



# CHEESE BITS

**W3CCX**  
**CLUB MEMORIAL CALL**

ARRL  
Affiliated  
Club



**Volume XLVI**

**DECEMBER 2004**

**Number 12**

## PrezSez

It is always an educational experience for me to hear our speakers at the club meetings, and the computerized band-changing interface board talk by Steve, N3FTI was no exception. I learned the pros and cons of using this type of arrangement and took some good tips on using those multi-pole relays and their prices. Great job, Steve! I was also glad to be able to get some more contest discussion going, and you'll see a lot more organization for growth of the efforts for both January and June activities. Steve also volunteered to assist Bill, AA2UK in the January contest efforts. What we need now is some additional geographic assistance to make sure that everyone can maximize their equipment, or borrow gear to increase their bands, power, antennas and general contest capabilities. Remember that one of the member responsibilities is your best effort and contribution toward the club score.

The Board of Directors will be going through the club roster to make sure that stations are as active as possible in January. As a club, we have won the Unlimited category top honors for a number of years, and we expect that 2005 will be better than ever, due to club membership growth and equipment refinement, added bands and bigger towers and antennas. But everything needs to be fully functional and operational, so be sure that you are doing your on-the-air testing with the Monday Night nets. That's how I discovered the problem in a broken solder connection of the balun of my 432 beam a few years ago. After routine business, the December meeting will be devoted to a general discussion of the contest activity and preparations and operating suggestions, led by our chairpersons.

Our initial two Board meetings with the use of phone conferencing seemed to go well. Feedback is always welcome. It has allowed folks from 1-3 hours drive away to be able to actively participate, and the amplified speaker-phone supplied by WA3YUE, along with a toll-free number was extremely helpful. The Board has recommended that we "pass-the-hat" at the final two meetings of the year for a collection to be donated to the ARRL Spectrum Defense Fund. The November collection was extremely successful, and December meeting attendees will have another opportunity to contribute. Those unable to make the meeting can send directly to the ARRL, or make their donations on-line with the use of a credit card through the ARRL website. If you want to add you dollars to the Packrat membership donation, bring your dollars to the meeting or send a check to Dave, W3KM, our treasurer.

As members' roles within the club and their personal lives and work responsibilities continue to change, we have room for additional help with many of the activities that our club has a reputation for doing well annually. As we have deferred a Mid-Atlantic Conference this past year, it is now time to resurrect it, possibly in conjunction with the proposed date for Hamarama: Sat, Sept 24<sup>th</sup>, potentially for the conference, and Sun, Sept 25<sup>th</sup> for Hamarama. We will need to verify those dates, and will need a chairperson lead for the conference organization. This is a great opportunity for growth within the club, and fun as well. Please tell me you'll do it! Yes, you. Call me or email. Happy Holiday season, and a Healthy New Year to all. C U at the meeting, Thu, Dec 16. 73, Rick, K1DS

## Editor's Column

Pack Rats **CHEESE BITS** is a monthly publication of the **Mt. AIRY VHF RADIO CLUB, INC.** -Southampton, PA.  
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 222.98/224.58 MHz, Churchville, PA

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**PACKRAT BEACONS - W3CCX/B**  
 FM29jw Philadelphia, PA  
 50.080, 144.284, 222.065, 432.295, 903.071, 1296.251,  
 2304.037, 3456.220, 5763.190, 10,368.140 MHz (as of 3/1/01)

### **MONDAY NIGHT NETS**

TIME	FREQUENCY	NET CONTROL
7:30 PM	50.150 MHz	K3EOD FM29II
8:00 PM	144.150 MHz	N3ITT FN20KI
8:30 PM	222.125 MHz	K3TUF FN10we
8:30 PM	224.58R MHz	W3GXB FN20jm
9:00 PM	432.110 MHz	WA3EHD FN20kd
9:30 PM	1296.100 MHz	WA3NUF FN20le
10:00 PM	903.125 MHz	AA3GN FN20ig
10:30 PM	2304.085 MHz	W3KJ FN20hg

& go to 3.4G & up after FN20hg

Visit the Mt. Airy VHF Radio Club at: <http://www.ij.net/packrats>

We are all very busy this time of year with preparations for the holidays and my house is not any different. The shack is totally displaced to make room for a new rack and improved operating position and the rest of the house is a shambles due to renovating the kitchen. Work schedules have been hectic and I got a touch of VERTIGO—I know you all think I'm dizzy anyway but tain't fun to have the whole world in a spin when you have to travel.



Here is the late and latest issue of CHESSEBITS for your holiday enjoyment including the promised article on the DEMI 10 GHz transverter tweaks. Since we are running late we have also been able include a few photos of frugal folks doing last minute shopping at the DEMI Open House on 4 December.

