

# ***N.E.W.S. LETTER***

The Publication of the North East Weak Signal Group

January, 2013

Volume 22

Issue 1

## **NEXT MEETING: 1/5/2013**

**BOARD MEETING** - 11:00 AM at Lulu's, 151 Hazard Ave. Enfield, CT **phone:** (860) 763-2377  
**\*\*\*NOTE NEW LOCATION\*\*\***

**GENERAL MEETING** - STORRS LIBRARY - from 1 PM to approximately 3:45 PM.

## **2013 Eastern VHF-UHF-MW Conference**

**April 26-27-28, 2013**

**Baymont Inn-- 20 Taylor St., Manchester, CT Hotel Tel# 860-643-5645**

## **2013 Meeting Dates**

**Jan 5, March 9, April 27 (VHF Conf!!!), July 13 or 27, Sept 28, Nov. 23**

### **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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3456, 5760, 10 GHz, 24 GHz.

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3456, 5760, 10 GHz

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3456, 5760, 10 GHz, 24 GHz.

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3456, 5760, 10 GHz.

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ACTIVE ON: 6, 2, 432, 1296

## 2013 NEWS CALENDAR:

January 3 - Quadrantids meteor shower  
January 5, 1PM - 4PM - [N.E.W.S. Group Meeting](#)  
January 19-21, 1900Z-0359Z - [ARRL January VHF SweepStakes](#)  
March 9, 1PM - 4PM - [N.E.W.S. Group Meeting](#)  
April 8, 1900-2300 Local - [144 MHz Spring Sprint](#)  
April 18, 1900-2300 Local - [222 MHz Spring Sprint](#)  
April 21 - Lyrids meteor shower  
April 19-20 - [Southeastern VHF Society Conference](#)  
April 24, 1900-2300 Local - [432 MHz Spring Sprint](#)  
April 26-28 - [Eastern VHF-UHF Conference](#)  
May 3-4 - [New England Amateur Radio Festival - Deerfield, NH](#)  
May 4, 0600-1300 Local - [Microwave Spring Sprint](#)  
May 11-12, 2300-0300Z - [50 MHz Spring Sprint](#)  
May 17-19 - [Dayton Hamfest](#)  
June 8-10, 1800Z-0300Z - [ARRL June VHF QSO Party](#)  
June 29 - [Rochester NY RARA Hamfest](#)  
July 13 or 27 ? , 11AM - 4PM - [N.E.W.S. Group Picnic](#)  
July 20-21, 1800Z - 2100Z - [CQ Worldwide VHF Contest](#)  
August 3-4, 1800Z - 1800Z - [ARRL UHF Contest](#)  
August 10, 2300-0300 UTC - [50 MHz Fall Sprint](#)  
August 12 - Perseids meteor shower  
August 17-18, 6AM - 11:59:59PM - [ARRL 10-GHz & up Cumulative Contest](#)  
September 7-9, 1800Z-0300Z - [ARRL September VHF QSO Party](#)  
September 14-15, 6AM - 11:59:59PM - [ARRL 10-GHz & up Cumulative Contest](#)  
September 16, 1900-2300 Local - [144 MHz Fall Sprint](#)  
September 24, 1900-2300 Local - [222 MHz Fall Sprint](#)  
September 28, 1PM - 4PM - [N.E.W.S. Group Meeting](#)  
September 29 ? - [Mt. Airy \(PackRats\) Hamarama](#)  
October 2, 1900-2300 Local - [432 MHz Fall Sprint](#)  
October 11-12 - [New England Amateur Radio Festival - Deerfield, NH](#)  
October 12, 0600-1200 Local - [Microwave Fall Sprint](#)  
October 18-19 - [Microwave Update - Morehead, KY](#)  
November 23, 1PM - 4PM - [N.E.W.S. Group Meeting](#)  
November 17 - Leonids meteor shower  
December 12 - Geminids meteor shower

