



# CHEESE BITS

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

ARRL  
Affiliated  
Club



**Volume L**

**November 2009**

**Number 11**

**PREZ**

**SEZ:**

As a kid I played HIDE and SEEK and remember the warning phrase as "IT" shouted "Here I come ready or not".

Well the January Contest is "IT" and it is coming "READY OR NOT." We get a respite as the date is a week later than usual. January 23/24/25 to be exact. If your station is at all like mine there are many repairs left incomplete and new projects awaiting completion. Not to mention all those great plans for improvements.

I have already solicited help to get a few of my items completed but, as fate would have it, things have gotten bogged down with domestic needs. Unavoidably; my XYL has just had a hip replacement. This has been a great distraction while I try to do all my usual chores plus all the cooking and housekeeping. This will not prevent me from getting the station ready for January but it is slowing progress on new projects like the improved 2304 system.

The January Contest is only one of the great things to look forward to in the months to come. For November Chris Patterson, W3CMP, will present a program on the VHF Activities for this summers DX-pedition to Guyana.

Following in December will be WA3RLT's analysis of last years contest featuring his computer program that can detail exactly

how important each log is to the overall success of the PACKRATS dominating the January Contest. Remember to get on the air and submit your logs no matter how small your score. We need everyone to make a maximum effort every year. Home stations and rovers are really important to the over all results.

Looking further ahead, the presentation on Software Defined Radio will be presented on January 21 by N4HY Bob McGwier. The subject is fascinating and Bob is a member of the design team.

The ANNUAL CRYING TOWEL and HOMEBREW NIGHT will again be combined in February so you have a little extra time to prepare your story and your props. HOME BREW NIGHT always delivers a variety of very interesting projects.

As for other news – K3EOD will be back on the air this January with some new antennas. Everything was completed in the past few weeks thanks to the leadership of K3JJZ and W2SJ. This is one of the best things about the Mount Airy VHF Radio Club – PACKRATS helping PACKRATS get their stations up and running.

With the remodeling required to accommodate my wife's needs here I will be delivering a lot goodies for the MARIO Auctions over the next few months – I need to trim down the inventory and it might as well benefit the PACKRATS.

Pack Rats **CHEESE BITS** is a monthly publication of the  
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2304.043 3456.207 5763.196 10,368.062 MHz (as of 1/08)

**MONDAY NIGHT NETS**

<u>TIME</u>	<u>FREQUENCY</u>	<u>NET CONTROL</u>
7:30 PM	50.145 MHz	K3EOD FM29II
8:00 PM	144.150 MHz	N3ITT FN20kl
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	K3TUF FN10we
10:00 PM	903.125 MHz	W2SJ FM29LW

Visit the Mt Airy VHF Radio Club at: [www.packratvhf.com](http://www.packratvhf.com) or  
[www.w3ccx.com](http://www.w3ccx.com)

Remember to tell you friends about the VHF and up activities, invite them to our meetings and help them get on the air. All meetings are open to all interested Amateurs.

Lenny and Ed are hoping to hear from you with your articles for CHEESEBITS too.

See you at the November meeting and ...  
**LISTEN FOR THE WEAK ONES.**

**73 de Doc W3GAD**



**Editors Column**

**Our next meeting** will be at our usual meeting site, the Ben Wilson Senior Center, 580 Delmont Avenue, Warminster PA., on November 19. The meeting starts at 7:30 pm with a pre-meeting dinner for anyone who cares to attend. Dinner this month is at the Eagle Diner, 739 Street Rd in Warminster.

Our featured speaker for the November meeting is **Chris Patterson**, who will provide many details of his recent **DXpedition to Guyana**. Come down and hear what it's like to put together a major VHF setup in South America and how Chris was able to handle the pileups!

A quick note on this month's issue. You'll notice that it's arriving a bit later than usual. My "Cheese Bits" computer had a major hardware malfunction which is still not resolved. It took awhile to rescue the partially composed November issue and the remainder of the material for this month's issue. And in the "**when it rains it pours**" category: this morning the computer I'm currently using lost about 20% of its screen memory! I apologize for any inconvenience. Wish me luck for next month's issue!