I am ready to either push the shack table back into place or get the whole station revamped. I do have better amplifiers I may try to get on the air and we are still trying to get on 2304 and the prospects look good for success.

If you are looking for equipment keep an eye on the reflector W3OR and others have equipment to sell or lend for your contest preparations or speak to your team leaders.

Well I have to move on to the January issue and try t get it to you in a more timely manner so...

From our house to yours:

HAPPY HOLIDAYS  
 and a  
 PROSPORUS NEW YEAR

*Listen for the weak ones*  
 73 de  
 W3GAD Doc



# 10GHz DEMI TRANSVERTER TWEAKS

## K2AXX Mark Hoffman

After the 1st weekend of the 10GHz Cumulative—I got sick and tired of some long-standing problems my transverter was having! In my fit of rage, I took down the 10GHz dish, transverter—and all the other antennas on the tower just to spite it. Once it was down on the ground, I started to poke into it and see what the hell was really wrong with it! WOW—I'm a BIG dummy, I said to myself. Looking over the unit, there were some MAJOR flaws I'd done over the years—and actually right from the day I built the thing!

### MAJOR AREAS OF FOCUS:

1) Improve Frequency stability / accuracy of base oscillator.

The base oscillator of the 10GHz DEMI transverter is at 189.333333333333MHz, which multiplied 6X = 1136MHz. This is then multiplied 9X to arrive at 10224MHz. In my instance, the LO frequency was ALWAYS running low in frequency, causing me to use a much higher IF frequency to find .100. This is OK, as I had a frequency counter measuring the base LO frequency, so I could find .100 with reasonable accuracy and assurance. On average, it was running down around 189.331940MHz—making my tuning offset like +76kHz at 10G. That means to be on .100—I have the IF set to 144.176—pretty crappy.

Doing some surfing on <http://www.downeastmicrowave.com>—I found a Design Note (DN0016) which addresses this issue directly! Check it out yourself. I decided to implement this change and see if it helped the frequency of the LO—it's really pretty easy. I found a 10pf, 1206-profile chip cap, and did just what Steve recommends. I cut the trace, inserted the cap, and fired it back up. BANG! Once the thermistor had stabilized the crystal, I found I was MUCH closer to 1136MHz than ever before!

Note Green inductor near the crystal. The added capacitor is the grey chip cap just below it, on the left-hand side of the inductor. This mod takes about 10 mins to complete and if you have LO running low—VERY highly recommended.

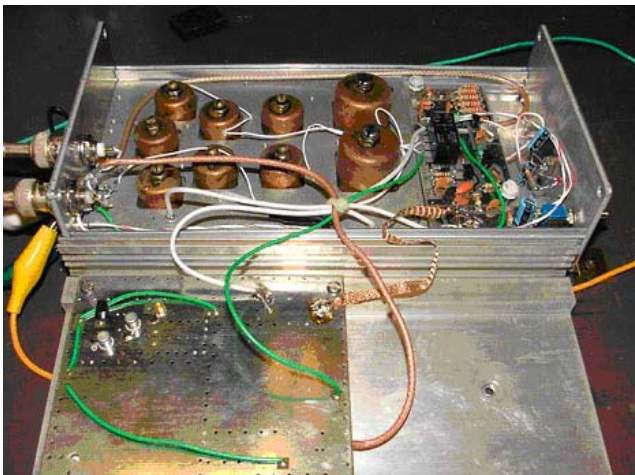
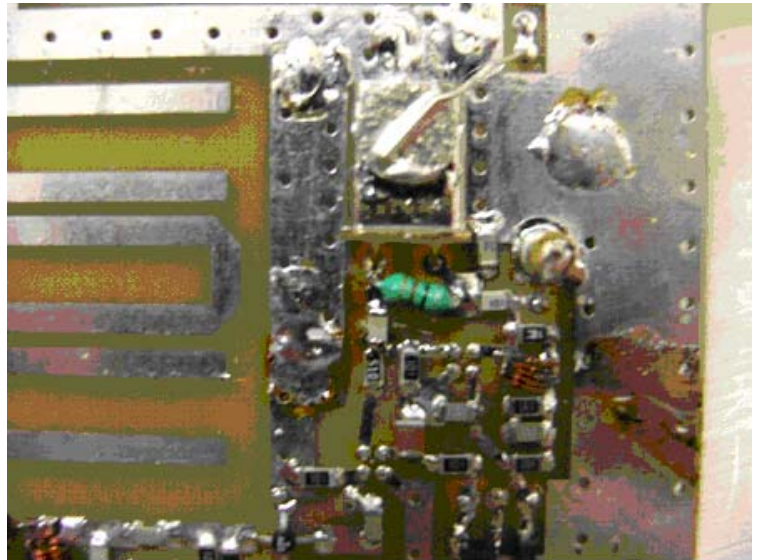
This worked out better than I'd ever expected, but still had some really weird problems. After dinking around some more, I discovered that I had created another issue on the LO board. During initial construction, one piece of coax leaves the LO and connects to the transverter board via a small rivet (connected to ground) thru the pallet.