## **Presidents Report – January 2013 NEWSletter**

**R. L. Frey – WA2AAU**

### **January Meeting Topics:**

#### **Home Brew Extravaganza – “Quick Talks” Presentations**

**Bring a home brew project and tell us about it for 5-10 minutes.**

#### **January Contest “Rap Session”**

**How do YOU plan to participate in the Jan VHF contest?**

Wow... does it feel weird typing the number 2013! It's the end of the year already! It's hard to believe. Well, now that we are feeling the onset of winter, our thoughts are turning to projects in the shop, INSIDE where it's a whole lot more comfortable. But, I must admit I was recently tempted by fairly reasonable temperatures in the 40s to do some last minute antenna tests on some dishes. But for the most part, we are now doing more inside work.

In that regard, let me suggest that with this very inventive group, I'm sure most of us can tell the group a little bit about a project they've been working on or maybe still are working on. So if you've got something to “show and tell”, by all means bring it along, but even if you don't, bring along your ideas and tell us about them. What are you doing? How is it going? What interesting stuff did you learn?

I suggest limiting any description to 10 minutes or less, so we have enough time to hear about lots of different ideas. If you want, bring along a few “Power Point” frames, to help us understand your project, but that's not required. If you have some hardware for us to look at, great, but even if you don't, that's OK too. Maybe it's too big or just an idea without any result yet.

Then we have the ARRL January VHF Sweepstakes contest scheduled this year for January 19-21, 2013. So what are you planning to do to be active on the VHF bands this year? Will you contribute to the NEWS club score? Which bands will you be on? Do you plan to try anything new? Who is going roving? (BRRrrrrr) Remember the old adage about the bands: USE 'EM or LOOSE 'EM. Let's all get out there and USE 'EM.

If we run short of people to talk about their projects (which is unlikely with this group), I plan to have a (longer) presentation ready about some experiments and results from an “Elevated Antenna Range” we played with in the Albany area in the last month. We tried two antenna range paths of 1250 and 1600 feet over a gorge 200-400 ft deep with sharp cliffs on each end. So far we have been working only on 5760 MHz but tests are planned on all the microwave bands in the future. One very big advantage of this type of range is a large antenna supported on a car or truck can be positioned at one end above the cliff and measured fairly accurately. This can be very hard to do on a slant range. The range and equipment had excellent long- and short-term amplitude stability of better than 0.2 dB peak-to-peak over many hours and reference horn amplitude fluctuations over the test aperture due to reflections were less than +/- 0.2 dB (even +/- 0.1 dB if the reference horn position was chosen carefully). Very simple hardware was use for the tests.

Happy Holidays and a Great New Year to Everyone

Dick – WA2AAU



December 13, 2012

North East Weak Signal Group  
PO Box 35  
Cabot, VT 05647

Dear Friends,

On behalf of the ARRL Foundation thank you so much for your 2012 contribution of \$9,968 to fund the Byron Blanchard, N1EKV Memorial Scholarship Fund. This Scholarship is possible to do the proceeds of the sale of Mr. Blanchard's radio equipment.

As stated in the Terms of Reference: The Byron Blanchard, N1EKV Memorial Scholarship will be funded by an initial contribution of \$9,968. Additional funds may be added to the fund. Annual contributions to the fund should be made by December 31 each year. The scholarship award will be \$500 annually with the first scholarship awarded in 2013.

Your commitment will support the Foundation's efforts to provide annual scholarships for higher education to students who are radio amateurs.

Best 73,

Tom Frenaye, K1K1  
President  
ARRL Foundation  
Cc: Paula Blanchard

### North East Weak Signal Group

Paul Wade, W1GHZ, Secretary 15 November 2012  
PO Box 35  
Cabot, VT 05647

The ARRL Foundation  
225 Main Street  
Newington, CT 06111

Attn: Mary M. Hobart, K1 MfH, Secretary

Dear Ms. Hobart:

Byron Blanchard, N1EKV, a longtime N.E.W.S. Group member, passed away this year. His wife, Paula Blanchard, asked the N.E.W.S. Group to dispose of his equipment and very generously offered the proceeds for club purposes.

