359Z - [ARRL January VHF SweepStakes](#)
March 8, 1PM - 4PM - [N.E.W.S. Group Meeting](#)
April 7, 1900-2300 Local - [144 MHz Spring Sprint](#)
April 11-13 - [Eastern VHF-UHF Conference](#)
April 15, 1900-2300 Local - [222 MHz Spring Sprint](#)
April 20 - Lyrids meteor shower
April 23, 1900-2300 Local - [432 MHz Spring Sprint](#)
April 25-26 - [Southeastern VHF Society Conference](#)
May 2-3 - [New England Amateur Radio Festival - Deerfield, NH](#)
May 3, 0600-1300 Local - [Microwave Spring Sprint](#)
May 10-11, 2300-0300Z - [50 MHz Spring Sprint](#)
May 16-18 - [Dayton Hamfest](#)
June 14-16, 1800Z-0300Z - [ARRL June VHF QSO Party](#)
June 28 - [Rochester NY RARA Hamfest](#)
July 12, 11AM - 4PM - [N.E.W.S. Group Picnic](#)
July 19-20, 1800Z - 2100Z - [CQ Worldwide VHF Contest](#)
August 2-3, 1800Z - 1800Z - [ARRL UHF Contest](#)
August 9, 2000-0000 UTC - [50 MHz Fall Sprint](#)
August 11-12 - Perseids meteor shower
August 16-17, 6AM - 11:59:59PM - [ARRL 10-GHz & up Cumulative Contest](#)
September 6, 1PM - 4PM - [N.E.W.S. Group Meeting](#)
September 13-15, 1800Z-0300Z - [ARRL September VHF QSO Party](#)
September 20-21, 6AM - 11:59:59PM - [ARRL 10-GHz & up Cumulative Contest](#)
September 22, 1900-2300 Local - [144 MHz Fall Sprint](#)
September 26-28 - [Mid-Atlantic VHF Conference](#)
October 1, 1900-2300 Local - [222 MHz Fall Sprint](#)
October 9, 1900-2300 Local - [432 MHz Fall Sprint](#)
October 10-11 - [New England Amateur Radio Festival - Deerfield, NH](#)
October 11, 0700-1300 Local - [Microwave Fall Sprint](#)
October 12, 8AM-2PM - [Nutmeg Hamfest & ARRL CT State Convention](#)
October 17-18 - [Microwave Update - Rochester, NY](#)
November 16 - Leonids meteor shower
November 22, 1PM - 4PM - [N.E.W.S. Group Meeting](#)
December 11 - Geminids meteor shower

President's Report – January 2014

NEWSletter

R. L. Frey – WA2AAU

January Meeting Topics:

Group Show and Tell – “Quick Talks” Presentations

Bring your home brew projects and tell us about them for 5-10 minutes.

Duc Tape Auction

Something Nice to Something That Needs a New Home

Wow! 2014 is already on the doorstep. I guess it should be no surprise. As I write this we are expecting our first major snowstorm of the season in the northeast, with up to a foot predicted where I live. Winter is here!

This January meeting let's hope we don't get snowed out on the day of the meeting! For those who can make it, please join us for a Group Show and Tell. With this bunch of inventive guys, there is always something interesting going on in their Ham shacks or at least in their brains. Some come tell us about what you have been working on. It doesn't need to be super-duper. Just share what you have been playing with. If you have been working with more than one thing, GREAT, tell us about each of them. Just thought of a new idea, tell us about that too, with a little bit of background and why you think it might be interesting. Have you modeled an antenna or circuit recently that has potential for use in the real world? Tell us about that too. Did you have an interesting operating experience? Work some interesting DX on a weird band? Tell us about it. You get the idea.

Now, even better, if you have something you can show us, bring it along. I know the new kilowatt power supply might be too heavy, but who knows, if it is a switcher, you could bring that to SHOW to the group. (Come to think of it, those 50-volt switchers that are commonly used with the new high power VHF power amps really are easy enough to carry.) Seriously, if you can bring something to pass around, so much the better. Plan on a talk time of up to 10 minutes unless you have multiple projects, then we can probably give you more time (but they better be interesting... ☺)

To add a little spice to the action, bring some stuff along for a “Duc Tape Auction”. You know, where you tape something that needs a new home to something that somebody might really want to bid on. This can be fun, especially if it's not too clear what the “blivit” is, or you can't see the “blivit” at all. So come with some money and have some fun.