With all the opening and closing of the clamshell case, the braid had become torn at each end, creating a really bad grounding situation. As it was, the resistance between the LO board and the Transverter control board inside the enclosure was 7 OHMS! That's nowhere NEAR a good ground.

I decided to add a supplemental ground connection between the top-half of the enclosure and the base. I used a short piece of Solder wick, connected to the LO ground pads and the transverter controller ground pads. This now helped with the common grounding, and measured .01 ohms. BIG improvement.

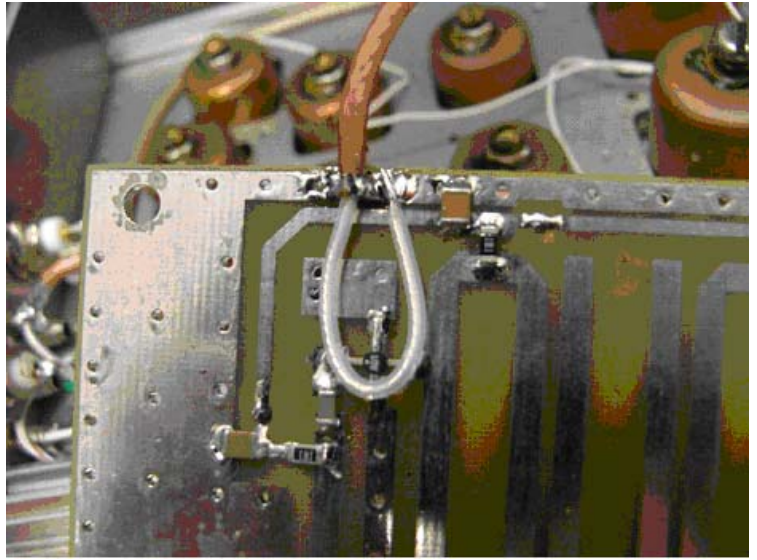
Your transverter probably looks a lot like this. At least I HOPE it doesn't, for your sake!

You can see the added ground connection, along with another coax cable coming from the center of the LO board.



That's the coupling loop, which now is working very well and is no longer creating headaches. I'll explain that in a minute!

Once that was done, I started to do more testing. I decided to check the transmit output, and found the THIRD screw up! Last year, I had added a coupling loop to the LO so I could monitor the 189MHz crystal frequency. It was easy, and quick—and quite helpful. However, I always noticed after that—my TX frequency was slightly off from the RX frequency. Something was pulling the LO, and I just thought it was voltage drop somewhere. SO—while the covers were off, I keyed the unit and BANG—the base frequency shifted about 50Hz! Well, doing some quick math, that translates to 2.7kHz of shift (after the 54x multiplication). Hmmm—that's about how far the RIT goes on my IF rig, and sure enough—I found out WHAT was really happening. Now, to find WHY! I measured the voltages in TX and RX, and there's NO shift. I checked the test point of the crystal—and I'm making plenty of juice. The crystal seems to be staying put.



Well, I got ahead of myself. As I was dinking around, I noticed that jiggling the coupling loop coax shifted the LO frequency dramatically! WOAH—could that be it? SURE ENOUGH, I remove the coupling loop from its original location (near the crystal) and the OFFSET GOES AWAY! Wow. I inadvertently placed a capacitor at the base of the crystal, and only during transmit would it skew. Weird! That set my next plan of action—to find a better place to put the coupling loop on the board.

This time, I decided to try tapping into the 1136MHz multiple, as my counter is good up to that frequency. And it's much easier to multiply x9 in my head rather than x54. So that's what I set off to do. The photo in Fig 3 highlights the location I chose for the loop:

The new coupling loop location is MUCH better. It's at the opposite end of the board from the crystal, and surrounds the final amplifier in the multiplier. The output I see at the connector is on the order of  $-10\text{dBm}$ . Depending on the coax and length between the counter and the LO, you may need to amplify this level. In my case, It'll be crucial. The coax used is just a piece of RG-316, long enough to reach the other half of the transverter. I use the spare BNC jack to feed this out.