After all the equipment was sold, the proceeds were far in excess of N.E.W.S. Group needs. As a result, the club voted to retain 10% of the proceeds for club purposes and donate the remainder to the ARRL Foundation for scholarships in Byron's name. The amount to be donated for scholarships is \$9968; a check is enclosed.

We request that any tax deductions should go to Mrs. Paula Blanchard. Please send the appropriate documentation to her at:

73,

Paul Wade W1GHZ  
Secretary

Thomas Williams WA1MBA  
Treasurer

Cc: Mrs. Paula Blanchard

## Secretary's Report

NEWS Meeting 17 November 2012, Storrs Library, Longmeadow, MA

Preceded by a Board of Directors meeting

President WA2AAU called meeting to order at 1324

### TREASURERS REPORT by WA1MBA

- 86 paid members to date + 14 permanent members
- 27 not renewed yet
- \$9968 sent to ARRL Foundation for N1EKV Scholarship
- Report Approved unanimously

**OLD BUSINESS** - none

### **NEW BUSINESS**

Conferences

- April 26-28 Eastern VHF/UHF Conference - Baymont Hotel Manchester CT
- Joint conference with Packrats went well
- MUD2014 Rochester - consensus is to

participate but not co-sponsor

WA2AAU to followup

- MUD 2013 in Kentucky at Morehead State College

Beacons

- K1IIG new beacon 432.320 & old beacon 432.360

- N2YYU 10GHz beacon (NEWS contacted by tower owner)

KB2RWW to maintain and remove when necessary

### **ANNOUNCEMENTS**

- WA1MBA will have video DVD of MUD 2012 talks

- 144.205 morning group will have streaming audio 24/7

Meeting adjourned 1422

followed by:

Duct tape auction

### **PRESENTATIONS**

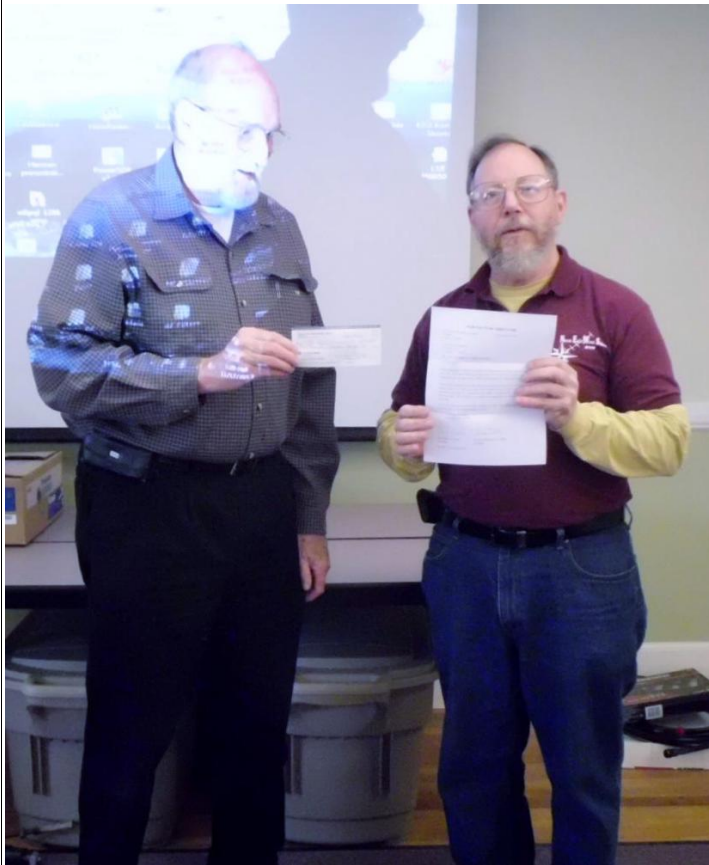
K1WHS Tower maintenance story



"Why I should have paid attention in Chem 101"

N1JEZ Hermes SDR Transceiver

## Treasurer's Report



We remain in good shape financially as we cross into 2013. Our membership is strong and our expenses under control. We have paid for our library room rental, and as you know, sent a check to the ARRL in memory of Byron N1EKV thanks to the sale of his equipment. I am personally busy building 78 GHz preamps and will be very glad when that project is behind me. See you at the January meeting.