73, and Merry Christmas, Happy New Year and Happy Holidays – Dick, WA2AAU

Secretary's Report

NEWS Meeting 23 November 2013, Storrs Library, Longmeadow, MA

Preceded by a Board of Directors meeting at Lulu's Restaurant

President WA2AAU called meeting to order at 1312

TREASURERS REPORT by WA1MBA

- 80 paid members to date + 14 permanent members
- 32 members not renewed yet
- Balance \$4681
- Report Approved unanimously

OLD BUSINESS

- K2DLL beacons will be staying on for the winter
- There are opportunities for additional beacons, perhaps N2YYU 10 GHz beacon
- MOTION by K2BXC to make insurance a recurring annual expense. UNANIMOUS.
- MOTION by WZ1V to change club call from W1RJA to K1FO. APPROVED.

Club has received a verbal OK from Mrs. Powlishen, but a letter is needed.

- Dates for 2014 meetings:

1/4, 3/8, 4/12, 7/12 tentative, 9/6, 11/22

MOTION by WZ1V to accept these dates. UNANIMOUS

NEW BUSINESS

- MOTION by WZ1V that the NEWS Group to pay

for Web site hosting. UNANIMOUS

(Ron has been paying the fee)

- MOTION by K1MAP to pay Storrs Library fee plus \$100 gift. UNANIMOUS

ANNOUNCEMENTS

- K1BXC report on 144.205 group. Stan is working on repairs.

One more trip needed.

- Prize chairperson is needed for 2014 Eastern VHF/UHF Conference.

- Speakers and papers are also needed

- Suggestions needed for topics for future meetings. Ideas to WA2AAU

PRESENTATIONS

- K1IW New England Spectrum Management Council Presentation on 2M bandplan for more repeaters in EMass & SNH.

Survey of FM Simplex users and spectrum analyzer survey.

New channels have output in 146.4 range, input in 144.9 range

Lots of debate

- WA1MBA 77 GHz EME test at MUD using Morehead 21 meter dish.

- W1GHZ on some small projects in Altoids tins.

Meeting adjourned 1550.

- Paul, W1GHZ

Treasurer Report

We had our first inch of snow last night. Winter usually means its time to try to straighten out the shack, and find those projects that never got done. What actually gets done is usually different, like more disorganized and starting new projects. Anyway, membership renewals (due in July) continue to trickle in, along with a few new members. We even got another life membership! The beginning of January is

when I count the annual census - that is, I count the paid-up members and put the number on the chart. The last three years the number of paid up members (excluding Permanent members) held steady at 94. I am writing this in early December and we are at 88. Hopefully we will get a least six more renewals and/or new members by early January to continue that average. Note that for the last three years we have been gaining exactly as many members as we have lost. Thanks to all of you who have mentioned our club to your friends and other clubs. See you early next year!

Tom WA1MBA

40th Eastern VHF/UHF/Microwave Conference

Hey NEWS Members!

Here is the Preliminary Announcement for our 40th Eastern VHF-UHF-MW Conference. This will be held the weekend before Easter.

Our 2014 event will be held at the same hotel as it was in 2013.

We are looking for Volunteers to help with the conference.

We need a Volunteer for "Door Prizes Chairperson."

If You can volunteer, please contact any one of the conference co-chair's. Thank-You!!

40th ANNUAL EASTERN VHF/UHF/MW CONFERENCE

Fri./Sat./Sun. April 11-12-13 2014

BAYMONT INN & SUITES
20 Taylor St., Manchester, CT 06042
(10 miles northeast of Hartford, CT, I-84, at Exit 63)

FRIDAY--

6pm to ?--SUPER HOSPITALITY ROOM & IN-DOOR SWAP

SATURDAY--

8am to 5pm--Presentations & Indoor Vendors

7pm-- BANQUET BUFFET, Tom Kirby Award, Banquet Speaker, Trivia Quiz, Door Prizes

SUNDAY--

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

The Baymont Room rates will be the same as last year: Double \$69.00, Suites \$99.00

Sponsored by: North East Weak Signal Group (NEWS).