**73, Lenny W2BVH**

# Sun Noise Measurement

By John Jaminet, W3HMS

*Last month we presented some of the challenges in assembling and testing a 1296 MHz 3-Meter Dish for EME operations. This month we follow up with an article on using and measuring sun noise for adjusting a microwave dish and feed. Thanks to John and to Scatterpoint for the info! --Ed.*

This article, since slightly rewritten, appeared in the May 2009 edition of "Scatterpoint", the superb UK Microwave Group Newsletter edited by Peter Day, G3PHO.

EME operators use sun noise measurements and Microwave operators do not, or so it seems! I have always been intrigued by the idea of sun noise measurement but have been "turned -off" in the past by an apparent lack of detail and precise "how to do it" methods.

I became active on 23 cm EME in August 2008 with a 3m/10 ft dish and 120 watts. Very quickly I learned that my station is a very small QRP station and that it would take perhaps one year to get it finely tuned for maximum performance. Equally rapidly I learned that EME ops use sun noise measurements to fine-tune their systems for the last few tenths of a dB. This is so because EME signals are weak at best and often very weak.

It seems that few conventional microwave ops use sun noise measurements yet the improvements on a band like 10 GHz would seem obvious given the weak signals found in 10 GHz and other microwave band DX QSOs.

What is sun noise measurement? The sun is a very dependable and constant noise source for the UHF and up bands. I do not know how low nor how high it is usable but I have seen references to measurements on 6m through 47 GHz which is good enough for me.

The basic reference is to cold sky which is ideally a place in the sky where there are no Celestial bodies that emit noise, nor trees, nor buildings, etc in the antenna view.

The purist would note that one should indeed avoid constellations that emit noise but that it is equally not a concern to a small 3-meter dish station like mine.

The sun noise then is a measurement of the cold sky value. For example -67 db compared to, example -57 db when the antenna is on the sun which yields a difference of 10 db. This is the sun noise value. If I were to log these 3 values along with the date, time, and solar flux, I would know that if I installed a new "Super - Snazzy" Model X10FV LNA from Brand X LNA, Inc. and had 4 db of sun noise that I was going very much in the wrong direction!!!! Conversely, if I replaced an LNA protection relay of unknown value and found a sun noise reading of 10.7 db, I would be happy!!

Some advantages of precise sun noise measurements:

1. No near -field distortions with a noise source only 93 million miles away, HI!!
2. Repeatability when referenced to the solar flux (SFI).
3. Precision to about one tenth of a dB to make system improvements be noticeable.
4. The same level of precision to make system degradation be evident.
5. No worries about polarization being H, V or circular.
6. No installation costs or power bills to pay for beacons.
7. No political “overrides” on your signal source location.

Most references to measuring sun noise that I have seen suggest that one must have a very wide- band amplifier connected to at least two or more expensive pieces of GR, HP, ABC equipments. As I did not work in the electronics business, I was neither a “walking catalog” of nomenclatures nor a person for whom pieces of lovely test equipment fell from unmarked trucks in front of his QTH, HI!

Many EME ops, like microwave ops are quite helpful to “newbies” in these two hobby sub-sets. Even those with gray hair!. Some are not. One just answered my question about sun noise measurement simply saying the GR-1296 is the standard with no info like, what it does, where can I get one, what is the going price, what else do I need to use with it, etc. At this point, I was almost a retired EME op before being a working one!!

It seemed reasonable that my 23 cm EME IF radio, the IC 756P3 with AGC disabled, would measure sun noise and so it will but with questionable precision. Is each S unit equal to 4 or 6 db? My Users Manual doesn't tell me and even if it did I could not read it by eye with sufficient accuracy for repeat measurements. I would also not know how it compared to the GR-1236 meter for comparison to other station measurements.

An option to this with possibilities (not tried by me), is a large audio dB meter on the speaker terminals or a digital VOM that can show readings to at least one decimal place.