Once this change was implemented, the LO no longer shifted frequency in transmit, and I was now able to measure the higher multiple with ease! If I remember right, K2DH warned me about this possibility years ago when I went to do it, and failing to listen to him then spawned this whole effort! Well Dave, I hear ya LOUD AND FREAKIN CLEAR NOW!

This completed the last objective. I thought. I discovered another one as I was closing the case! I was monitoring a  $-99\text{dBm}$  input signal on 10GHz, and when I was putting the unit back together I was hearing HORRIFIC microphonic response in the received audio! Started banging on it a bit, and WOW—it could cause a frequency shift of MANY MANY Hz! Enough, so it moved my LO from 1136.000128MHz to 1135.998242MHz with a hearty RAP on the case. That's HUGE. Now my next mission — either cure it or dampen it.

## 2) Reduce Microphonic affects on the LO stability

I needed to pad the LO somehow. My fix? EASY. TO-220 type voltage regulators (like an LM7812) use small insulators that rest inside the hole, to keep the hold down screw from contacting it. Well, ironically, the LO is held in place to the chassis using 4-40 screws. The little button insulators are meant for 4-40 hardware. I thought, “could it be?” - yep. I added one under each hole in the corners of the board, and tightened it back to the enclosure. I could now BANG the case, and induce audible microphonic responses, but the frequency didn't move more than a few Hz (unless I REALLY hit it hard), which was quite pleasing. As the board was ground to the chassis by this connection, it makes adding the supplemental ground more important. Since I'd done that already, it didn't seem to make any difference in operation. This MAY be really good for portable stations, as any banging on the enclosure might cause the frequency to jump a bit—BAD NEWS

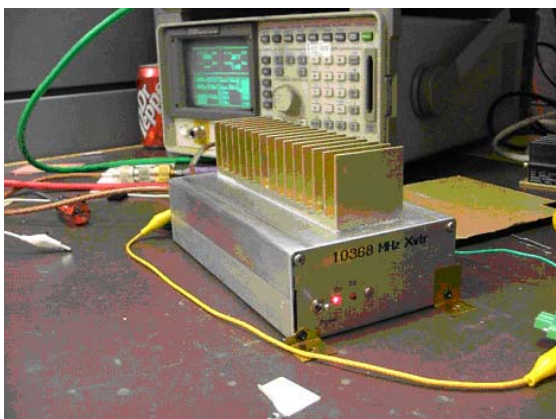
when listening for weak dashes...

Now I thought I was all set. I let the transverter run overnight, watching the LO output on a Spectrum Analyzer and checking for overall drift. The analyzer was set to a 1kHz span, and I thought that it would be a bit more stable now (I'd observed greater than 15kHz drift at 189MHz with the unit on the tower...this HAD to be better!). Well, I wasn't disappointed. The total drift WAS greater than 1kHz, though. That's a potential error of 9kHz at 10GHz. Sucks still. I also noticed that the top of the enclosure was REALLY hot. That set me to thinking—if the thermistor is mounted the way it is—won't the crystal be heating the ENTIRE BOARD? And could THAT be adding to the drift problem?

**NOTE: THIS NEXT SECTION IS AN EXPERIMENT THAT MAY FAIL! READ WITH CAUTION!**

3) Reduce Excess heat in the transverter to let the thermistor do it's real job:

After feeling how warm the unit was, I thought it might be wise to "let the heat out". Yeah, the extrusion is a really good heat sink as it is. However, if it's getting warm, and the crystal is already at temperature—by heating the board and the aluminum, wouldn't it be generating additional heat? That might be part of my problem here. So I decided to add a heat sink to the top of the chassis in hopes of reducing the excess heating to continue to pull the crystal.



The transverter in all its glory. The heat sink is only bolted to the top of the chassis. The LO board has no physical connection to it. The entire concept is to remove EXCESS heat from the LO, not to let the thermistor heat IT. That would be foolish. It doesn't require much to move the heat away from the case, and in my instance I don't need a fan to keep it cool—in this environment it's completely cool to the touch now.

This entire addition took only 30 minutes to achieve. The toughest part was finding the scrap of heat sink to add to the enclosure. I roughed up the top portion of the chassis with steel wool, and added some

heat sink compound. With this done, I then left the transverter to run for a weekend.