Questions? Email Mark, K1MAP: map1@mapinternet.com or Contact one of the Conference Co-Chairs:

Mark K1MAP, (hospitality, hotel & general)

Ron, WZ1V, (registration, available after Jan 1, 2014)

Paul, W1GHZ, (presentations, proceedings)

Check: www.newsvhf.com for updates--

-----MORE TO COME!

- Mark, K1MAP



Request for Revisions to the ARRL 10GHz and Up Contest Rules

The existing ARRL 10GHz and Up Contest rules have not kept up with the advancements in competitive operation strategies and do not promote operation of the available microwave bands 24 GHz and above. The proliferation of narrowband equipment on 10 GHz. has made operation much easier on that band and more hams are getting excited about microwave operating but are not exploring the higher bands above. It is recommended that the following points should be addressed to possibly increase activity and promote development of all microwave bands the original rules of the contest were designed for.

- Create single band entries and eliminate the "10GHz and above" class. This would evenly promote activity on all bands 24 GHz and above by creating individual band competi-

tions. As one goes higher frequency, the contacts are more time consuming and more difficult to amass cumulative distances. Those that wish to compete now on the bands 24 GHz and higher have their efforts masked by easier 10 GHz contacts.

- For the "10 GHz and Above" class, the existing rules promote the strategy of amassing the bulk of one's score on the lower 10GHz band and only use the 24GHz and higher bands for short QSO's to gather the initial 100 point QSO's or simply make one QSO just to qualify for the class. This strategy of operating in the "10GHz and Up" class is demonstrated in past contest entries and is responsible for inhibiting activity on the bands 24GHz and above.
- Single band awards will show appreciation of the difficulty, the time consumed to make a quality contact, and the expense of constructing and operating equipment for 24 GHz and above.
- Include 5.7GHz since it shares similar propagation and methods with the higher frequencies and increase use of existing equipment and activity on an otherwise seldom used band.

The intentions of the Florida Weak Signal Society are to have these suggestions circulated among all weak signal enthusiasts and all 10 GHz Cumulative Contest operators for their review and if in agreement, forward these suggestions and/or possibly provide additional comments and suggestions to the ARRL contest dept and your ARRL Division Director.



Altoids Tin Filters

Paul Wade W1GHZ ©2013
w1ghz@arrl.net

Several years ago, I described a series of "Multiband Microwave Transverters for the Rover - *Simple and Cheap* " (www.w1ghz.org), with several later enhancements. These have proved popular; I hope they have gotten some hams on new microwave bands. I did warn that they were adequate for a simple QRP station, but would need more filtering when augmented with amplifiers.

My suggestion was for "real metal filters," but no concrete suggestions. Unless you are lucky with surplus finds, good filters are hard to make or expensive to buy. Even with some decent machine tools, filters take time and care, but the results are usually rewarding.

I was recently inspired by bad weather and too much broken equipment needing repair to try building some simple, inexpensive filters. The goal is a filter with good performance with minimal cost that can be built in a couple of hours with modest tools.

Filter design

Filter design software, no matter what the cost, yields a set of dimensions that meet some performance specifications. This is only half of the problem; the other half is making it realizable within practical limitations - can I build it? The practical limitations could range anywhere from a shop with a 6-axis CNC machine to a drill and soldering iron on the kitchen table. Most hams are somewhere in between, but closer to the latter.

Since these transverters are QRP rigs, aren't we required to use an Altoids tin somewhere? Can we build a decent filter in an Altoids tin?

A good filter type for UHF and microwaves is the combline filter. I use a printed version in my LO boards. The combline filter uses parallel transmission line resonators less than a quarter-wave long, loaded by capacitance at the open end. This allows tuning over a range of frequencies by varying the capacitance. Typical electrical length of the resonators is between 30 and 60 electrical degrees; a quarter-wavelength is 90 degrees.