It seemed perfectly reasonable to me that my **SDR IQ** at the 28 Mhz EME IF frequency could be used to measure sun noise using the **Spectravue** software. To get more help, I posed the question to the Moonnet and the WA1MBA Reflector. Ben, W4SC, kindly replied with info that he had done this, just as I had envisioned, at Dale, W4OP's EME station and that the sun noise values were very close, (within 4 tenths of a dB), to the GR-1236 standard meter. He emphasized that the SDR-IQ is thus a very good relative measure.

He offered as well the complete settings as I show below.

One could, of course, suggest that the SDR-IQ is an equally esoteric piece of gear not widely held and that my conclusions about the GR standard meter apply here. That is correct. However, we note with pleasure that the SDR design is here to stay with more and more radios using it so the SDR radio will be found in more and more stations as time moves along.

My steps are as follows:

1. Using the camera on EME dish feed to the station video monitor, position the dish on the vertical line that extends above and below the sun. In your case, position the dish on the sun. A mirror is an excellent and SAFE indicator to ensure the dish is exactly positioned on the sun.
2. Switch this camera off to avoid damage caused by too much sun.
3. Activate SDR IQ receiver on 28.050 MHz, CW, BW to 150 KHz, DEMOD is off, S meter is RMS, AGC is OFF, FFT/BLK size at 32768

to reduce “jump”, Display Peak Markers is ON, FFT Average to 1, and “Continuum Mode” is the display. Set the vertical scale to 1 or 2 dB but this is a function of your dish size and gain.

4. Move the dish EL and AZ for maximum sun noise. Mine is often about  $-57$  db on sun....record value on scratch paper.

5. Move the dish in AZ and EL so the TV camera shows no trees in view nor any object and record the cold-sky value, example  $-67$  db.

6. Calculate the difference: in this case it is 10 db and this is your sun noise measurement.

7. Enter these values into an EXCEL spreadsheet along with the solar flux (obtainable from [www.solen.info/solar/](http://www.solen.info/solar/) among other sites) and log the date and time. Do this every time you make an improvement, or you think you do, in your system.

8.. Note that you now have repeatability in your system measurement even if the values are just close to the GR  $-1236$ .

The “Display Peak Markers”, per Pete, N4ZR, will give you more precision by showing the 4 highest power peaks on a list marked by an “x” with numeric values in the INFO box.

Some EME ops have suggested that you can add date and time to an image of the above as a permanent record but I did not record the details of doing this. To me, the record in EXCEL is enough.

The next question is the obvious, I think: OK, so I have 10 dB of sun noise, what should it be for my station? The K5SO Web site ([www.K5SO.com](http://www.K5SO.com)) has an excellent article on the topic and shows a chart of actual

measurement by several of the most competent EME stations for different size dishes. My 3 m dish fell between 2 measures so I drew in a line to represent a 3m dish. This told me I needed to find about 2 dB in loss now present in my system. For info, VK3UM has developed and modified over time an excellent no cost software program in which the entry of the receive side data yields the predicted sun noise value. This software can be found on the VE1ALQ site, [www.VE1ALQ.com](http://www.VE1ALQ.com).

There are also simpler programs to do this in K1JT’s WSJT4, F1EHN’s EME among others.

With this as a background, I said to my Roving partner, Joe, WA3PTV, “Lets check-out our 10 GHz rigs the same way”. I did some planning and realized that I could power the laptop PC, the SDR-IQ receiver, and the 144 MHz to 28 MHz converter from an alternator in the van. The planned scenario for measurement would have Joe and I, plus MW colleagues, at a school yard about noon when the sun is overhead.

Then a seemingly mundane question hit us both: will the tripods permit looking up at 90 degrees and making minute and very precise adjustments without holding the dish and without the dish falling over?

A quick look at our two portable stations said: NO!! So before we venture forth to measure we must venture forth to our respective workshops to change the dish mountings. When ready, our objective will be to:

Set up the dishes on cold sky and record the value.