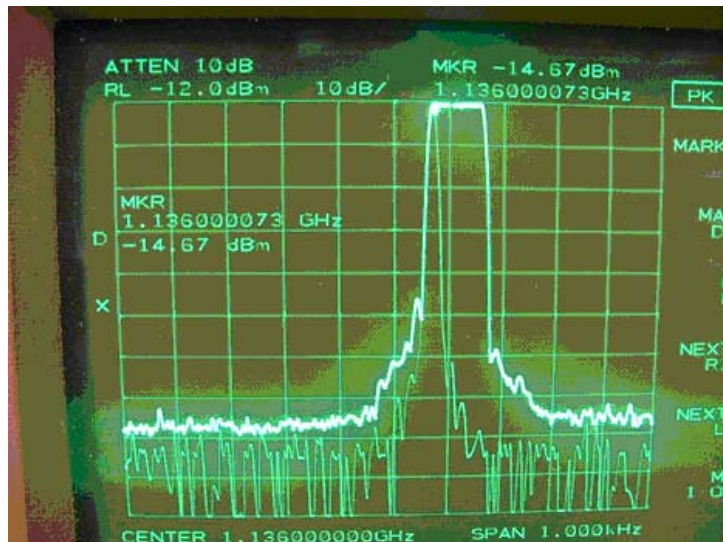
Here's what I saw on the spectrum analyzer the following Monday. The total drift for 72 hours was VERY minimal! Check out the operating frequency now—I'm within 1kHz of 10368.100 now! I'm quite pleased with these results.

Overall, the transverter isn't really "better" than it was before. Same measured output, same RX noise figure—but now I've fixed a couple little quirks that were only mildly annoying in the past.

On/Off performance, by the way, is still very good. From a cold start, once the unit warms up—the LO frequency returns to within a few Hz of before—nominally settling at 1136.000025MHz or thereabouts. This means, I'm probably going to be within +/- 3kHz of 10368.100 from here on in, so long as things remain stable. AND—no more annoying TX/RX offset.

For the cost of a single chip capacitor, and some time—I think I've improved on something that was already pretty good. It now suits my needs more than ever, and I've learned a few things in the process.

Hope to work you all on 10GHz now! Happy Tweaking!  
Mark, K2AXX



ed: Mark Hoffman is a member of the Rochester VHF Club. He can be reached on the web at:  
[k2axx@frontiernet.net](mailto:k2axx@frontiernet.net)

The greatest obstacle to discovery is not ignorance – it is the illusion of knowledge. -Daniel J Boorstin

# DOWN EAST MICROWAVE HOLD OPEN HOUSE

A major supporter of Amateur Radio and the development of transverters, pre-amps and accessories that have enabled many of us to expand our horizons past 30 mhz held an open house on 4 December 2004. Many PACKRATS made the journey to Frenchtown, NJ and took advantage of excellent savings opportunities on antennas and other accessories.



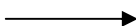
They came in groups and enjoyed the excellent hospitality of Steve and Sandy.

← Shown with Sandy are Phil K3TUF, Harry, W3IIT, Ben WA3RLT, Steve, N3FTI, Jim WA3EHD, Bernie KF3DO and Steve KF6AJ ( a long distance traveler)  
Photo via K1DS

*Wisdom is knowing what path to take next... Integrity is taking it.*

Author unknown

Joe K1JT, Rick K1DS, Phil K3TUF Host Steve N2CEI, Harry W3IIT, Bernie, FK3DO, Vahan, KB3DHU, Tom, KA3FQS, Dave KB3HCL and Steve N3FTI.  
Photo via K1DS



*The greatest obstacle to discovery is not ignorance -- It is the illusion of knowledge.*  
-Daniel J Boorstin



Among the, late in the day, visitors with a still smiling Steve, are Drex, W3ICC, Ed WB3BZT, Paul W2PED.  
Photo via W2PED



No! I didn't find these quips in a fortune cookie. ed

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# ARE YOU READY FOR JANUARY?

The JANUARY VHF SWEEPSTAKES contest is just around the corner. As a PACKRATE everyone of us should submit a log. Even if you are part of a multi-op, you can operate your own station for a few hrs to make a log (just don't work the multi-op you were part of below 2304).

The teams are set up by geographic areas. The team captains will be "tapping each team member on the shoulder" with a contact by phone and/or mail to remind them of the event, the dates, times, and the expectation that they will operate to the best of their ability and submit their log with the Club aggregate. Additionally, if possible, to help with any technical or equipment issues.