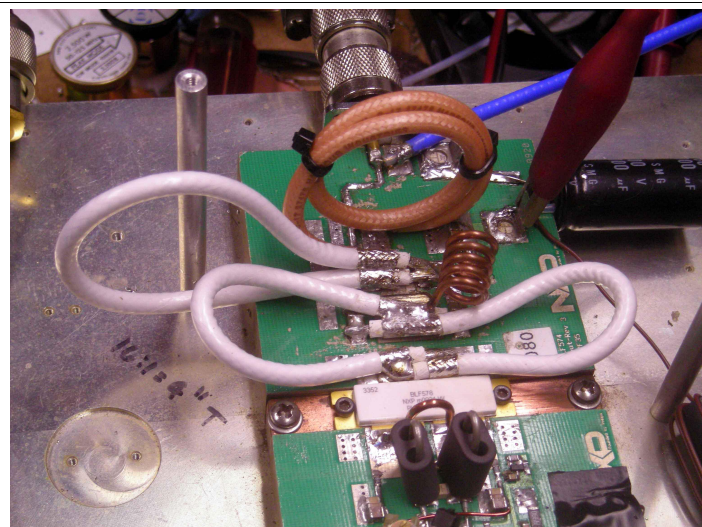
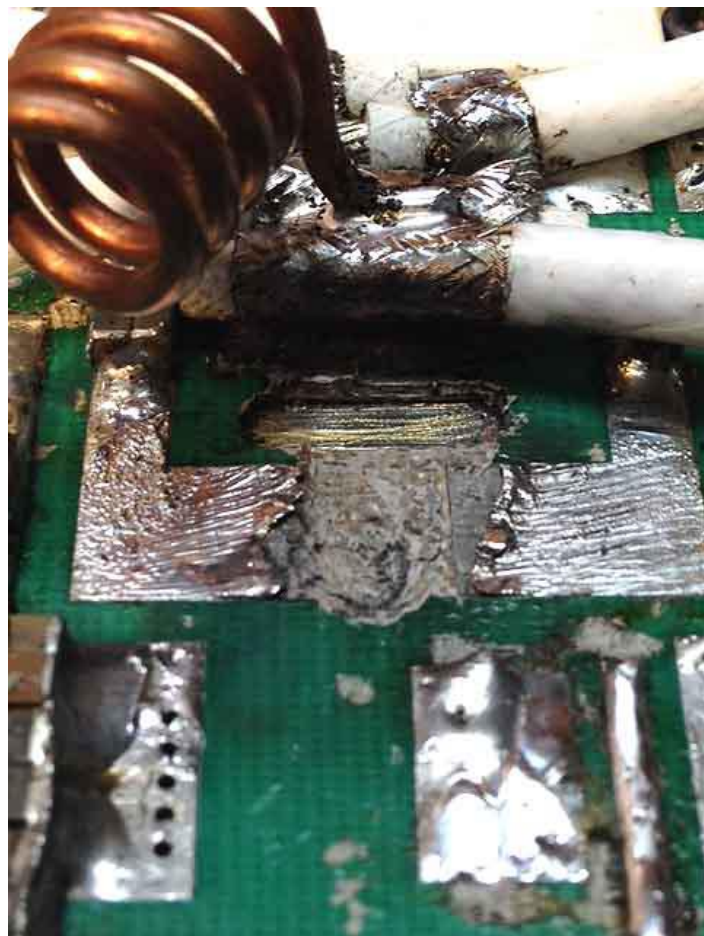
## 2 Meter Solid State kW Amplifier Failure and Repair