1. Set the dishes on the sun and record the value.
2. Subtract and record the sun noise.
3. Change the focal length + or – about 4 mm (a guess but go small) and do steps 1-3

again.

4. Repeat steps 1-4 enough times with changed focal lengths until you know that you have found the maximum value. If you are using an offset dish, do the same steps 1-5 with vertical alignment of the feed until you have the maximum sun noise.

Alternatively, one could measure from a usable site in late afternoon when the sun angle is less severe. To avoid major tripod surgery, one could mount the dish and tripod on an old door, panel, or framework angled to reduce dish tilt.

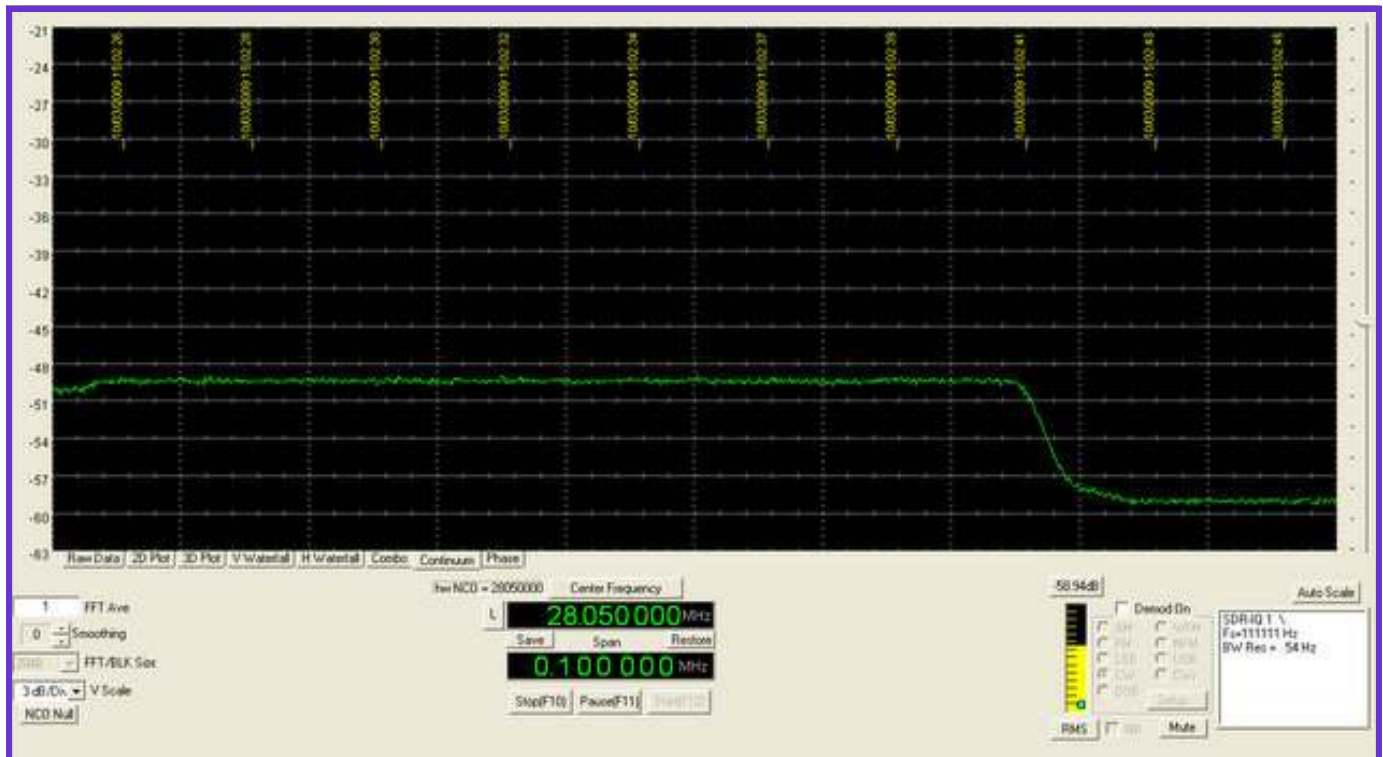
The 23 cm EME test is very easy to do and I can do it in just a few minutes. One day I got my physical exercise by making 7 trips to the dish, each time making an adjustment in the focal length of the feed, then measuring and

recording the sun noise again, then repeating this 6 more times!!!