The teams are: <Team Captain>

**Contest Chair:** N3FTI. *Honorary Chair:* AA2UK

**Norristown:** <WA2OMY & W3KJ> WA3YUE, KB3XG, WN3A, KA3MGB

**Ottsville:** <W3KM> KU3A, W3GXB, W3HMU, N3ITT, K3BPP

**Blue Bell:** <K1DS> WA3AQA, NE3I, K3LOM, K3VEQ, N1XKT, W3RZU, AA3RE

**West:** <K3TUF> N3NGE, K3IB, W3DFM, N3FTI, W3SZ, KF3DO, W3FEY,

**SNJ:** <W2SJ> N2DEQ, K3EOD, AA2UK, WB2RVX, WB2RXM, W2SB, KC2JPN

**NNJ:** <K1JT> WC2K, N2SB, WB2ONA, W2PED, WB2VLA, K2TXB, N4HY, N2CG

**Newtown/Southampton:** <WA3DRC & K3IUUV> W3GAD, W3ICC, K3MFI, W3RJW

**Hilltown:** <N3PLM> AA3GN, K3ESJ, WA3NFV, KA3WXV, K3IB, N3GSA

**Warminster:** <WA3NUF> N3AOG, W2SK, W3FQD, N3OZO, K3EBZ, KB3GJT, KA3FQS

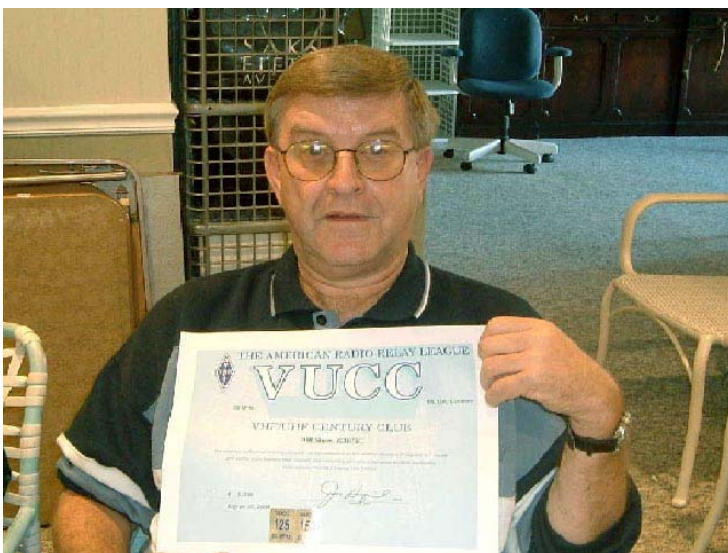
**South:** <WA3RLT> KB3BBR, K3EGE, W3EFH, WA3U, K3JJZ

**Glenside:** <WA3GFZ> K3DMA, WA3EHD, N3EVV, W3KKN, KB3HCL, WA3NAY, W3SYN

**Other:** <KF6AJ> WA3BZT, W3OR

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## K3EGE EARNS 6 Meter VUCC



Congratulations are in order for Bill Shaw K3EGE for being awarded a VHF—UHF CENTRUY CLUB CERTIFICATE (VUCC) with 2 endorsements for his work on 6 METERS—Bill now has confirmed 168 grids—over half his contacts were with CW.

**NE3I**

**Robert A. Griffiths**  
Attorney at Law

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# WHATS HAPPENING

## A LISTING OF INTERESTING EVENTS

**2 DECEMBER 2004— NOTE NEW DATE** PACKRATS BOARD of DIRECTORS Meeting at the QTH of WA3GFZ

**6 DECEMBER 2004—** Check into the PACKRATS VHF & UFH NETS starting at 19:30 EST on 50.150

**11-15 DECEMBER 2004—**NORTH AMERICAN METEOR SCATTER RALLY 000Z on 11 Dec to 0700 on the 15th. Looks like a good time to check out your digital modes before the January sweepstakes. ed

**16 DECEMBER 2004—**Regular meeting of the Mount Airy VHF Radio Club (PACKRATS) at the Southampton Public Library at 8 PM. Focus meeting for Contest preparations—Have you met your 2 meeting requirements to be eligible to support your club in January? Only 2 regular meetings before the contest.

**1 JANUARY 2005—**MICROWAVE ACTIVITY DAY—0800 to 1300 EST—Now is the time to check out all those wonderful Holiday gifts and be sure those microwaves can find their way to your antennas.

**13 JANUARY 2005—**PACKRATS BOARD of DIRECTORS meeting at the QTH of WA3EHD

**20 JANUARY 2005—**Regular meeting of the Mount Airy VHF Radio Club (PACKRATS) at the Southampton Public Library at 8 PM WA3RLY Ben will once again look at the contest results. This should help us all with our plans to be more productive during the contest.

### **22, 23 AND 24 JANUARY 2005—JANUARY VHF SWEEPSTAKES 2005**

We have a tradition to uphold—get going on all those repairs, construction and antenna projects. Look for, complete and submit your wants, needs and available equipment listings and get them to Steve N3FTI or Rick K1DS as soon as possible. N3FTI is the Chairperson. Give Steve or you team leader a call for help with your station.