By Fred, N1DPM

During the first weekend of the ARRL EME contest I was operating and during the moontime on Saturday night while calling CQ I dozed off since no one was calling me. I woke up again about 15 minutes later to see no one was answering my CQ. I thought this was strange

because conditions seemed good and activity was good too. I then noticed the reason why.....No output power! That'll cut down the QSO's in a real hurry! I went into the other room where the amplifiers are located and didn't immediately see anything wrong with my BLF578 SS kW amp that had been solid as a rock for 2+ years of EME and contest operation. Upon looking a bit closer I discovered the FET side of the output balun had come unsoldered from the board and it was hanging in mid air. Unfortunately the FET was also dead. No VSWR protection would have saved this. I went to bed..... I just got around to investigating and repairing the amplifier (luckily I had a spare FET!). When I started to dig into it after removing the balun it appeared the balun had come unsoldered but the solder on it was all shiney as if the original joint was good and that it simply melted. I looked closer and there were 3 ATC ceramic chip caps that go across the input of the balun where it had come unsoldered. Two of the 3 were under the output 1:4 coax transformers about 1 inch away from their proper location. When I looked for the third I found what appeared to be a ceramic "blob" with metalization on one side of it in the "pit" on the PC board where the "action" took place. This was the remnants of the third chip cap. Apparently it had had enough abuse and melted down causing the balun to de-solder itself and then with the no existing output match the FET then gave up too. Interestingly enough it appears that one side of the FET is still good! So I'm in the process of rebuilding the output section and I think I'll replace these chip caps with a couple of uncased clamp type mica RF caps. As I recall Brian, WA1ZMS, talked about using the clamp mica caps in the output section of his 1.5kW SS amp because of the high RF currents. I've included pictures of the output balun, the 2 caps plus "the blob", and the amplifier where I carved away the burned PC board material before I put this all back together.





I put it back together and I used clamped mica (uncased mica) capacitors for the matching section between the output transformer and the balun where the ATC chip caps failed originally. I used 2x 15pF in parallel with a 5pF cap. The amplifier performance was right on the money with the original performance I published. I was still a bit uncomfortable with the caps because they did run warm. They were about as warm as the transformers and balun coaxes. I then did some research and correspondance with Jim, W6PQL and he has seen this part of the matching run warm on his amps too. He has since gone to using a short stub of 10 ohm coax to make his 35pF capacitor and he said it runs cold and feels it's bulletproof. This is much like my stub on the output that happens to be 50 ohm coax that does double duty as a 3F0 stub along with adding the capacitance needed for final matching on that part of the circuit. Well I didn't have any 10 ohm coax so I used the next best thing which is the ~22ohm stuff I used on the transformer sections. Jim said he left his open ended because it was

less than 0.1 wavelength. Since mine was a bit longer, near 0.125 wavelength I decided to double it back on itself so it would just look like a coaxial capacitor and not an open stub. I tested it tonight and the amp performance is again right on the money and this "loop" of coax runs dead cold with the exception of conducted heat from the balun as any temp rise is confined to where it solders to the board across the balun input. I think this is a winner! I'd like this info to reach anyone playing with these amplifiers and especially those who purchased the auction kits over the last year. The capacitors in those kits are C26, C26a and C26b, 18pF, 9.1pF and 4.3pF respectively that would get replaced by this coaxial capacitor. I would be glad to provide these coaxial capacitors to anyone who purchased one of the conference auction kits over the last year. Individuals can contact me via email [n1dpm@verizon.net](mailto:n1dpm@verizon.net) and we can go from there.

## 2013 Conference

Hi All NEWS Group Members,

We need help with getting PRIZES for the Banquet. If you can help at all, even just to contact one company, please let me know. If you have a personal contact with a company that may be able to help us, please go ahead and talk with that person.