The question can be asked: can I measure sun noise in the rain or overcast skies? Some authorities say yes and some say no. I take no sides on this issue: I just simply prefer to see the sun on camera, HI!!

WA3PTV and I look forward to trying our hand at 10 Ghz measuring using the procedure as above which we have NOT tried to date. We can, and no doubt will, learn some new points and change our methods accordingly.

Please address any questions, comments or concerns to me. John Jaminet, W3HMS  
W3HMS@aol.com



This shows the dish moving away from the sun towards cold sky. The difference is 9.5 db in sun noise, good but I still have some room for improvement, about 2.5-3.0 db --W3HMS

# The Little Tower That Could

By Michael Davis KB1JEY

When I returned from summer vacation in September, I realized that I would not be able to get my 54 foot steel crank-up tower installed in time for the January contest. Even if I had enough money on hand to throw at the project, by the time the concrete set, I would be asking my ham buddies to help me with antennas in middle of winter. I needed to find a feasible alternative in time for the January contest.

Once again, the seemingly infinite inventory of Rick Rosen K1DS came through. Rick had four 6 foot sections of a light-weight aluminum tower stowed in a closet. The tower sections needed some metal-working to be put into shape, including the creation of a tower base and rotator plate. Mark Hinkle WA3QUV liberated some scrap pieces of aluminum plate that was the perfect thickness and size for the tower base and for the rotator plate. After a couple of weeks of drilling, fabricating, and a little thread tapping, I was certain that the tower would be ready to be raised the following weekend.

Rick sounded the cautionary note. "Are you sure that you are going to be ready?" Rick took a look at my inventory of coax and sniffed, "It would be good to know how long each piece is." So my next step was to take every piece of coax, unroll it, measure and

tag the length. I then checked each length of coax with my MFJ analyzer for loss and tested for shorts before inventorying it.

One lesson I learned while preparing for last January's contest is that weight is nearly everything. I paid for that lesson by bending a telescoping steel mast. While I could tilt up that 24 foot aluminum by myself, after attaching six antennas and feedlines, the tower would be top-heavy.

To put the temporary tower on a weight diet, I removed the front sections of the 2 meter, 222 MHz, 432 MHz yagi antennas, and the 903 MHz and 1296 MHz loopers. I also decided to go with a lighter rotator, a spare Alliance HD-73 that I picked up at Timonium a couple of years ago.

The Friday before my tower party, I was up past midnight fashioning an H-frame for the two looper antennas, moving the mast clamps to the new balance points, and getting the anchor stakes ready.

The day of the tower party was rainy but my ham friends Tom KA3FQS, Rick K1DS, Dan KB3IBQ, El K3JJZ, and George KA3WXV showed up anyway. Despite my preparations, we had a couple of last minute adventures. One of the leads of the 432 MHz antenna's balun had broken off and had to be carefully re-soldered. Also, the direction lever on the rotator control box broke off. Fortunately, we had finished orienting the mast before the level failed.

Now that my hand tools have received the requisite post-rain attention with WD-40, I can finish the inside work to get ready for January. The rotator control box is on its way back from Rotor Norm. Thanks to the kindness of Packrats and other ham friends, I now own a 222 MHz FM rig; 222

... continued on next page

MHz transverter and linear amp. With my ICOM IC-746, I now have 100 watts on 6 and 2 meters.

With linear amps for 903 and 1296 MHz, my band with the lowest power remains 432 MHz. Putting up the crank-up tower, getting more power on 432 MHz, and getting on 2304 MHz remain among the challenges for Spring and January 2011.