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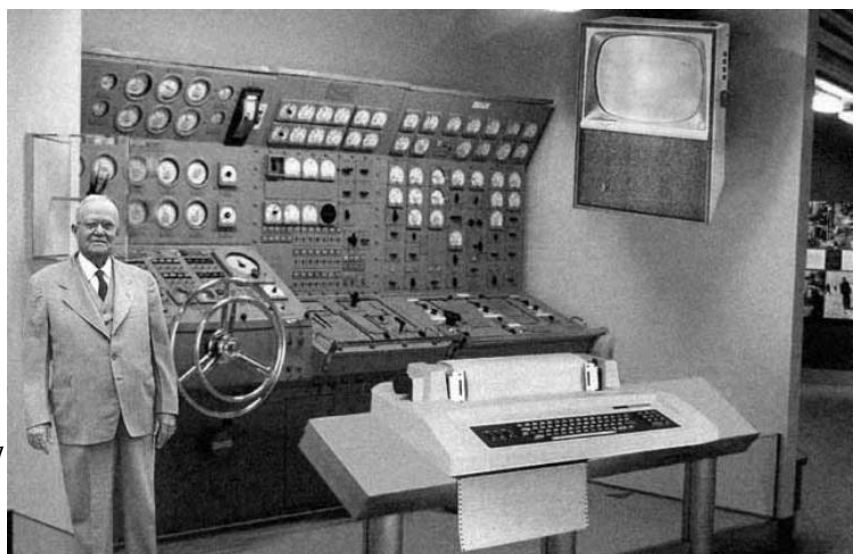
#### **What will they think of next?**

This picture appeared in a 1954 POPULAR MECHANICS magazine.

The text reads:

*Scientist from the RAND Corporation have created this model to illustrate how a "home Computer" could look like in the year 2004. However the needed technology will not be economically feasible for the average home. Also the scientists readily admit that the computer will require not yet invented technology to actually work, but 50 years from now scientific progress is expected to solve these problems. With teletype interface and the Fortran language, the computer will be easy to use.*

**LITTLE DID THEY KNOW!**



*Scientists from the RAND Corporation have created this model to illustrate how a "home computer" could look like in the year 2004. However the needed technology will not be economically feasible for the average home. Also the scientists readily admit that the computer will require not yet invented technology to actually work, but 50 years from now scientific progress is expected to solve these problems. With teletype interface and the Fortran language, the computer will be easy to use.*



## NORTH AMERICAN METEOR SCATTER CONTEST

North American Meteor Scatter Contest - any mode, sponsored by the WSJTGROU**P** from 0000Z Dec 11 - 0700Z Dec 15 (the Geminids meteor shower). Frequencies (MHz): 50, 144, 222, 432, via meteor scatter.

Categories: SOSB, SOAB, (HP, LP < 200W), Assisted or Unassisted. No QSOs with your own or adjacent grid squares, QSOs are counted as Scheduled or Random. Exchange: full call signs, grid square and QSOs must be acknowledged. QSO Points, Assisted / Unassisted: 50 - 1 / 3 pt, 144 - 1 / 3 pts, 222 - 3 / 9 pts, 432 - 10 / 30 pts. Score: QSO Points x grid squares counted once per band + random QSOs.

For more information: <http://www.ykc.com/wa5ufh/Rally/NAHSMS.htm>. Logs due Jan 12 to [wa5ufh@ykc.com](mailto:wa5ufh@ykc.com) or Randy Tipton, 778CR123, Edna, Texas 77957.

Along with the Meteor Scatter Contest, The WSJTGROU**P** announces the new Century Grid Award. The Century Grid Award is available to all operators worldwide. Past contacts using HSCW or any other High Speed Meteor Scatter technique is accepted along with all your FSK441 or JT6M contacts. The rules are posted on the WSJTGROU**P** Web page <http://www.ykc.com/wa5ufh/>.

## IEEE PCJS AP/ED/MTT Societies Presents: A Traveling Wave Tube Tutorial

By Herbert Wolkstein

Travel Wave Tubes (TWTs) are the most efficient and for many applications the preferred device for microwave power amplification. They also remain an evolving technology. During the past ten years the efficiency of TWTs has been increased by more than 20 percent. Their size, power capacity, maximum frequency of operation and bandwidth have also seen significant advances.

Herbert Wolkstein, the Dean of TWT Technology, will tell us what makes these amazing devices tick. He will also discuss their performance characteristics and what we can expect from TWTs in the future.

Herbert Wolkstein is considered one of the world foremost authorities on TWTs. For many years he was associated RCA's Traveling Wave Tube Operations and later RCA's David Sarnoff Research Laboratories. He is currently an independent consultant. He has been awarded 21 patents, numerous technical awards and has written over 40 papers.