Thank-You

Mark Casey  
 2013 VHF Conference Co-Chair  
 413-566-8118, 413-566-2445

Committee: WZ1V, W1GHZ, K1MAP, N1JFU



# A 222 MHz transverter for the Yaesu FT-817 – *Revisited*

## Revision 3 – November 2012

*Paul Wade W1GHZ ©2012*  
w1ghz@arrl.net

My 222 MHz transverter project<sup>1</sup> was intended to provide the missing band to the FT-817 transceiver, a great rover rig. It proved to be quite popular, and, I hope, got some new stations on this neglected band. However, several of the key components, the Toko filters and the power amplifier module, have become unavailable, so I stopped making PC boards.

Recently, a stash of surplus modules was located by a fellow N.E.W.S. Group ([www.newsvhf.com](http://www.newsvhf.com)) member that contain both the power amplifier module and the larger Toko filter, along with some spare parts. These were acquired at a favorable cost, providing enough parts for another batch of PC boards. The combination should enable some more hams to get on 222 MHz at a reasonable cost. (Note: DigiKey apparently has several hundred Toko filters remaining at a good price – TK3501-ND.) Dick, WA2AAU, convinced me to make some more PC boards to put these parts to use and get more folks on 222 MHz.

### Modifications to PCB

Since I was ordering new boards, I decided to make a few modification to extend the life, usefulness, and flexibility of these boards. Making them usable with other transceivers, particularly the FLEX-1500 and other SDR rigs, was also a consideration. The major changes include:

1. Making the power amplifier section compatible with both the current Mitsubishi M67723 and a newer MOSFET module, the Mitsubishi RA07M2127M. This requires some changes to the biasing scheme, detailed in the “Power Amplifier” section below. The newer module is significantly less expensive than original cost of the older ones.
2. The mixer was a Minicircuits TUF-1H, which has become rather expensive. In recent projects, I have been using inexpensive surface-mount mixers from Minicircuits, the ADE series. The new boards have a footprint for these devices, which cover a range of LO powers, from a standard level (+7 dBm) ADE-1 or ADE-2, to a high-level mixer, the ADE-1H (+17 dBm LO) for maximum IMD performance. In between are the ADE-1LH (+10 dBm) and ADE-1MH (+13 dBm); one of these might be a better choice if using the original LO scheme, since the typical output was +12dBm. The mixer goes on the bottom of the board, but the silkscreen pattern showing placement is on the top. Pin 1 is also indicated in copper on the bottom.
3. The LO has two changes:
  - a. A surface-mount oscillator footprint has been added, since oscillators with pins are getting hard to find. If you do find one, it will still fit.
  - b. The LO filter is no longer available. The footprint is modified to also fit a Minicircuits BPF-B199+ surface-mount filter.
  - c. An alternative is to use an external LO – many folks like to have an accurate frequency locked to GPS or other reference. One possibility is the VHF Apollo Synthesizer from Down East Microwave. The buffer amplifier, A6, can still be used to drive a high-level mixer. External LO connection point is shown in Figure 1.