Once the resonator length is chosen, the type and impedance of the transmission line resonators is estimated. Then the resonator spacing and required tuning capacitance may be calculated - usually by software except in very simple cases. If we are trying to fit into an available enclosure, like the Altoids tin, the choices may be limited and require some trial-and-error tradeoffs to fit.

Altoids filter



Figure 1 – 432 MHz Combline filter in Altoids tin

A simple way to make a transmission line resonator is a cylinder between two flat plates, known as slabline. For the cylinder, I use the outer conductor of common semi-rigid coax, 0.141 inches in diameter, such as UT-141. Then the inner conductor provides the capacitor, sliding out to adjust the capacitance – approximately 2.4 pf per inch. The outer conductor is soldered to the tin wall at one end, and the inner conductor to the other end after tuning, making a reasonably rigid assembly.

Several configurations of input and output connections are commonly used, but most straightforward is to tap the end resonators near the ground end. This configuration does not permit easy adjustment, but once the correct tap point is known, adjustment is not needed.

The minimum number of resonators for decent filter shape is three. More resonators provide better filter shape but make tuning more difficult, especially with limited test equipment.

A few trial calculations suggested that the lowest ham band frequency that would fit in an Altoids tin is about 432 MHz. The resonators are about 46 degrees long, and require about [xx pf] to tune. Lower frequencies would require more capacitance than the coax can provide. Calculated characteristic impedance of the semi-rigid coax resonators is 116 ohms. A lower impedance might be desirable, but would require larger, more expensive coax than the readily available 0.141 inch diameter.

Since I needed a 432 MHz filter for another project, I put one together - construction details below. The filter is shown in Figure 1, and the performance in Figure 2. Loss is about 1 dB, and bandwidth is about 36 MHz, with the common LO frequency of 404 MHz about 15 dB down. A narrower filter would be desirable, but would require wider spacing between the resonators, and there isn't room in the Altoids tin, especially with the rounded corners.

Combine Filter for 432 MHz in Altoids tin

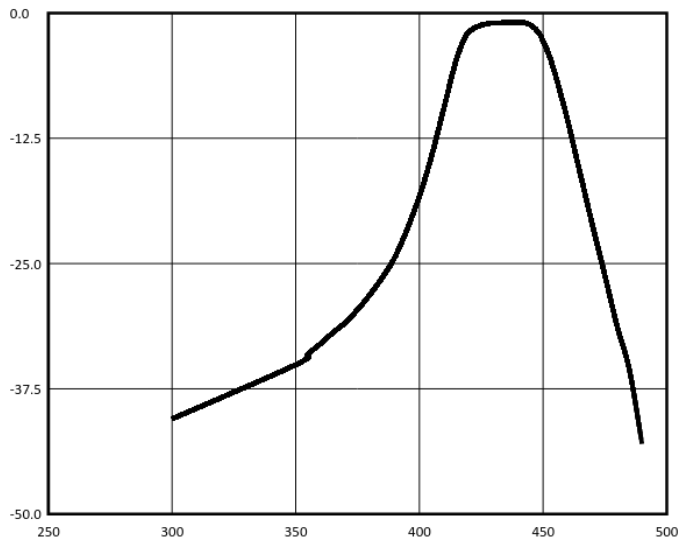


Figure 2 – Performance of 432 MHz Filter

Tuning is a bit tricky, involving pulling one center conductor with a pair of pliers while holding the other two center conductors with other fingers so they make connection to the box. This is repeated for each conductor in turn until the desired performance achieved - then the inner conductors are soldered to the box.

Tuning a filter is a series of tradeoffs, and is easier with a swept-frequency setup. The tuning starts around 300 MHz with the inner conductor only pulled out a small amount, perhaps 1/2 inch, but moves up smoothly to 432 MHz or a bit higher - it could be tuned anywhere in this range, perhaps for an LO frequency.