**The little tower that could, all set to go** —>



## Homebrew, Experiments and Design in Amateur Radio

by Rick Campbell, KK7B

— Presented with the kind permission of "Anomalous Propagation" the newsletter of the Midwest VHF / UHF Society

I've been thinking about three concepts lately: what makes an amateur license unique; how do we contribute technically; and how does a beginner start experimenting.

When I make a presentation to an amateur radio group I am often asked the question: "how did you learn how to do all of this cool experimental stuff?" I get a similar question from students and young professionals wanting to know how to become a professional radio designer. Those have always been hard questions to answer, because I don't remember a time when I didn't make changes and modifications to practically everything I own. But I do



remember when I was a young boy and discovered amateur radio, years before I earned my license. In amateur radio, your license encourages you to modify, experiment with, and even design and build your own transmitter and antennas. That is different from every other radio service.

Amateur radio is a big tent, and covers all sorts of interesting activities: traffic handling; emergency communications; collecting QSL cards; working DX; and many others. Those games all develop useful skills that provide "a pool of trained radio operators" when needed during natural and man-made disasters. But there are other people with those skills. What has always excited me about amateur radio is the game of taking something that doesn't work and getting it on the air. It could be a radio that worked yesterday and doesn't anymore; an old TV set that could be turned into a transmitter; or a radio on a VHF band that might be modified to work on the next higher band.

That last activity: Getting to the Next Higher Band, occupied most of my youth and early adulthood in my amateur radio hobby. As a sophomore in college I built a SSB exciter for 2m, and in the few years after graduation I modified it to work on the 1.25m and 70cm bands.

When I went back for graduate school, an amateur friend W7YOZ encouraged me to explore the higher bands in my spare time. By the time I finished grad school, I had a SSB-CW signal on every band up through 3456 MHz. The microwave bands required different techniques, and I had to invent some inexpensive ones as I went along. The alternative was to use converted hardware developed for the military and satellite communications--very capable, but Not cheap!

The No-Tune Local Oscillator and Transverters allowed a generation of microwave experimenters to get on the air with low-cost technology, and are still featured in handbooks. They also caught the attention of the cell-phone industry, who needed to make inexpensive handsets that operated on the microwave bands. My "Next Higher Band" experience was exactly what they needed to design integrated circuits that operated on the next higher cell-phone band.

This is the second important point: the free, unrestricted technical explorations of radio amateurs are a laboratory for next-generation technical developments. The basic ideas may come from somewhere else, but radio amateurs have the unique ability to combine a new idea with whatever parts are available, and make it work on the air. **That is the essence of Design.**

The final question is: how does a beginner start experimenting? That's easy. Once you know you are allowed to dig inside and poke around, all you need is a radio that doesn't work quite well enough. In the 1950s and 1960s, amateurs learned to experiment by converting surplus military hardware to work on the ham bands.

.....Homebrew, Experiments and Design in Amateur Radio

The receivers we could afford during those years were big open boxes that didn't work very well. While our high-school friends lifted the hoods of their cars and modified the engines, we lifted the covers of our receivers and improved the circuits.

Kids in the 1980s and 1990s did the same thing with their computers. For those of us with the urge to experiment, all we need is something that doesn't quite work, preferably something inexpensive enough that we aren't afraid to open up the case and look inside. It helps if the case already has a few extra holes, dents, and scratches. Experiments can be very simple: recently I added an external speaker to a radio that didn't have an external speaker jack. Now I like the way it sounds.

I have friends who are just as excited about emergency communications, collecting QSL cards, and owning the latest, most expensive transceiver. That is good--amateur radio needs them too. But for me, hacking my radio, getting on the next higher band, and coming up with something interesting enough to write about is the unique opportunity offered by amateur radio. My amateur radio license is a "License to Experiment." Homebrew, Experiments, and Design in Amateur Radio

## June VHF QSO Party Results

Rick, K1DS is the author of the June Contest results article in December's QST. An advance copy can be found on the internet at <http://www.arrl.org/contests/results/2009/junvhf.pdf> (You'll need a pdf file reader application to view it. The reader is available, free at <http://get.adobe.com/reader/>).