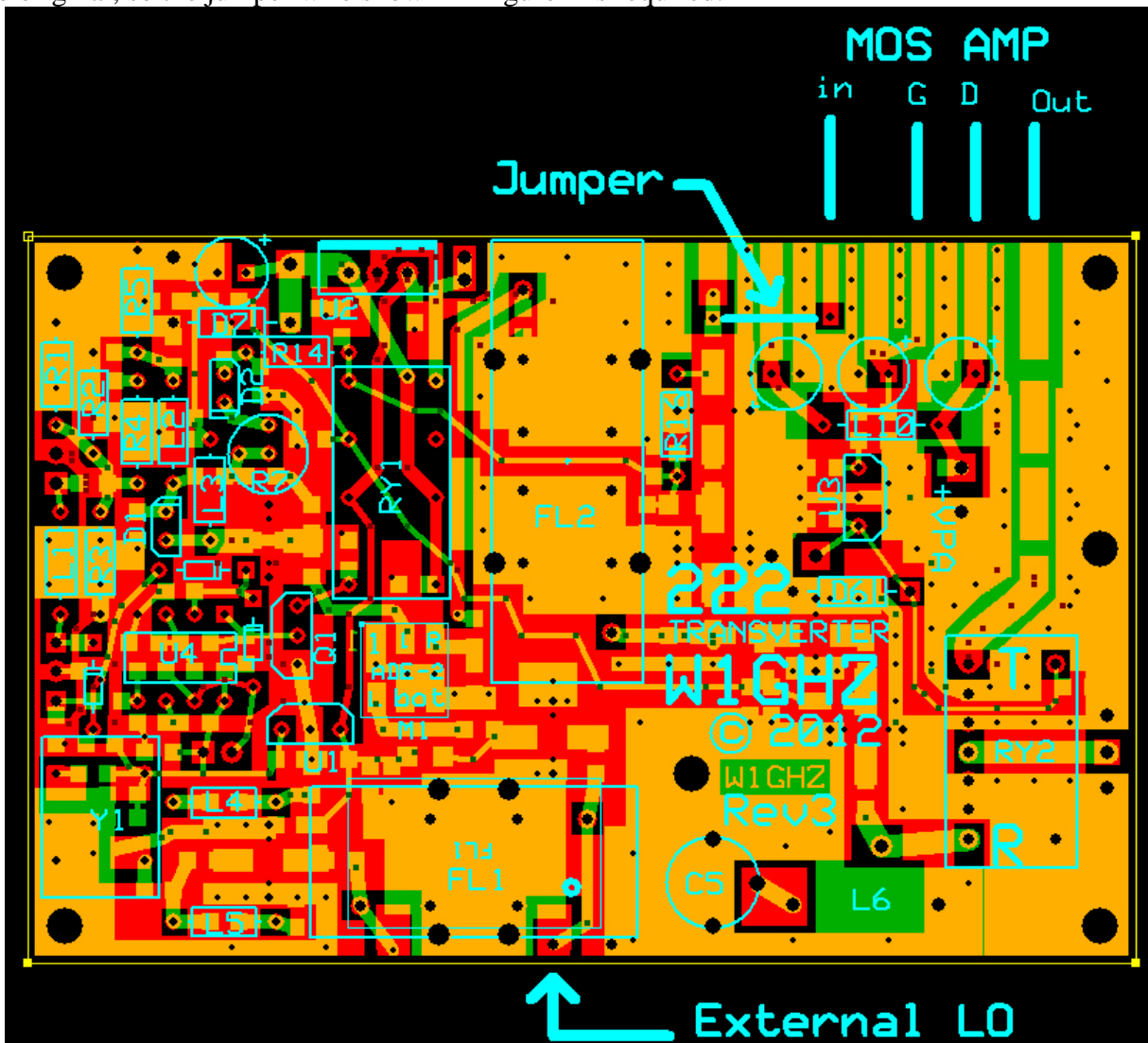


## Power Amplifier

The power amplifier section now has the option to use a MOSFET module, the Mitsubishi RA07M2127M, in place of the original bipolar module, Mitsubishi M67723. Since they have different footprints, the board has pads for both varieties, but the pads have tighter spacing, so soldering of the bypass capacitors may require more care.

If the original Mitsubishi M67723 is to be used, the original schematic and parts still apply. The placement and soldering of the bypass capacitors will require minor adjustment because of the tighter spacing. The only change is the new bias resistors, R101 and R102 – R101 is zero ohms, a piece of wire, and R102 is omitted. The supply voltage for this module is 12V (13.6V is OK), connected to the +VPA terminal.

The Mitsubishi RA07M2127M MOSFET module requires different bypassing and a significant change in voltages. The part is placed with the output lead on the same pad as the original module, but the other leads land on new pads, as shown in Figure 1. The new input pad is not connected to the original, so the jumper wire shown in Figure 1 is required.