Date: Tuesday, December 14, 2004 at 5:30 pm

Location: The College of New Jersey,  
Armstrong Hall Room 144

Information: Mary Kalada at 609-771-2779

Directions: See <http://www.tcnj.edu/%7Eccr/about/directions.html>

All PCJS IEEE meetings are open to the public. Students and their parents are welcome. There is no admission charge and refreshments will be served. A post meeting dinner will be held at Wildflower Restaurant. Please send e-mail to:

[A.katz@ieee.org](mailto:A.katz@ieee.org), if you plan to attend.

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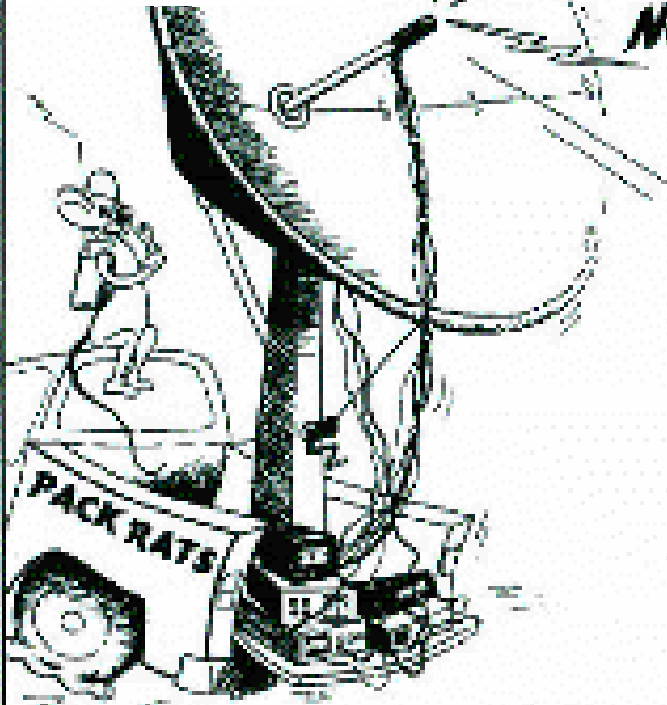
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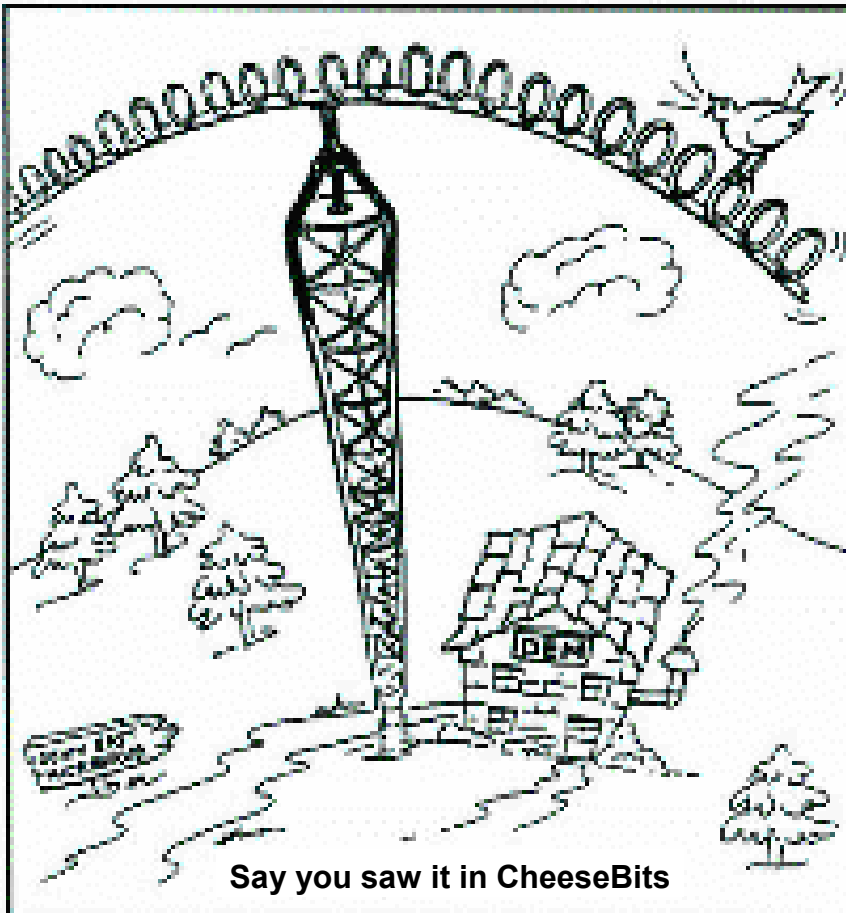
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