Here's a quick summary of the top 4 contestants in the "Affiliated Club, Medium Club" category; columns are Club Name, Entities, Points:

1. Potomac Valley Radio Club 36 1,823,783
2. Nacogdoches ARC 7 1,465,974
3. North East Weak Signal Group 24 1,387,075
4. **Mt Airy VHF Radio Club** 11 947,154

The ARRL's soapbox entries for the contest at [http://www.arrl.org/contests/soapbox/?con\\_id=174](http://www.arrl.org/contests/soapbox/?con_id=174) has tons of great photos further down the page.

## Ham Radio URL of the Month

This month's url is <http://commfaculty.fullerton.edu/woverbeck/quagi.htm>  
It's a fine narrative of the history of the venerable hybrid directional array, the "Quagi". Besides the history of this antenna type, dimensions of several arrays for 2M through 1296 MHz are given.

ENJOY!

— Lenny W2BVH

## Events

For inclusion, please direct event notices to the editor.

**Harrisburg RAC Winterfest Hamfest**— Jan 16, 2010. See [http://hrac.tripod.com/Winterfest\\_2010\\_flyer1.pdf](http://hrac.tripod.com/Winterfest_2010_flyer1.pdf) for details

**ARRL VHF Sweepstakes Contest** - Jan 23-25, 2010. Details to follow at <http://www.arrl.org/contests/rules/2010/jan-vhf-ss.html>, when available. See email reflector message from Bill K3EGE January Contest Chairman for additional information

**JCDXA Hamfest** - April 10 and Sept. 11, 2010. Details to follow. See <http://nadxa.org> when available.

**Trenton Computer Festival / NJ State ARRL Convention**— April 24-25, 2010. A combined event. Computer and ham radio presentations, hamfest and computerfest. Details to follow. Don't miss this one!

**ARRL June VHF QSO Party Contest** - Jun 13-14, 2010 Details to follow at <http://www.arrl.org/contests/rules/2010/june-vhf.html>, when available