The RA07M2127M MOSFET module is specified to operate at 7.2 volts, and capable of 8 to 10 watts output at a current drain in excess of 2 amps. This means that the voltage must be reduced with a voltage regulator that will dissipate perhaps 15 watts from a 13.6 volt supply – lots of heat sinking suggested if you plan on FM ragchewing. There are a couple of ways to reduce the voltage:

1. Separate 3-terminal regulator providing 7.2 volts to the PA “+VPA” terminal on the board. Adjustable regulators LM350 or LT1085 will provide the current with no problem. The adjustment resistors are set for 7.2 volts.
2. Large 8 volt regulator for the whole transverter in place of U2. A diode (rated for at least 3 amps) in series with the “+VPA” terminal will reduce the PA voltage to roughly 7.2 volts. Or you could just run the PA at 8 volts to the “+VPA” and get a bit more power out – the data sheet goes up to 9 volts.

The MOSFET module also requires setting the gate bias for the desired idling current. Typical gate bias voltage is 3.0 to 3.5 volts, set by R101 and R102. The output power doesn't change a lot with idling current, but the gain increases with higher idling current. A good starting point would be R101 = 200 ohms and R102 = 330 ohms, which should yield about 3.1 volts of gate bias.

## **Other Transceivers**

Many of the SDR transceivers, like the FLEX-1500, have a transverter port with an output of roughly 0 dBm, adjustable in software. At this level, no TR switch is necessary, so we can simplify things – remove the PIN diode switch and reduce the input attenuator to perhaps 3 dB, just enough to provide a good match to the mixer. So R1 and R5 = 300 ohms, R4 = 18 ohms; C42 and D1 are replaced by wires to provide a straight-through connection. Components to be omitted are: R2, R3, R6, R7, R8, R9, R10, R14, D2, L3, C21, C43, C45, C46, and C75.

The “Band Data” input should be >4 volts to activate the transverter – this can be provided through the IF connector, J1, if desired. Then the “PTT LO” pin is pulled to ground to transmit.

If, for some reason, you wish to use a high-power transceiver, you'll have to figure out what to do with the excess power. Turning the power output down may not work – many rigs output a spike at full power before the ALC reduces the power; the spike will damage something sooner or later.

## Other bands

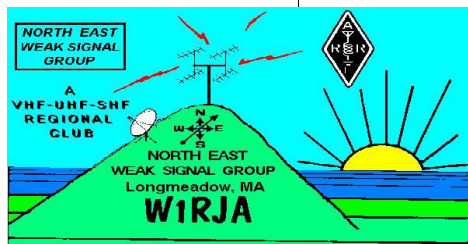
Most of the SDR transceivers only go up to 6 meters – we would like to use them on higher bands. The only components in this transverter that are frequency sensitive are the LO, the filters, and the PA module. We have already considered the possibility of an external LO, so that is not a problem. MOSFET PA modules with the same pinout are available for 144 (RA08H1317M) and 432 MHz (RA07H4047M). These versions also run on 12 volts, simplifying the regulator problem.

The remaining problem is the Toko filter, FL2. Unless you have any in your junk box, they are not available. Temwell makes equivalent filters, but the minimum order is a bit steep. They also make similar filters in a smaller package, which Down East Microwave uses in their current products. DEMI may also have an adaptor PCB to fit the Temwell filters in a Toko footprint.

The receiver input coil, L6, and the transmit low-pass filter, L7, C6, L8, C7, and L9 will have to be adjusted for other bands. These are hand wound coils, so changing values is not a major problem.

## Reference

1. Paul Wade, W1GHZ, "A 222 MHz transverter for the Yaesu FT-817," *QST*, January 2003.  
<http://www.w1ghz.org/222xvtr/222.htm>



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



<http://www.flex-radio.com/>

### Directive Systems

Contest-proven VHF/UHF/Microwave amateur radio antennas.

Dave Olean K1WHS, 177 Dixon Rd., Lebanon, ME 04027

207-658-7758

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



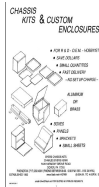




**SSB Electronic USA**  
 manufactures and distributes  
 HF, VHF, UHF and SHF  
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