902 MHz Filter

The 432 MHz filter demonstrates that the Altoids filter is feasible - now what about higher frequencies? Rotating the Altoids tin so the resonators fit the short dimension, as shown in Figure 3, makes the length about 57 degrees at 902 MHz. Much less capacitance is required, roughly 1.5 pf, so the inner conductor is nearly all the way out and tuning is much more finicky. The tuning starts about 600 MHz before the inner conductor is pulled out, so it could be tuned anywhere in between, if needed.

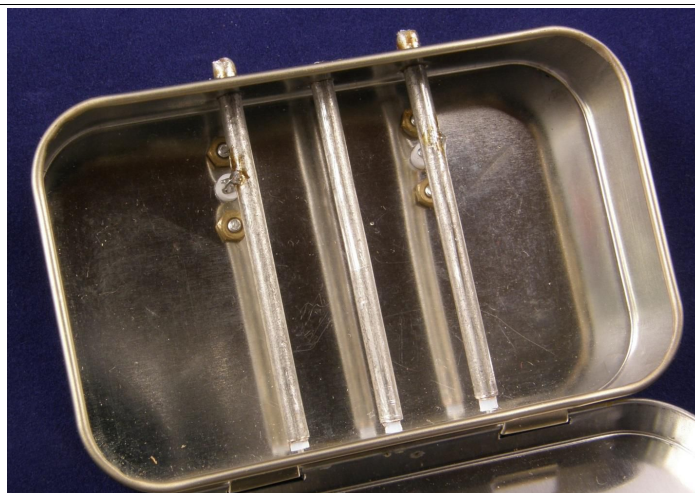


Figure 3 – 902 MHz Combine filter in Altoids tin

Performance is shown in Figure 4, with a loss of about 1 dB and a bandwidth of about 80 MHz. The filter shape isn't as pretty because I chose to improve the VSWR at 902 MHz rather than worry about loss over the whole bandwidth.

Combine Filter for 902 MHz in Altoids tin

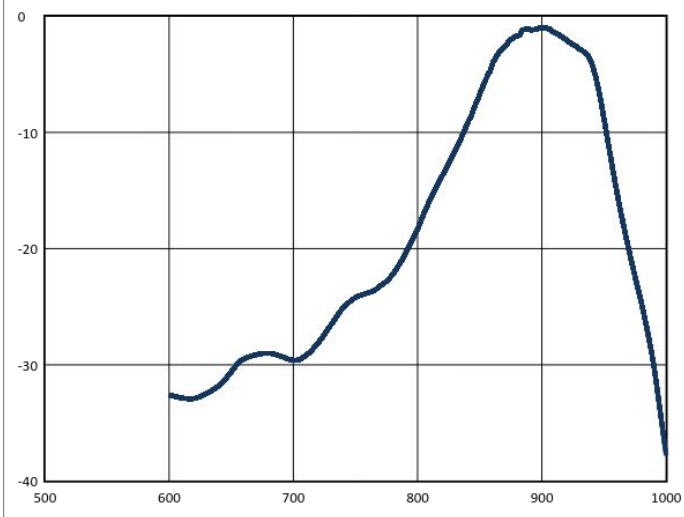


Figure 4 – Performance of 902 MHz Filter

For the higher frequency, there is room in the Altoids tin make the filter sharper by increasing the spacing between resonators or to add an additional resonator. Either would make the tuning more difficult, and increase the loss - tinned steel isn't the highest Q material.

1296 MHz Filter

The width of the Altoids tin is a quarter-wavelength at 1282 MHz, so resonators for 1296 MHz would be 90 degrees long; un-

fortunately, this will make a bandstop filter rather than bandpass. Instead, we can flip the center resonator to make an interdigital filter. I wasn't happy with the results of my first attempt, so we will wait for better results.

Filter Construction

The Altoids tin is made of very thin steel, easily soldered with a medium-sized iron, but the paint must be removed first. I use an abrasive wheel in a drill or drill press, which removes paint quickly without tearing up the metal. Then it is a matter of marking and drilling the holes. I mark them with a cheap caliper used as a scribe, prick the hole location with a scriber, then drill a very small hole, #60 or 1 mm at each location. Then I use brad point drill bits which make a clean hole in thin metal. Sets are sold for woodworking (www.woodcraft.com), but only two sizes are needed for these filters: 9/64" for the semi-rigid coax and 5/32" for the SMA connectors.