**CQ WW VHF Contest**— 3rd full weekend in July. Details to follow.

**ARRL UHF Contest** - Aug 1-2, 2010. Details to follow

**ARRL 10 GHz and Up Contest**—Aug 15-16, 2010. Details to follow

....Events continued

....Events continued

**ARRL September VHF QSO Party Contest** - Sept 12-13, 2010. Details to follow

**ARRL 10 GHz and Up Contest**— Sept 19-20, 2010. Details to follow

**ARRL International EME Competition Contest**— Oct 10-11, 2010. Details to follow.

**ARRL International EME Competition Contest**— Nov 7-8, 2010. Details to follow.

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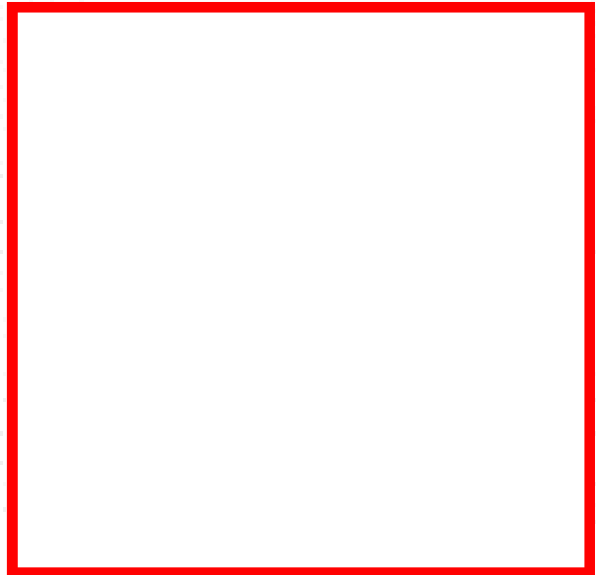
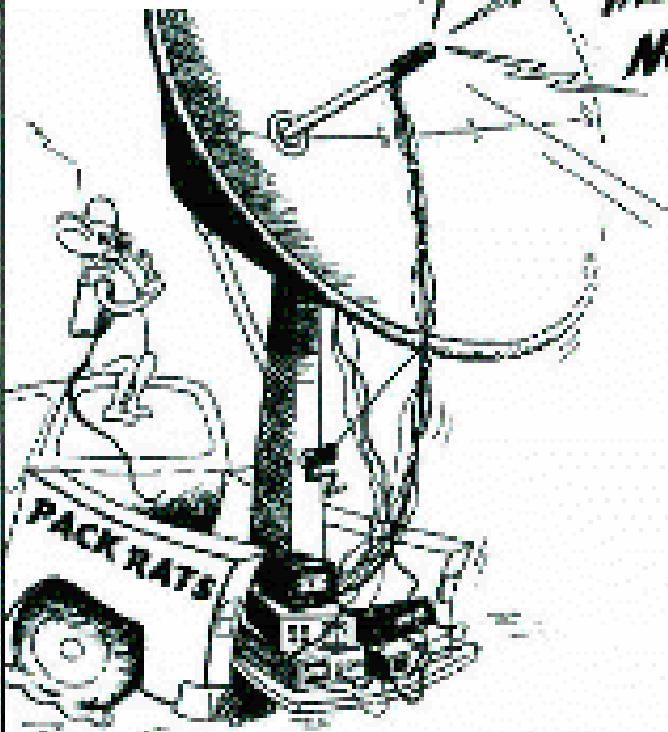
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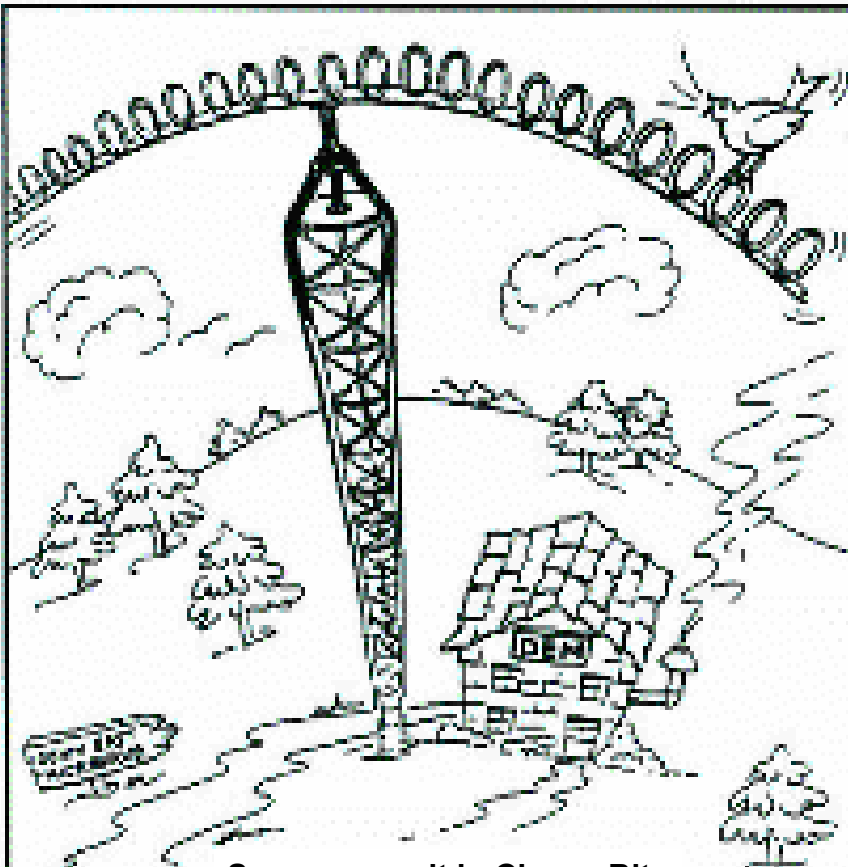
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