Figure 5 – Preparing semi-rigid coax with miniature tubing cutter

For the semi-rigid coax, the best tool is a miniature tubing cutter.

As shown in Figure 5, the tubing cutter is used to nick the outer conductor just enough so it snaps instead of bending. Nick it again about a half-inch away, snap it again, then pull the short section of outer conductor off with pliers. Make a cut all the way around the Teflon at the desired location and pull off the end of the Teflon, leaving a short length of inner conductor exposed.

Then clamp the coax in a vise with V-jaws (which also straighten any small bends in the coax) and pull on the inner conductor with pliers (Figure 6) until it starts to move. Trim the end of the inner conductor slightly to remove any burr.

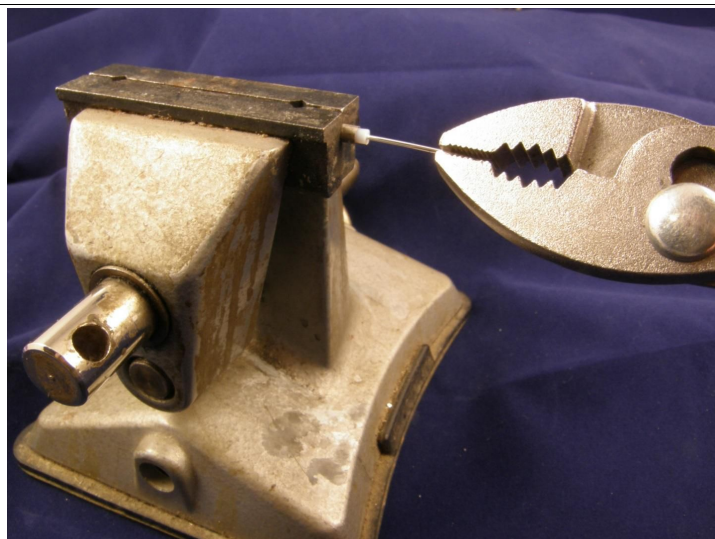


Figure 6 – Pulling out center conductor of semi-rigid coax

Install the SMA connectors in the Altoids box, then add the input and output wires and push them aside. Now it is time to install the resonators. The 0.141" diameter coax is a very tight fit in the 0.140" diameter holes, but the thin metal gives enough so it slides in tightly and stays put.

At the far end, guide the inner conductor through the small hole and adjust for the desired resonator length. When all three resonators are in place, apply a bit of paste flux around them on the outside of the box only, and then solder them in place at the ground end only. Finally, solder the input and output wires to the resonator tap points with small dab of paste flux. Clean up flux and close the lid, and the filter is ready for tuning.

Connect the filter to a detector and a signal generator, preferably a swept-frequency setup. Of course, if you have a network analyzer, that's even better. Tuning is a matter of pulling (or pushing if needed) one center conductor with a pair of pliers (see Figure 3) while holding the other two center conductors with other fingers so they make connection to the box. This is repeated for each conductor in turn until the desired performance achieved - then the inner conductors are soldered to the box. For fine tuning and final compromise, VSWR may be more sensitive than loss.

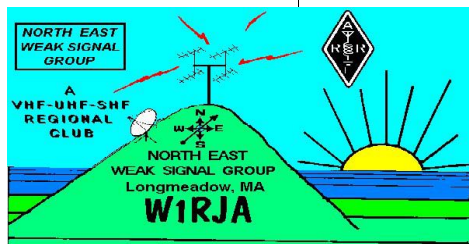
Dimensions:

432 - resonators are 16.7mm center to center, input and output taps at 19.5 mm from ground end

902 - resonators are 17mm center to center, input and output taps at 11 mm from ground end

Summary

These simple filters are easy to build and cost very little, even if you have to buy the Altoids. They can help clean up your signal, reduce birdies, and sweeten your breath at the same time.



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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:

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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!

